ABSORPTIVE CAPACITY FRAMEWORK IN KNOWLEDGE INTENSIVE ENVIRONMENT—STUDY ON PHARMACEUTICAL COMPANIES OF PAKISTAN

By

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ABSTRACT

Industrial growth has forced the companies especially knowledge in nature to adopt latest knowledge critical to their processes in order to maintain their market position. Due to fast growth in every field in the present technological environment, it is not possible for any firm to produce its required knowledge even if it is knowledge intensive in nature. Therefore, the companies have to rely on the external knowledge to upgrade their processes. The companies focus on their capabilities to absorb the external knowledge critical to their operations effectively. This is referred as Absorptive Capacity in literature. The concept of Absorptive Capacity was introduced in 1990 and there has been extensive research on this construct since then. Most of the research on this construct has focused either on external antecedents to develop absorptive capacity such as inter-firm collaboration or has taken into account organizational antecedents such human resource management and its processes in broader perspective for its development. The intra organizational micro level antecedents, such as behavior mechanism and internal knowledge process, have been ignored in extant literature. Moreover, the employees are considered the basic ingredients in knowledge activities but scant studies in absorptive capacity literature are found which incorporate micro level antecedents for the development of this construct.

In this research work, the impact of Organizational Mechanisms related to Formalization, Cross Functional Integration and Job Rotation of employees within the company and Human Behavior Mechanisms related to tacit knowledge sharing, Affective Commitment and Instrumental Ties on Absorptive Capacity have been studied through quantitative study. Contribution of middle managers as boundary spanners, Knowledge transformation process and critical success factors for the development of absorptive capacity have been evaluated through qualitative portion of study. The data was collected from pharmaceutical companies of Pakistan. The impact of all the independent variables on absorptive capacity was studied on dependent variable (absorptive capacity) by using multiple regression analysis. The gaps of the quantitative study were filled through qualitative portion and framework was developed by analysis of results and nature of relationship between independent and dependent variables both in qualitative and quantitative portions of study.

Results indicate that organizational mechanisms related to formalization, cross functional integration and job rotation of employees and human behavior mechanisms related to tacit knowledge sharing, affective commitment and instrumental ties do contribute to develop absorptive capacity directly or indirectly. Results also indicate that role of boundary spanners is critical in the development of absorptive capacity. Critical success factors related to employees, management and process attributing to absorptive capacity enhancement were also identified. Pharmaceutical companies of Pakistan need to focus its intra company processes related to knowledge activities with key focus on its employees for the development of absorptive capacity.

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LIST OF ABBREVIATIONS

Absorptive Capacity	AC
Acquisition	ACQ
Assimilation	ASM
Transformation	TFM
Exploitation	EXPL
Formalization	FORM
Cross Functional Integration	INT
Job Rotation	JR
Affective Commitment	AFC
Tacit Knowledge Sharing	TKS
Instrumental Ties	INST
Factor Analysis	FA
Student t test	t
Variance Inflation Factor	VIF
Tolerance	T
Kaiser- Meyer Olkin test	KMO
Degree of freedom	df
Chi square test	X^2
Confidence Interval	CI
Chronbach alpha	α

Regression coefficient	B
Analysis of Variance	ANOVA
Standardized Predicted value	ZPRED
Standard residuals	ZRES

CHAPTER - 1

INTRODUCTION

1.0 Introduction

In the turbulent technological environment knowledge has become strategic asset of the firms (Nonaka, 1994). Firms focus on latest valued knowledge available outside their boundaries and continuously involve themselves in the knowledge process activities within their boundaries to compete in this fast growing technological environment. Search and selection of related and valued knowledge is extremely important in this dynamic environment. The process to get valued and targeted knowledge from the external boundaries of organizations and disseminate it across its processes and routines within organization requires dynamic capability. In research literature, this dynamic capability to deal with knowledge achieved from outside the organization is termed as Absorptive Capacity. This is defined as the ability of an organization to recognize the value of new knowledge from outside the boundaries of organization, its Assimilation inside the organization and application to the commercial ends (Cohen and Levinthal, 1990). They argued that Absorptive Capacity has positive impact on organizational capabilities. Their argument has opened a new stream of research and it is being studied in different perspectives keeping in view both internal and external antecedents.

The studies on this emerging construct expand on continuum from individuals and organizations to country level. Mowery and Oxley (1995), Keller (1996) and Liu and White (1997) carried out studies at country level. Lane and Lubatkin (1998) focused on inter organization perspective. Cohen and Levinthal (1990), Szulanski (1996), Zahra and George (2002) in their studies have taken in to account antecedent at organizational level. Literature lacks in the studies relating to Absorptive Capacity which incorporate micro level antecedents or sub systems of organization. More over the knowledge culture highlighting critical success factors and failures have not been incorporated in studies of extant literature. Lenox and King (2004) in their study have focused on intra organization mechanisms. They have taken into account the human resource (HR) practices of the employees in their study. Knowledge being the strong resource for any organization especially the companies in knowledge intensive environment is acquired and assimilated as a

priority. Companies in knowledge intensive environment strive to enhance their knowledge process capabilities (Absorptive Capacity) by incorporating antecedents from different perspective with in organization. Generally the antecedents in relation to this construct are divided in two main groups: internal antecedents and external antecedents.

This study has taken into account two types of internal antecedents within organization. Specifically, it includes organizational mechanisms related to Formalization, Cross Functional Integration and Job Rotation and human behavior mechanisms related to Tacit Knowledge Sharing, Instrumental Ties and Affective Commitment of employees in the organization. This study also highlights the critical success factors and explores the transformation process based on competence level of employees. Moreover, the roles of boundary spanners (middle managers) have also been identified in order to develop absorptive capacity framework. This study has been carried out in knowledge intensive environment and collected data from pharmaceutical companies of Pakistan.

1.1 Chapter Overview

This chapter presents brief introduction of absorptive capacity starting from basic definition, its developmental path and studies related to it as a part of introduction. Importance of the construct for firms in turbulent environment and especially in knowledge intensive environment is discussed in introduction part. Fast changing knowledge structures and growing of this construct in the extant literature is argued as a motivational rationale of study. After giving exposition of motivation, the purpose of the study is given. The introduction of different operational definitions related to this study is discussed. The results of different studies from existing literature are discussed broadly as a part of background information. Enhanced introduction followed by results of different studies is part of background information. Theme of this thesis work is narrated. On the basis of the introduction and initial data collection through interviews and visits of different industries the problem statement is given. Research questions and generation of hypotheses in broad spectrum are also part of this chapter. Keeping in view the focus of this study to knowledge intensive environment the limitations and scope is described. At the end before giving summary of the chapter, the contribution of this study to the body of

knowledge in knowledge intensive environment is presented followed by chapter summary as last section of this chapter.

1.2 Motivational Rationale of Study

Cohen and Levinthal (1990) were the first to introduce Absorptive Capacity as firm's ability to process new external knowledge for the innovation. Research scholars have conducted extensive studies to develop this emerging field in different contexts and perspectives both quantitatively and qualitatively. Cohen and Levinthal's work has received more than 30,000 citations in over 1000 well known journals. The construct is still in the development phase. The tremendous research in scholarly community speaks about the importance of this construct. Most of the research has been carried out to develop models and frameworks of the construct (Absorptive Capacity) with the focus on different external antecedents and lacks the studies incorporating internal antecedents and its different levels. Moreover, the research has been carried out in the companies having different knowledge and management structures.

Each set of companies with specific strategy such as resource based view (RBV) and knowledge based view (KBV) processes the new knowledge in its own way as per their strategy. Different companies respond to knowledge activities both inside and outside the boundaries differently due to variation in culture, knowledge structures, processes, infrastructure, skill level, technology, the resources and capability to use resources. An important point to mention is that generally the knowledge intensive industries have the potential to develop the knowledge process capabilities but may lack in the capability to create coherence between existing and new valued knowledge necessary for their routines and processes. In extant research literature there are a few studies which focus on antecedents at micro level in company for development of absorptive capacity in knowledge intensive environment.

This study therefore, focuses on micro level antecedents contributing to the development of Absorptive Capacity framework in knowledge intensive environment. Organizational mechanisms and human behavior mechanisms along with identification of critical success factors and boundary spanners' roles attributing to development of absorptive capacity have been evaluated for the development of absorptive capacity framework.

1.3 Purpose of Study

In traditional management structures knowledge is dealt in a sequential process because new knowledge production is a slow and progressive phenomenon. Any new knowledge required in

traditional system is easily assimilated by making slight changes in the knowledge and management infrastructures. Moreover, the knowledge is considered as routine resource like other resources in the context of Resource Based View (RBV) of the firm, Penrose (1959). In contrast to traditional knowledge flow process, presently, there is fast and turbulent knowledge flows inside the organizations. The organizations need dynamic capabilities to deal with fast growing knowledge inside the organizations. This refers to Knowledge Based View (KBV) of the firms where the knowledge is considered a key and specialized resource in contrast to Resource Based View (RBV) (Teece et al, 1997). The importance of new dynamic capabilities is accepted by all the companies in general and knowledge intensive firms in particular. In this turbulent environment the organizations need either to enhance traditional knowledge structures or transform to new ones, Cohen and Levinthal (1990). Zahra and George (2002) and Todorova and Durisin (2007) argue that organizations need to transform management structures and make them aligned with requirement of new incoming knowledge for its assimilation. In this context, firms need to develop their capabilities referred as Absorptive Capacity for swift transformation of their knowledge structures and better assimilation of new knowledge.

The purpose of this study is to develop Absorptive Capacity framework in the context of knowledge intensive companies by taking into account two different but equally important types of micro level antecedents of organization (organizational and human behavior mechanisms) along with internal processes. Human behavior mechanisms are the basic building blocks of knowledge process activities (Cohen and Levinthal, 1990). This study intends to incorporate individual level antecedents namely as Affective commitment of employees, Tacit Knowledge Sharing and Instrumental Ties in the organization and antecedents related to organizational mechanisms namely as Formalization, Cross Functional Integration and Job Rotation. This study also intends to explore success factors critical to Absorptive Capacity framework in knowledge intensive environment and identification of roles of boundary spanners in its development.

1.4 Operational Definitions

1.4.1 Absorptive Capacity (ACAP).

Cohen and Levinthal (1990) introduced the concept of Absorptive Capacity and they defined as: “The ability of an organization to recognize the value of new information, assimilate it and apply

it to commercial ends". Zahra and George (2002) viewed this ability as a dynamic capability of firms based on set of organizational routines and processes. They further elaborated this definition and referred this ability as to acquire, assimilate, transform and exploit knowledge obtained form outside the firms. Schmidt (2010) referred it as ability to deal with new external knowledge. Zhixiong and Yuonjin (2010) defined this ability as "Collection of Skills and knowledge that enterprise acquires, absorbs, transforms and utilizes the external knowledge". Newalla and Nishiguchi (2001), referred knowledge creation of the organization as function of Absorptive Capacity". Overall Absorptive Capacity is viewed as the ability of one organization to deal with newly obtained knowledge by organization from outside boundaries of organization.

Breakdown of Absorptive Capacity to different components to deal with new external knowledge has extensively been discussed in literature a lot. Some authors have taken it in the view of process having three components e.g., Cohen & Levitnal (1990) focus on three components recognition Assimilation and application by organization. Zahra and George (2002) Jansen et al (2005) and Todorva and Durisin (2007) focused on four components as Acquisition, Assimilation Transformation and exploration as part and parcel of Absorptive Capacity. This study adopts the basic definition of Absorptive Capacity as ability of an organization to deal with the new external knowledge with four components as, Acquisition, Assimilation Transformation and Exploitation as suggested by Zahra and Georgic (2002).

1.4.1.1 Acquisition (ACQ). It is the Firm's capability to identify and acquire externally generated (from external sources) knowledge that is critical to its operations.

1.4.1.2 Assimilation (ASM). It refers to the firm's routines and processes that allow it to analyze process, interpret and understand the information obtained from the external sources.

1.4.1.3 Transformation (TFM). It is capability to develop and refine the routines (practices) that facilitate combining existing knowledge with newly acquired and assimilated knowledge.

1.4.1.4 Exploitation (EXPL). Organizational capability based on routines (practices) that allow the firm to refine, extend and leverage existing competencies or to create new ones by incorporating acquired and transformed knowledge into its operations.

1.4.2 Formalization (FORM)

Formalization is viewed as description of organizational processes in written form. Mintzberg (1979) viewed Formalization in three different perspectives, i.e. by job, by work flow and by rule. Concerning to job Formalization, Job is described in written form. Formalization related to work flow is referred to the well composed instructions and Formalization related to rules is described as the policies or rules in written document form to be followed for execution of tasks.

Focusing on the written and defined sequences of events followed by the organization for execution Taggart and Mays (1987) define Formalization as well defined rules and regulations to govern the behavior of individuals so that actions within organization become standardized".

Similarly, Burton et al (2002), refer to these written procedures and documents along with communication as formal system. King and Sabherwal (1992) refer Formalization as direction to employees in formal written/documented instructions. All the definitions focus on one point and that is written rules and instructions to be adopted by employees for execution of different activities of organization. This study adopts conclusive definition as the written policies, documents, instructions and rules formulated on the basis of organizational activities to be performed by the employees and managers at all levels for accomplishment of assigned task or to perform activities.

1.4.3 Cross Functional Integration (INT)

Integration refers to the process and activities of the organization converging to a single system for overall process of systems in a systematic way. In the sense of knowledge management, Cross Functional Integration refers to combining all the knowledge process activities in order to define a single unit for swift processing of knowledge within organization. Miller and Droge (1986) argue that organizations facing complications in executing processes and activities in the organizations opt to integrate their subsystems and employees from different subsystems for optimized solution. In research literature, this is referred as Cross Functional Integration. In knowledge process activities especially dealing with novice knowledge, employees in the organization are dependent on each other to process this new knowledge in to routines and processes of the organization, thus forming Cross Functional Integration. This study focuses on the definition of integration which is based on the employees i.e., integration through the cross functional employees of the organization.

1.4.4 Job Rotation (JR)

Research literature lacks theoretical work on account of Job Rotation. Authors generally refer Job Rotation practices but specific conclusions in specific domains and insights of studies are lacking in literature. Lexical definition of Job Rotation refers to switching of employees to different jobs. Authors in research literature have either adopted the definition as such with little enhancement such as Edward (2005) defines it as switching of employees between different jobs, or modules and Jorgenson (2005) argue job rotation as performing different tasks and jobs in varying positions for a certain period of time in context to Job Rotation. Overall, lexical definition stands true in context to Job Rotation as most research adopts this definition as such. This study therefore, follows as the lateral transfer of employees to different jobs within the organization in processing the knowledge based activities.

1.4.5 Tacit Knowledge Sharing (TKS)

Generally in the context of organization, knowledge sharing is the mutual exchange of information among employees within the organization.There is no accepted definition of knowledge sharing in literature. However, Nonaka (1991) defines knowledge sharing in context to knowledge management as dissemination of information accumulated from different sources inside and outside the organization. Lin (2008) defines it in terms of flow of information among employees which they possess. Knowledge has two broad categories as highlighted by Polanyi (1962) namely as tacit referring to knowledge hidden in the minds of employees and explicit that is in the form of documents and written form and is easily transferable. Knowledge sharing is slightly different in both categories. Explicit knowledge is easily transferred and shared however tacit knowledge is hard to share and transfer (Nonaka, 1994). This study focuses on the Tacit Knowledge Sharing and follows the definition as sharing of personal experience about the job, knowledge that is not in the written form and other aspects of knowledge which contribute directly to undergoing processes in the organization. In conclusion this study focuses on sharing of tacit knowledge which is residing in the minds of employees as the outcome of their practical experiences on the job and their personal experiences.

1.4.6 Instrumental Ties (INST)

Instrumental Ties generally refer to the social network ties among employees working in the same organization or engaged in the activities together. Manev and Stevenson (2001) have viewed Instrumental Ties in perspective of performance of employees and facilitation by them in the execution of tasks by transferring information and resources to their team members as a support. This study operationalizes the Instrumental Ties as closeness of employees with their team members and offering them support to execute tasks together as a team.

1.4.7 Affective Commitment (AFC)

Organizational Commitment generally refers to the attitudes and behaviors towards task and assignments and different organizational processes and in turn reflecting the level of their commitment to organization. Organizational commitment refers to different antecedents and outcomes in different contexts (Angle & Perry, 1981). Formally, Sheldon (1971) defines Organizational Commitment as an attitude or on orientation towards organization which links and attaches the identity of the person to the organization.

Mowday et al (1982) define “relative strength of an individual’s identification with and involvement in a particular organization. Mayer and Allen (1997), based on behavior and attitudes of employees divided organizational commitment into three types as Affective, Continuous and Normative commitment. Affective Commitment refers to liking of an employee for an organization. Study being focused on knowledge intensive companies defines Affective Commitment as the attachment of employees with their company to process knowledge process activities which is basically same as definition given by Mayer and Allen (1997).

1.5 Background Information

The term “Absorptive Capacity” was introduced by Cohen and Levinthal (1990) to label the capabilities of the firm to innovate. They defined Absorptive Capacity as the abilities of the firm to recognize the value of new knowledge, to assimilate it, and to apply it to commercial ends. They further added that Absorptive Capacity is largely a function of prior related knowledge of the organization. Lane et al. (2001) refined the Absorptive Capacity definition offered by Cohen and Levinthal. They proposed that the first two components, the ability to understand external knowledge and the ability to assimilate it, are interdependent yet distinct from the third

component, the ability to apply the knowledge. The definition was further refined by Zahra and George (2002) and according to them, the Absorptive Capacity has four dimensions as, Acquisition and Assimilation named as Potential Absorptive Capacity (PACAP) and formulation and Exploitation named as Realized Absorptive Capacity (RACAP).The use of the concept of Absorptive Capacity has not been limited to the firm level; it ranges from the level of the individual to that of entire nations (Van Den Bosch et al., 2003; Narula, 2004). These levels are intertwined, as a nation's Absorptive Capacity depends on that of its organizations and the Absorptive Capacity of an organization depends on that of its individuals (Cohen and Levinthal, 1990).There is no direct measure of the Absorptive Capacity (Zahra and George, 2002), therefore , this construct is still in the development phase and need to be operationalzed further (Lane et al., 2002). Veugelers (1997) writes *"More work is needed to identify specific firm characteristics generating this Absorptive Capacity"*. Mahnke et al. (2005) also highlight that there is a lack of empirical literature on how a firm can increase its Absorptive Capacity. The concept of the Absorptive Capacity needs to be operationalized further and its antecedents and dimensions need to be explored. Although rich literature about this domain is available but studies mostly focus on macro level antecedents and a few studies have incorporated sub systems or micro level antecedents in the context of this domain.

1.6 Theme of Thesis

In the organizations two kinds of knowledge flows are found. First, normal knowledge flows which are normal and flow inside the organizations whether required by them or not. This knowledge flow inside the boundaries is never ending process and its value is recognized at different levels inside organization. The Assimilation and Exploitation of such knowledge is a routine matter and management and knowledge structures of organizations are not changed at large rather it is disseminated in existing routines and procedures at fixed patterns. Other type is the flow of specialized knowledge which is targeted by organizations for their use inside organization. This valued knowledge flow is managed by the management hierarchy at each level. The managers align their knowledge structures with this knowledge flow for assimilation and practical application of this new knowledge to their routines and processes. Phenomenal changes are required in management and knowledge structures for complicated knowledge which is required by the firms and is critical to its operations across the firm's processes.

Knowledge structures need special attention and capabilities in relation to this knowledge need to be enhanced in contrast to traditional capabilities to handle natural flows of knowledge. The theme of this thesis revolves around the knowledge handling capabilities within the organizations. Knowledge handling capabilities and all variables directly or indirectly impacting flow of specialized knowledge are reevaluated. Internal and external antecedents are emphasized with more inclination on internal antecedents as they are inside parameters and directly under control of management. In this case, the important antecedents are highlighted and earmarked by organizations for effective assimilation of this specialized knowledge. The importance of internal antecedents is enhanced especially in knowledge intensive environment. This thesis incorporates internal antecedents at micro level in the organization in the context of knowledge process activities.

1.7 Problem Statement

In this fast growing technological era industrial setups especially knowledge intensive companies need special attention to manage the newly acquired knowledge from outside their boundaries. This new knowledge compels the firms to reframe their knowledge and management structures. To remain in competition in this environment, generally firms while dealing with new knowledge either keep their focus only on the existing knowledge resources and under utilize their intellectual assets (human capital) or extend their physical resources beyond their capacity to import technology and over utilize their physical assets. In both the cases they become out of sequence with the inflow of new knowledge. The inflow of knowledge from outside the boundaries is fast and there is need to assimilate and apply it to their processes with the same pace. The importance of new knowledge is enhanced for the companies operating in knowledge intensive environment. There is need to develop the capability in knowledge intensive environment to handle this inflow of knowledge which is termed as Absorptive Capacity in research literature. Absorptive Capacity being an ability to recognize the new knowledge, its assimilation and application to the routines and critical operations is one strong way to explore and exploit such knowledge for maintaining the market position especially the companies operating in knowledge intensive environment where the frequency and intensity of knowledge flow is high. It is therefore necessary for management hierarchy to keep their focus in enhancing their knowledge process capabilities instead of following traditional procedures to upgrade their

knowledge base. The enhancement of knowledge process capabilities (absorptive Capacity) may lead the companies in knowledge environment to keep their position in market and adopt pro active approach to deal with any new knowledge to be acquired for company. Generally the managers at each level in knowledge intensive environment know what they want but may lack the understanding or procedures to achieve it. This study therefore, focuses on the development of Absorptive Capacity framework in knowledge intensive environment as an input to decision makers and managerial hierarchy.

1.8 Research Question

This study addresses the research question in context to development of absorptive capacity as: How do different internal micro level antecedents and processes contribute to develop absorptive capacity framework in knowledge intensive companies (pharmaceutical companies) in Pakistan?

This research question is divided into sub questions as:-

a. How do organizational mechanisms (Formalization, Cross Functional Integration and Job Rotation) impact Absorptive Capacity in knowledge intensive companies?
b. How do human behavior mechanisms (Affective Commitment, Tacit Knowledge Sharing and Instrumental Ties) impact Absorptive Capacity in knowledge intensive companies?
c. What are the critical success factors in knowledge intensive environment which contribute to develop Absorptive Capacity in knowledge intensive companies?
d. What transformation process prevails in knowledge intensive environment in context to Absorptive Capacity?
e. How do roles of boundary spanners (middle managers) attribute to develop absorptive capacity in knowledge intensive companies?

1.9 Objectives

This study has the following objectives:-

a. To ascertain the impact of Formalization on Absorptive Capacity in knowledge intensive companies.

b. To ascertain the impact of Cross Functional Integration on Absorptive Capacity in knowledge intensive companies.
c. To ascertain the impact of Job Rotation on Absorptive Capacity in knowledge intensive companies.
d. To ascertain the impact of Instrumental Ties on Absorptive Capacity in knowledge intensive companies.
e. To ascertain the impact of Tacit Knowledge Sharing on Absorptive Capacity in knowledge intensive companies.
f. To ascertain the impact of Affective Commitment on Absorptive Capacity in knowledge intensive companies.
g. To explore the critical success factors attributing to develop Absorptive Capacity in knowledge intensive environment.
h. To explore the transformation process of absorptive capacity in knowledge intensive environment.
i. To explore the roles of middle managers in context to absorptive capacity development in knowledge intensive environment.

1.10 Research Hypotheses

a. Organizational Mechanisms (Formalization, Cross Functional Integration and Job Rotation) in knowledge intensive environment are directly related to Absorptive Capacity.
b. Human Behavior Mechanisms (Instrumental Ties, Tacit Knowledge Sharing Affective Commitment) in knowledge intensive environment are directly related to Absorptive Capacity.
c. Roles of middle managers are critical to absorptive capacity framework.

1.11 Scope and Limitations

Absorptive Capacity construct is in the development phase and extensive studies are being conducted to explore it in different perspectives. The research literature shows different levels of study related to Absorptive Capacity i.e., inter organizational, joint ventures, and country levels. This study narrows down its scope and focuses on internal antecedents which contribute to develop Absorptive Capacity and external antecedents contributing to this construct are out of

scope of this study. This study focuses on the knowledge intensive firms which may limit to replicate generalizations to less knowledge intensive or low technology firms. More over, this study specifically focuses on the micro level antecedents in the organization related to employees and knowledge processes in knowledge intensive environment which may not be generalized to firms with different working environment as employees show specific behavior in specific environment.

1.12 Contribution of this study

This study makes several contributions to the body of knowledge of Absorptive Capacity and in knowledge intensive companies.

a. Theory

First, this explores the importance of internal antecedents of organization for development of Absorptive Capacity of firms especially in knowledge intensive environment as literature lacks studies having different antecedents related to organizational and human behavior mechanisms in the same study. Absorptive Capacity in extant literature has been studied only at macro levels thus leaving the gaps to study at micro levels. This study intended to fill this gap by incorporating individual behavior of employees i.e., Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment.

Secondly, understanding the Absorptive Capacity process is critical to operations in knowledge intensive environment. This study highlights the fact that Absorptive Capacity should not be taken as granted that it grows in routine procedures rather it needs special attention for handling new knowledge outside the boundaries of firms.

Third, it explores the Absorptive Capacity antecedents at micro level which are building blocks of Absorptive Capacity as per original work of Cohen and Levinthal (1990). Most of studies focus on Absorptive Capacity as a predictor or a role of moderator/mediator in predicting the performance of organization such as innovation. Despite strong argument of original work of Cohen and Levinthal, that individual Absorptive Capacity accumulate to organizational Absorptive Capacity, the antecedents at sub levels and micro levels of organization remain unattended in the context of Absorptive Capacity. This study addresses this unattended segment

by incorporating the internal antecedents at micro levels such as organizational commitment, knowledge sharing behaviors and Instrumental Ties of the employees in knowledge intensive environment. This study thus contributes to the body of knowledge in academia.

b. Practices

The research question is addressed in the context of knowledge intensive companies. Research and development, manufacturing and reevaluation of the products (drugs) on regular basis are non reversible processes followed in knowledge intensive companies. Major barrier for these companies is cost of drugs and high risk factor in case of failures. At the same time, companies compete with scarce intellectual resources. Achieving new knowledge is a basic ingredient of their competition. This study, focusing on different levels of antecedents, provides insights of the knowledge process (Absorptive Capacity) and results of this study provide healthy input for principal decision making in routine processes. Results of this study show that knowledge process activities are influenced by organizational mechanisms and individual behavior of employees. This provides another finding for managers and practitioners in knowledge intensive environment that routine knowledge activities are different from knowledge process activities related to specialized knowledge (recognized and valued knowledge). This study, thus, provides importance of different trade offs between management structures within the organization and knowledge process activities in relation to knowledge culture.

1.13 Thesis Organization

Chapter 1 gives comprehensive introduction of topic, purpose of study, problem statement, objective and general hypotheses along with scope of the study. In chapter 2 literature review in elaborated form is presented along with insights of the research topic. The literature review covers the detailed definitions of all the study variables in context to different perspectives. Different antecedents and models of construct in the extant research are presented. This chapter also covers the related theories of construct and gives conceptual framework of the study as a contribution to research literature. This chapter also explains the research questions and detailed research hypotheses. Chapter 3 deals with methodology and it gives complete course of action, how the study will be analyzed. A section of this study is dedicated to methods and it deals with the data collection technique, types of research and the research type adopted for this study. The results of pilot study conducted are presented in this section. Details of the studies conducted are

also endorsed in this chapter. The pilot study conducted is also a part of this study. The results of pilot study have been analyzed in this chapter. Chapter 4 is dedicated to compile the results of this study. Four quantitative and three qualitative studies have been analyzed and results have been elaborated in this chapter. Chapter 5 gives analysis and discussion of study in different perspectives in the light of research questions and hypotheses of study. Chapter 6 provides critical review of the work based the results of studies conducted. Chapter 7 highlights conclusion and recommendations on the basis of results and critical analysis of work.

1.14 Chapter Summary

This chapter has given comprehensive introduction of present work along with different perspectives already catered for in literature regarding understudy construct (Absorptive Capacity). Previous work has been criticized in broad spectrum and research gaps in different contexts regarding Absorptive Capacity have been highlighted. Based on critical review of literature and gaps found in literature, this chapter has described the purpose of study keeping in view knowledge process activities in knowledge intensive environment and need of organization specific to absorption of knowledge from outside the boundaries of organization. After comprehensive introduction and definitions of the antecedents of study based on extant literature, background information of thesis understudy has been elaborated. Theme of thesis emerged from critical review of literature followed by problem statement has been described. Problem statement has been structured into research questions and objectives of study. Based on research questions, objectives and in depth interviews by researcher from industry, research hypotheses in broader perspective has been developed and narrated in this chapter. This chapter has presented the contribution of the study to research world both in academia and practices. At the end of chapter scope and limitations of thesis work have been highlighted followed by sequence of rest of the thesis.

CHAPTER-2
LITERATURE REVIEW

2.0 Introduction

Absorptive Capacity has been discussed in research literature in different contexts and with diverse perspectives. Overall, Absorptive Capacity has been considered a new stream of research for organizations especially in the context of knowledge process activities. It is therefore, considered the organizational capabilities to process knowledge activities. This construct is under consideration for study in every aspect of organization, may it be individual or organizational perspective. In this context original work carried out by Cohen and Levinthal (1990) focused on firms for the development of Absorptive Capacity and they showed that relationship between technological knowledge base and knowledge spillovers is moderated by intensity of Absorptive Capacity.

Absorptive Capacity has been studied as a process with varying contexts both in quantitative and qualitative domains. Original study of Absorptive Capacity by Cohen and Levinthal (1990) aims at knowledge process with the recognition of new knowledge from outside the boundaries of firms, its assimilation and finally exploitation of this assimilated knowledge for application to routines and processes in firms. Zahra and George (2002) refined this process and proposed a series of capabilities to deal with new knowledge with four dimensions of Absorptive capacity namely as Acquisition, Assimilation, Transformation and Exploitation. Although series of capabilities proposed by Zahra and George have been objected by Todorova and Durisin (2007) with the argument that Assimilation and Transformation process are not mutually exclusive rather dependent on each other, but no specific frame work for Absorptive Capacity in research literature has been developed yet in a formal way. Nonaka (1994) in his study highlights the knowledge creation of the organization comprising on four patterns of interaction of employees as socialization internalization, externalization and combination with the main focus in switching from tacit to explicit type of knowledge and vice versa. He further suggests that execution of these four patterns for knowledge creation are not carried out in isolation, they need to be triggered by other organizational systems and capabilities.

These organizational capabilities in extant literature have been argued as knowledge process capabilities and termed as Absorptive Capacity. As per knowledge creation the development of knowledge and capabilities has the analogy with spiral expansion. Absorptive Capacity expands from individual levels and then at team level and finally terminates at organizational level. The expansion of capabilities (Absorptive Capacity) needs strong role to be played at subsequent level of its development that is individual team and organization level knowledge. Management studies in literature argue the importance of antecedents to build capabilities for knowledge creation and enhancement in the entire organization. Knowledge being the most important resource of organization for competition in turbulent environment is processed by following different strategies and in turn developing the capabilities to handle this new knowledge. Almost all studies related to knowledge management converge to a single theme and that is to deal with knowledge and make use of this knowledge to gain organizational objectives what so ever, either profits or gaining competitive advantage or employee building or enhancing organizational data memory for future use.

Next important point in context to Absorptive Capacity is to find out ways and means to develop this capability. Original study of Absorptive Capacity focused on spending in research and development activities and prior related knowledge as main antecedents to enhance it along with other variables directly or indirectly impacting the Absorptive Capacity which include cognitive structures, communication structures (Mayeh etal,2016), role of boundary spanners (Manfreda et al, 2014)and behavior of employees (hart et al,2016) towards knowledge activities. Other studies focus on bisociation learning within organization, knowledge sharing practices, relevance of knowledge being assimilated, requirements human resource (HR) practices (Minbaeve et al,2014; Kang & lee,2016), skill levels of employees (Gracia-Morales et al,2014) and different management systems and processes such as policies regulations etc. organizational behavior perspective such as attitude of employees (Ooms et al,2015; Shahzad et al,2011) towards information process activities and knowledge processes attributing to Absorptive Capacity of organization have also been discussed in research literature in the context of Absorptive Capacity.

One stream of literature reviews the development of Absorptive Capacity in the context of external antecedents (Schaarschmidt & Kilian, 2014; Lin et al,2016) and processes outside the

organization. Studies of this stream depict inter organizational learning (Backman et al,2015), international joint ventures and collaborations(Park & Harris, 2014) with other organizations as a source of development of Absorptive Capacity of organization. Despite extensive research literature about the construct in different dimensions and domains there still exists a gap especially in relation to intra organizational mechanisms as highlighted by Volberda et al (2010). The research in the context of Absorptive Capacity spans from cognitive theories to knowledge based theories and dynamic capabilities. Diverse empirical studies both qualitative and qualitative rapidly contribute to this emerging construct (Absorptive Capacity) by development of different organizational system. Majority of studies focus on macro level antecedents or external factors directly or indirectly related to different dimensions of Absorptive Capacity. The construct has been argued in context to innovation (Min et al,2015; Rangus et al,2017), HR practices (Chang et al,2013; Song, 2014) spillovers (Albornoz et al,2014; Ferragina & Mazzott, 2014) to have impact on adjacent management systems and its role in developing those systems and capabilities such as innovation capability, enhancement of knowledge base of firms and enhancement of performance capability but antecedent contributing to the development of its own (absorptive capacity) have less been discussed in literature. This leaves a gap in research literature which needs to be focused. Cohen and Levinthal (1990) argue that Absorptive Capacity is dependent on prior related knowledge of organization and further the prior related knowledge is again dependent on previous Absorptive Capacity. It may be inferred that Absorptive Capacity has the central role in processing the knowledge activities.

Majority of studies have focused on external and internal factors for its development with more inclination towards external antecedents. However, a series of studies related to Absorptive Capacity have recommended the intra organization mechanisms to be studied for example Jansen et al (2005) in their study of Absorptive Capacity in the context of organizational mechanisms related to system capabilities coordinated capabilities and socialization tactics recommend that this construct be studied at micro level antecedents, i.e., in cooperating individual and organizational antecedents together. They have studied this construct in intra organizational perspective but highlight the gaps relating to human behavior and social mechanisms. Similarly Lenox and King (2004) and Yao and Chang(2017), highlights the importance of human resource (HR) and the results of their empirical study show that role of managers directly effects

Absorptive Capacity by providing updated information to employees. They further argue that role of managers' impacts positively in gaining internal information by employees. Their study focused on adoption of pollution protection practices by employees and the mangers being first receptors of information from headquarters perform as boundary spanners.

Management structures and organizational capabilities are part and parcel of knowledge creation within the organization as argued by Nonaka (1994) in his theory of knowledge creation. It is highlighted that Absorptive Capacity needs to be developed at each level of organization. It is worth mentioning here that every level has certain antecedents which are very important for building Absorptive Capacity. This is not new finding rather it is highlighted in the original study of absorptive capacities proposed by Cohen and Levinthal (1990). They argue that Absorptive Capacity spans from individual level to organization level and at each level it needs communication and cognitive structures along with management support systems with the primary role of boundary spanners in knowledge process activities. It may be inferred that Absorptive Capacity development is a step by step approach to contribute to overall Absorptive Capacity of organization. However it is not taken for granted that Absorptive Capacity of every step is accumulated or integrated to form Absorptive Capacity of organization, rather every step has its own importance in itself.

This research work focuses on two intra organizational mechanisms in the context of development of frame work of Absorptive Capacity. First it takes in to account human behavior mechanisms related to organizational commitment (Affective Commitment, AFC), Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST). Secondly, organizational mechanism related to Formalization (FORM), Integration (INT) and Job Rotation (JR) within the organization have been considered for development of Absorptive Capacity. This research work further highlights the critical success factors and transformation process in the development of absorptive capacity along with identification of roles of middle managers (boundary spanners) in knowledge intensive environment by collecting data from pharmaceutical companies based in Pakistan. The studies conducted in this work cumulatively develop the absorptive Capacity framework.

2.1 Theories in the field

This study aims to develop the absorptive capacity framework in knowledge intensive environment. Absorptive Capacity being the capability to deal with the newly acquired knowledge from outside the boundaries of firm directly takes into account the theories related to knowledge process and its creation. The involvement of knowledge processes and activates and theories related to these knowledge structures are directly related to Absorptive Capacity framework development. Therefore, this thesis work takes into account the following theories in addition to other theories and perspectives highlighted at different parts of thesis.

2.1.1 Absorptive Capacity Theory.

The theory deals with the process of knowledge acquired by the organization from outside the boundaries the specific capabilities to deal with this new value knowledge. This theory was introduced by Cohen and Levinthal (1990) which highlights the capabilities of firms to identity assimilate and apply new external knowledge to commercial end of organization. Main focus of this theory is prior related knowledge of firm. Theory explains that R&D spending in the firm raises Absorptive Capacity as a byproduct and it is useful for enhancing the technological base of firm. As per theory the spending in the basic fields leads the firms to enhance their knowledge process capabilities (Absorptive Capacity). Cognitive structures, employee's behavior, communication structures and role of boundary spanners are directly related to Absorptive Capacity. Theory was extended by Zahra and George (2002) by introducing four components of Absorptive Capacity and overall considering it as a dynamic capability. The components introduced namely as Acquisition, Assimilation, Transformation and Exploitation through activation triggers leads the firms to gain competitive advantage and create flexibility at strategic level. The contribution by both the studies have one common point and that is establishment of ways and means to enhance knowledge process capabilities. The theory is being tested in literature and extensive studies are carried out to further explore the dimensions of this theory.

2.1.2 Knowledge Based Theory.

The initiation of Knowledge based theory is attributed to many authors named as Barney (1991&2001), Grant (1996) Nonaka and are kogut & Zender (2003). The theory of knowledge

creation is a step wise building process with the same focus that is the consideration of knowledge as significant resource for development of organization. This theory is basically extension of resource based view of the firm which considers the knowledge as most important resource. In perspective of this theory knowledge is considered a unique resource and organizations focus on protection of this resource from their competitors. As per theory the firms may get long term competitive advantage if they are able to develop it against imitation, substitution and transfer it to others. This means that knowledge is scarce and rare and its protection is necessary. In traditional firms this approach is good but in the case of present scenario where there is no concept of uniqueness of knowledge this approach is difficult to follow. This gap emerged with new theory named as knowledge based theory. According to this theory the knowledge is considered as dynamic resource and it needs to be developed at every stage. This focuses on long term sustained competitive advantage and is possible if the development of this resource is carried out periodically. Knowledge resource does not exist as highlighted by resource based theory but it needs to be developed at every stage as per theory of knowledge base. Authors argue organizational culture policies, behavior of employees, routines, processes and systems, information systems and intra firm and inter firm management systems drive this organization for sustained competitive advantage through strong and developed knowledge base of the firm.

2.1.3 Theory of knowledge Creation

Theory of knowledge creation was proposed by Nonaka (1994) and deals with the knowledge creation within the organization through a close loop process of switching between tacit and explicit knowledge. This theory is based on the concepts of Polanyi (1962) about tacit and explicit distinction of knowledge. According to him explicit knowledge refers to the knowledge found in explanation form and may be transferred easily to others whereas, implicit or tacit knowledge is hidden in the minds of people and can only be transferred through on the job training or specialized training of employees. Tacit knowledge is highly contextual and may be explored only by involving the employees physically in the process. Explicit knowledge is easy to codify and can be transferred or assimilated through normal process such as documents.

Polanyi suggested that the generation of new knowledge or assimilation of incoming knowledge requires some specific system as tacit and explicit knowledge are frequently required to be transferred from one from to another (tacit and explicit). This channel of knowledge creation has been extended into four components by Nonaka (1994) for knowledge creation in the firm. The theory of knowledge creation argues four interaction patterns for knowledge creation in the firms namely as internalization, externalization, socialization and combination. These four components are referred as interaction pattern namely as socialization, internalization, externalization and combination. Nonaka (1994) in his theory of knowledge creation argues that knowledge is created through knowledge conversion process in a continuous cycle via these four patterns of interaction.

As per theory first interaction of knowledge creation is socialization. In this interaction pattern the personal experience is shared and employees learn from each other with the same concept as on the job training in business environment. This interaction focuses on the imitation of knowledge which is tacit in nature. Second pattern refers to externalization and deals with converting tacit knowledge into explicit knowledge. Employees exchange such knowledge through interactions and by sharing it to each other in formal meeting and conversation both formal and informal. New knowledge is generated through combination of patterns and logics and this (tacit) knowledge is re-categorized and re-contextualized and converted into explicit knowledge. Internalization is third pattern of interaction which deals with conversion of explicit knowledge into tacit knowledge. Combination is the fourth pattern of interaction for knowledge creation in the organization. This deals with knowledge conversion from explicit to explicit. This focuses on the knowledge sharing among employees and procedures for generating of knowledge from one context to another are discussed in this pattern. Theory of knowledge creation is a step wise building process starting from individual, going up to team and organization level. As per theory the knowledge creation interaction patterns are triggered by auxiliary mechanisms and supporting systems of organization such as procedures, knowledge sharing among employees, documentations, sharing job experiences among employees and on the job training etc.

Overall, theory of knowledge creation broadly highlights and importance of commitments of employees in the context of knowledge sharing of both type of knowledge i.e. tacit and explicit

and behavior of employees in knowledge process activities in order to enhance knowledge base of firm along with formalization of knowledge within the organization.

2.2 Conceptual background

Knowledge being key resource and strategic (Teece et al, 1997) requires complex processes to effectively use in this turbulent environment, especially in context to knowledge intensive mechanism. Knowledge itself is either created inside the boundaries of organization through sequential interactions among employees namely socialization, through sequential interactions among employees namely socialization, internalization, ext and combination, (Nonaka, 1994) or obtained from outside the boundaries of organization through a series of processes namely as recognition, assimilation and exploitation (Cohen & Levinthal, 1990). In both cases, knowledge process activities need certain capabilities (Absorptive Capacity) as prerequisites in the light of based theory. Processing the external knowledge obtained from outside the boundaries of organization is difficult to process as compared to process and enhances existing knowledge already available in the organization. This new knowledge is assimilated within organization in different dimensions for example, Cohen and Levinthal (1990) study focus on cognitive structures, Zahra and George (2002) describe Absorptive Capacity in perspective of bisociation learning i.e. learning through interaction with other employees. Similarly Lane and Lubatkin (1998) even propose inter organization in context to Absorptive Capacity development.

In every level and context of organization, employees in the hierarchy of management are the basic units and of prime importance who apply this assimilated knowledge to their processes (Gong et ,2013; Rangus & Slavec 2017), as they are in possession of all tangibles and intangibles of organization. Therefore, behavior and attitude of employees play an important role in knowledge process activities. Theories of employee behavior argue that employees with high commitment perform better (Yoo et al,2016) as compared to employees with low commitment to organization, although it has certain exceptions for example, this does not become true to all age groups of employees and lack of incentive system and performance appraisal may affect their performance. Absorptive Capacity by definition being an ability to deal with the knowledge obtained from external sources is processed by employees in the organization.

The boundaries of organization are dependent on organizational mechanisms both macro and micro levels (Caligiuri, 2014). In the perspective of knowledge creation theory, knowledge based theory of firm and different attitudinal and learning theories of employees the development of Absorptive Capacity framework is aligned with the employee behaviors towards knowledge process activities. In this context, this study argues that human behavior mechanisms and organizational mechanisms contribute in a certain way to formulate frame work for Absorptive Capacity within organization.

2.3 Absorptive Capacity

2.3.1 Introduction to Absorptive Capacity

The Absorptive Capacity originally has been defined as the firm's ability to recognize the value of new external knowledge, assimilate it and apply it to the commercial ends (Cohen and Levinthal, 1990). According to various other definitions, the Absorptive Capacity has been defined in different contexts and perspectives but main focus is the handling of external knowledge obtained from outside of the firm's boundaries. The definition was further refined by (Zahra and George 2002) according to them, the Absorptive Capacity has four dimensions; Acquisition and Assimilation named as potential Absorptive Capacity (PACAP) and formulation and Exploitation named as realized Absorptive Capacity (RACAP).The use of the concept of Absorptive Capacity has not been limited to the firm level. It ranges from the level of the individual to that of entire nations (Van Den Bosch et al., 2003; Nonaka, 2004). These levels are intertwined, as a nation's Absorptive Capacity depends on that of its organizations and the Absorptive Capacity of an organization depends on that of its individuals (Cohen and Levinthal, 1990). Resultantly, Absorptive Capacity deals with the external knowledge and its processing to achieve the desired outcomes in the turbulent environment due to rapid growth technology. This research study deals with the development of Absorptive Capacity frame work in the context of knowledge intensive environment.

2.3.2 Background of Absorptive Capacity

The term "Absorptive Capacity" was introduced by Cohen and Levinthal (1990) to label the capabilities of the firm to innovate. They defined Absorptive Capacity as the abilities of the firm

to recognize the value of new knowledge, to assimilate it, and to apply it to commercial ends. They further added that Absorptive Capacity is largely a function of prior related knowledge of the organization. Lane et al. (2001) refined the Absorptive Capacity definition offered by Cohen and Levinthal. They proposed that the first two components, the ability to understand external knowledge and the ability to assimilate it, are interdependent yet distinct from the third component, the ability to apply the knowledge. The definition was further refined by (Zahra and George 2002) according to them, the Absorptive Capacity has four dimensions as, Acquisition and Assimilation named as Potential Absorptive Capacity (PACAP) and formulation and Exploitation named as realized Absorptive Capacity (RACAP).The use of the concept of Absorptive Capacity has not been limited to the firm level; it ranges from the level of the individual to that of entire nations (Van Den Bosch et al., 2003; Narula, 2004). These levels are intertwined, as a nation's Absorptive Capacity depends on that of its organizations and the Absorptive Capacity of an organization depends on that of its individuals (Cohen and Levinthal, 1990).There is no direct measure of the Absorptive Capacity (Zahra and George, 2002) therefore this construct is still in the development phase and need to be operationalized further (Lane et al., 2002). Veugelers (1997) writes that *"More work is needed to identify specific firm characteristics generating this Absorptive Capacity"*. Mahnke et al. (2005) also state that there is a lack of empirical literature on how a firm can increase its Absorptive Capacity. The concept of the absorptive needs to be operationalized further and its antecedents need to be defined. In the light of previous work the studies in different dimensions need to carry out to explore and refine this emerging construct.

2.3.3 Absorptive Capacity in relation to different contributions and implications

The Absorptive capacity has been studied in different contexts and it has made certain specific and important contributions to research literature. It has been studied in different contexts and under different theoretical perspectives. Each direction has contributed to main stream of literature in a specific way and has emerged with specific constructs. Table 2.1 gives detailed description of work carried out by different authors in this context.

Table 2.1: Theories informing Absorptive Capacity: Contributions, constructs, and implications			
Theories	Main contributions	AC-related constructs	Implications
Learning	Fiol & Lyles (1985) Levitt & March (1988) Cohen & Levinthal (1989, 1990) Lyles & Salk (1996) Lane & Lubatkin (1998) Lane, Salk & Lyles (2001) Reagans & McEvily (2003) Dhanaraj et. al. (2004) Lane et al. (2006)	Organizational learning is based on direct experience and routines, history dependent and target-oriented, and Influenced by contextual factors. Prior related knowledge is the most important antecedent of AC. Relative AC is more relevant for interorganizational learning than R&D-based AC.	• AC consists of three dimensions: Recognition, Assimilation, and Exploitation. • (Inter)Organizational context matters for AC. • Levels of analysis: individuals, organizations, dyads, and networks.
Innovation	Kedia & Bhagat (1988) Cohen & Levinthal (1989, 1990) Cockburn & Henderson (1998) Feinberg and Gupta (2004)	The influence of technological opportunity and appropriability regimes on innovation is mediated by AC. R&D and AC interact to increase a firm's knowledge base and innovation. There is more to AC than just R&D, several (inter-) organizational characteristics play a key role.	• AC influences innovative performance. • AC as by-product of R&D. • Cultural differences between countries affect AC. • (Inter)Organizational context matters for AC.
Managerial cognition	Bettis & Prahalad (1986, 1995) Lyles & Schwenk (1992) Calori et al. (1994) Dijksterhuis et al. (1999) Van den Bosch & Van Wijk (2001) Sanchez (2001)	Complexity tends to be resolved by a dominant logic. More diversity in a firm's activities increases the Comprehensiveness and complexity of the CEO's mental map of the	• Management logics, through organizational forms, influence Absorptive Capacity, Especially in complex

	Lenox and King (2004) Minbaeva et al. (2003)	environment. Management logics greatly influence a firm's actions in the competitive landscape, as well as the emergenceof new organizational forms. Providing information by managers as well as individuals' abilities and motivations enhance AC.	environments. • Managers can develop AC by directly providing information. • Individuals' abilities as well as their motivations enhance AC.
Knowledge-based view of the firm	Kogut & Zander (1992) Starbuck (1992) Garud & Nayyar (1994) Grant (1996a, 1996b) Van den Bosch et al. (1999) Van Wijk et al. (2003) Foss and Pedersen (2004) Andersen and Foss (2005) Malhotra et al. (2005) Matusik and Heeley (2005)	Combinative capabilities play a key role in leveraging Organizational knowledge. The knowledge characteristics of the environment influence the characteristics of the knowledge absorption by the firm. Organizational form determines the characteristics of AC. Network properties influence the level of AC.	• High AC increases the amount and productivity of knowledge. • Combinative capabilities, organizational form, and knowledge characteristics all influence the firm's AC. • AC is particularly relevant when knowledge is shared.
Dynamic capabilities	Cohen & Levinthal (1994) Grant (1996b) Van den Bosch et al. (1999) Floyd and Lane (2000) Zahra & George (2002) Jansen et al. (2005)	AC is a capability and thus requires investments. AC, being itself a high-level capability, is also the result Of lower-level organizational or combinative capabilities. Potential and realized AC (PAC and RAC) can be broken down into knowledge Acquisition, Assimilation, Transformation and Exploitation capabilities.	• AC is a high-level capability, supported by other capabilities • PAC consists of knowledge Acquisition and Assimilation capabilities and is increased by coordination capabilities • RAC consists of knowledge

			Transformation and Exploitation capabilities and is increased by systemsand socialization capabilities
Co-evolution	Cohen & Levinthal (1994, 1997) Koza & Lewin (1999) Lewin et al. (1999) Lewin & Volberda (1999) Van den Bosch et al. (1999) Huygens et al. (2001) Volberda & Lewin (2003)	Macro-coevolutionary effects: Knowledge environments co-evolve with the emergence of organizational forms and combinative capabilities that are suitable for absorbing knowledge Micro-coevolutionary effects: Increasing levels of AC lead to more readily accumulating additional knowledge in subsequent periods. Higher levels of AC raise the aspiration level and increase the level of exploration adaptation.	• AC enables or restricts firm adaptation • AC co-evolves with the knowledge environment. • Levels and direction of AC are shaped by the joint effect of managerial actions and developments in the knowledge environment
Source: Volberda et al (2010)			

2.3.4 Absorptive Capacity Models

2.3.4.1 Original Model of Absorptive Capacity

Cohen and Levinthal (1990) initially defined the Absorptive Capacity as the firm's ability to identify, assimilate and exploit knowledge for the commercial activities. The focus of the study carried out by Cohen ad Levinthal focused on the R& D firms. They viewed R& D firms to serve two purposes, first creating new knowledge to be used by the firm and second the ability of the firm to absorb the externally available knowledge outside the boundaries of the firms. On the

basis of their study they emphasized the spending on the R&D instead of spending on the innovations directly. At the same time they argued that by direct investment on R&D the firms sustain in the turbulent environment when they keep abreast with the latest research findings and developments of the industry thus achieve the first mover advantage in the new technologies. The economic models do not cater for the technological aspects of the firms in their models. They argue that firms must incur substantial costs transferred. This will allow them to acknowledge externally generated knowledge. So, spending in R&D of firms in this mode was the central approach to their work.

The mediating effect of the Absorptive Capacity in the relationship of the R&D of own firm and the relationship of competitor's spillovers and technical knowledge focus on number of factors i.e., industry environment, ease of learning. Thus they focused on scope of technical opportunities and knowledge spillover of the firms. The initial work of Cohen and Levinthal focused on the organizational factors in determination of Absorptive Capacity.

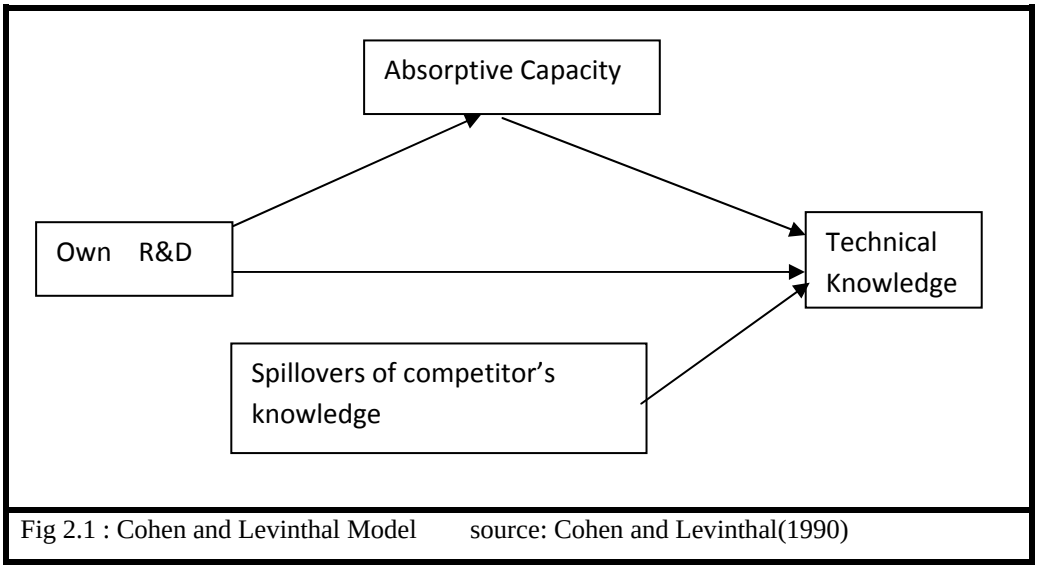

Fig 2.1 : Cohen and Levinthal Model source: Cohen and Levinthal(1990)

The model focused on the organizational processes which were based on the cognitive structures of the individuals, communication and problem solving activities. They argued that the firm's Absorptive Capacity is not limited to the organizational structures but are extended to the environment and sharing of common language and strong communication networks. The roles of boundary spanners (gatekeepers) and cross functional interfaces are also critical to enhance Absorptive Capacity of the firms. They further explained that the gatekeepers are responsible to

identify the relevant department/sub department where obtained external knowledge is required. This means that gatekeepers are experts of the organization. If the knowledge obtained is similar to the existing knowledge then it can be assimilated easily but if the knowledge is diversified then the boundary spanners may find it difficult to identify and convey to the relevant department effectively.

Moreover, knowledge assimilation process is not dependent to the knowledge donors and it is equally important for the recipients of the knowledge for effective knowledge assimilation. They argued that the prior related knowledge enhances the Absorptive Capacity effectively. The similarity of related prior knowledge with the knowledge to be assimilated facilitates to absorb the knowledge effectively. If the diversified knowledge is to be assimilated and existing knowledge is not aligned with it, then the ease of learning facilitates the effective assimilation. The spending in R&D leads to ease of learning and establishment of accumulated prior related knowledge helps in better learning of new knowledge. When the external knowledge is less targeted to the particular needs and concerns, then the own R&D becomes critical for recognition the value of new knowledge, assimilate it and apply it to the commercial ends.

The firms investing in the R&D, keeping not in focus the current requirement but the future milestones, the Absorptive Capacity will be a byproduct of the R&D. on the other hand if the firm is investing in their R&D in the short term requirements then the main focus of the firm may be to develop Absorptive Capacity by directly investing in it. Figure 2.1 shows the model.

As per the model presented by them, following factors were highlighted which influence the ease of learning:-

- Direct effect of ease of learning.
- Technological opportunity
- Appropriability.

General findings of their model present:-

- Main focus on R&D
- Absorptive Capacity as byproduct of R&D
- Ease of learning facilitates enhancement of Absorptive Capacity.
- Absorptive Capacity as a function of prior related knowledge.
- Absorptive Capacity is path dependent

- Emphasis on basic research enhances the Absorptive Capacity.
- Pre existing knowledge leads to effective Absorptive Capacity building and in turn innovations.

Conclusions

The firms are sensitive to the characteristics of learning environment in which they operate and decision making about the allocation of resources in this context of Absorptive Capacity is critical. The benefits of the absorptive capacity are intangible.

Limitations

The study focused on the R&D spending as a prime case which confines to R&D companies only and ignores the rest of domains which are critical to less developed and non R&D companies.

2.3.4.2 Model by Zahra and George (2002)

In response to Cohen and Levinthal's study based on the three dimensions i.e., to recognize the value of new external knowledge, acquire it and apply it to the commercial ends, Zahra and George (2002) formulated a new model. This model refers the concept of Absorptive Capacity as dynamic capability. The model highlights the four interdependent dimensions of the absorptive capacity named as, Acquisition, Assimilation, Transformation and Exploitation. The four components defining the concept of Absorptive Capacity, highlighted by the authors, are as follows:-

- **Acquisition.** Firm's capability to identify and acquire externally generated (from external sources) knowledge that is critical to its operations.
- **Assimilation**. It refers to the firm's routines and processes that allow it to analyze process, interpret and understand the information obtained from the external sources.
- **Transformation**. It is capability to develop and refine the routines (practices) that facilitate combining existing knowledge with newly acquired and assimilated knowledge.
- **Exploitation.** Organizational capability based on routines (practices) that allow the firm to refine, extend and leverage existing competencies or to create new ones by incorporating acquired and transformed knowledge into its operations.

The re-conceptualization of the Absorptive Capacity proposed as a dynamic capability by these authors which is pertaining to the knowledge creation and competences of firm to sustain a

competitive advantage. Intensity, speed and direction are three fundamental concepts highlighted by them for effective absorptive capacity development. Figure 2.2 shows the model.

Explanation of model

The external knowledge sources include Acquisition, purchasing through licensing and inter organizational relationships including R&D consortia, alliance and joint ventures as found in research literature and highlighted by the authors. The authors argue that the firms acquire knowledge from different sources and diversity of different sources lead to effective Acquisition.

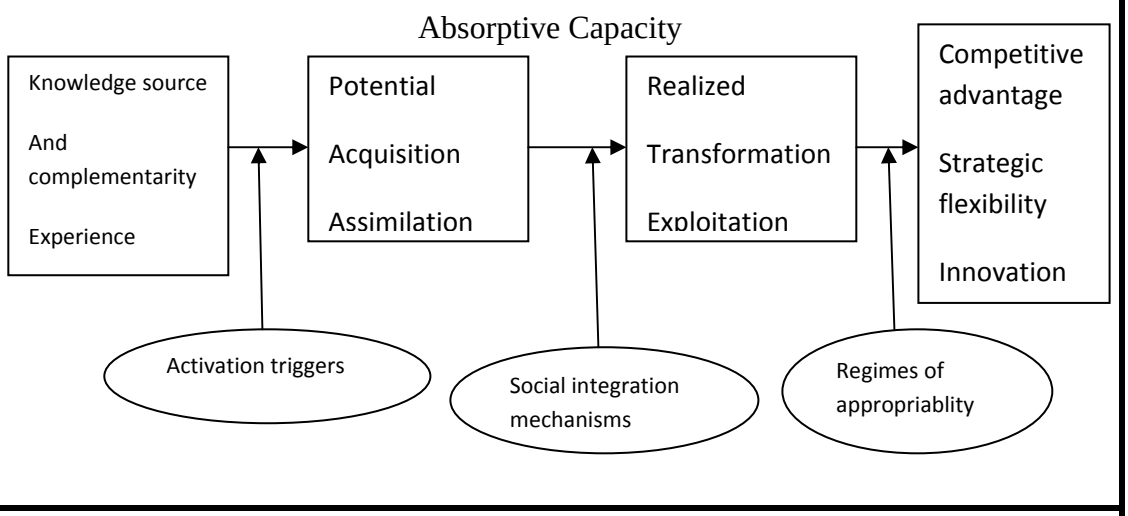

Figure 2.2 : Zahra and George's model Source : Zahra and George (2002)

Past experience as highlighted from research by the authors refers to locus of firm's technological search, the firms search in the areas where they have success in the past. Some experiences may be defined as learning by doing. Experience is closely related to organizational memory as pointed out in research and cited by authors.

Activation Triggers

As highlighted by the authors, activation both internal and external may indirectly impact the relationship of knowledge sources and experiences on the development of Absorptive Capacity. Authors argue that the triggers are wide in scope and impact the knowledge process activities

(Absorptive Capacity). However if the external knowledge is different from the existing knowledge, the firms have to increase the intensity of activation triggers. For example, change in the dominant design with industry will compel the firms to invest in the efforts to acquire relevant technology and assimilate it. Intensity of triggers enhances allocation of the resources of firms and therefore, it will influence a firm's investment in developing the capabilities to acquire and assimilate the new knowledge as argued by the authors.

Table 2.2 : Comparison of Absorptive Capacities as highlighted by Zahra and George

Issue	Traditional view	Reconceptualization
Definition	• Recognize value, assimilate and apply to commercial ends • Emphasis on externally generated knowledge	• Set of routines and processes, firms acquire assimilate, transform and exploit knowledge for knowledge creation. • Emphasis on dynamic capability for the response to strategic change
Dimensions and Components	• Multidimensional with three dimensions • Operationalzed as a single factor	• Multidimensional with four dimensions. • Four dimensions form two distinct components (potential and realized capacities)
Evaluation and development	• Dependent on firm's knowledge base and skills • Unidirectional and path dependent.	• Dependent on multiple factors including past experience, knowledge complementarity and diverse knowledge sources.
Contingent factors and managerial roles	• Exogenous • Managerial roles restricted to scanning of environment and R&D investment	• Multiple exogenous (external triggers) and endogenous (internal triggers and social mechanisms) contingencies. • Broader managerial roles in

		knowledge processing and Transformation.
Value creation	Value creation Through innovation	Through differentially derived from dimensions comprising on two components. Flexibility to change and reconfigure firm operations providing means to sustainable competitive advantage.

Authors argue in their model that social integration mechanisms can enhance the sharing of relevant knowledge which is required for knowledge exploitation Spender (1996). Social integration mechanisms contribute to knowledge Assimilation occurring either formally or in informal mechanisms. Informal mechanisms are useful in exchange of ideas but the formal mechanisms contribute in a systematic way. Therefore, firms use formal mechanisms to distribute information and interpretation of the new knowledge. Certain organizational structures enhance employee interaction, promoting problem solving and creative action as discussed by authors. The authors posit that the firms with effective social integration mechanisms get their employees to be aware of data required for Absorptive Capacity.

The firms that are flexible in utilizing the resources and capabilities and configuring the resource base may compete in the changing environment well. The components of the Absorptive Capacity could lead and sustain a competitive advantage when employed judiciously and in combination with firm's other assets. The firms with the unique resources and dynamic capabilities take first mover advantage. The model suggests that the firms can obtain performance differences under different regimes of appropriability. The model compares the new Absorptive Capacity with traditional one as highlighted in tabulated form.

2.3.4.3 Model by Jansen et al.

Research literature has considered the combinative capabilities but not specific to organizational mechanisms. The authors have carried out empirical testing of the Zahra and George's model

with the antecedents of organizational mechanisms. This model hypothesized the specific relationship of each organizational mechanism with different dimensions of Absorptive Capacity with different strength and direction. Organizational mechanisms associated to coordinated capabilities, system capabilities and socialization capabilities were empirically tested.The model tested by the authors is shown in Figure 2.3.

Results of empirically tested model

Along with other important results of impact of different organizational mechanisms on different components of Absorptive Capacity, the data analysis of the Absorptive Capacity revealed that the two factor model as developed by Zahra and George(2002) did not fit the data well. The confirmatory factor analysis was carried out of the dimensions of potential and realized Absorptive Capacity by authors to check for construct independence. The results indicated that the four factor model fitted the data moderately well as compared to two factor model. All the fit indexes of the two factor model were worse than four factor model. It is pertinent to mention that chi-square difference test showed that three factor model was significantly worse than the four factor model.

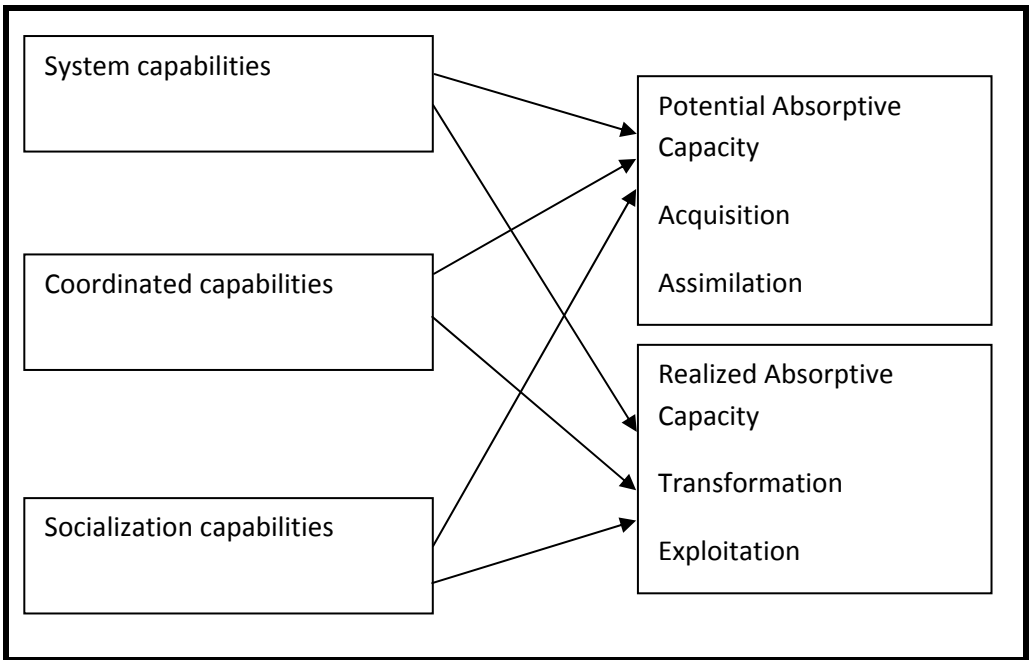

Figure 2.3: Model by Jansen et al Source : Jansen et al (2005)

Thus the two sub groups of dimensions of Absorptive Capacity , namely ,potential and realized potential Absorptive Capacity are meaning less and it is further added from the results of study of authors that four dimensions; Acquisition, Assimilation, Transformation and Exploitation are independent and model is four factor model.

2.3.4.4 Model presented by Todorova and Durisin

Zahra and George (2002) presented a model based on the Acquisition of new external knowledge as a replacement of recognition of new external knowledge and further suggested four components divided into two groups, namely potential and realized Absorptive Capacity. Todorova and Durisin (2007) reconceptualized the Absorptive Capacity model by introducing additional dimensions and antecedents and reframing the dimensions offered by Zahra and George (2002).

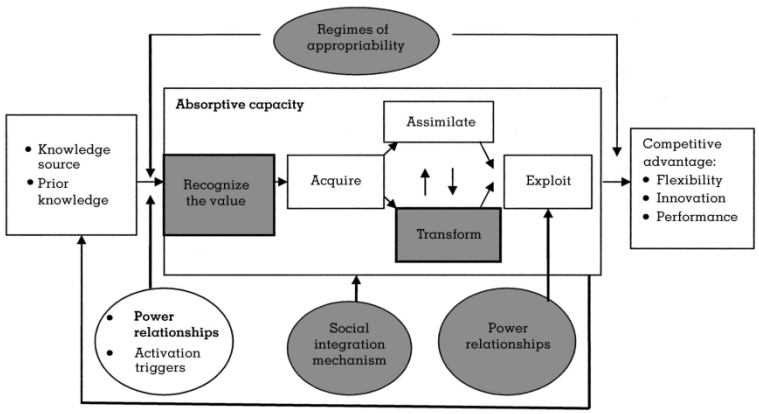

Table 2.4 : Todorova and Durisin Model Source: Todorova and Durisin(2007)

The first dimension introduced by the authors before the acquisition dimension in the Zahra and George's model. The dimension is same as introduced by the Cohen and Levinthal in their original model of Absorptive Capacity. On the basis of the learning theories perspective the step after assimilation is not the transformation rather it is the alternative path to assimilation in multiple paths. The assimilation is not directly linked to the transformation but it is reversal path to each other. It is therefore, argued that potential and realized absorptive capacities groups do

not hold well. The authors discuss the alternative approaches to the efficiency ratio of potential and realized absorptive capacities.

Another elaboration in the theorizing the concept in the contingency factors was carried out by authors. Considering Zahra and George's model, the social integration as contingency factor must influence not only the transformation but other components as well. The social integration may influence negatively. The authors introduced another contingency factor named as power relationships which may influence the valuing and Exploitation of new knowledge.

Another contribution by authors is the feedback loop in the model. Model presented by authors is shown in Figure 2.4. Absorptive Capacity was introduced as the dynamic capability of the firm that fosters the changing environment in an evolutionary manner. The authors pointed out the missing links of the feed back loop which enable the firms to rethink about the uncaptured external knowledge. The gap found in the assimilated knowledge and market knowledge may be addressed through this gap analysis.

The authors have incorporated the gaps left in previous studies such as introduction of dimension of recognition of value and refining of transformation and assimilation components. They introduce social integration mechanisms and contingency factors in their model. Feedback loop for the individual components of absorptive capacity was also narrated by their model.

2.3.4 Antecedents in literature related to Absorptive Capacity

Since the introduction of construct of Absorptive Capacity by Cohen and Levinthal (1990), there has been a large number of contributions in the development of this construct. The dimensions have been redefined (Zahara and George, 2002; Todorva and Durisin. 2007) and the construct has taken different shapes and its validity is being measured. Despite huge contributions, the construct is still in the development phase and need to be developed further (Lane and Lubatkin, 1998; Zahra and George, 2002 and Jansen et al, 2005).

This construct has been studied in different perspective and takes into account different variables in each perspective. Variables attributing to develop Absorptive Capacity may divided into two groups (internal and external variables). The external variables are the variables directly or indirectly contributing to develop absorptive capacity such as suppliers, consultants and joint

ventures with firms. The internal factors refer to the intra organizational factors such as employees' behavior, knowledge sharing and internal knowledge processes.

The antecedents and variables studied by different authors in their studies related to Absorptive Capacity are shown in table 2.3.

Table 2.3 : Antecedents in relation to past studies on Absorptive Capacity

variables	Reference
Absorptive Capacity, Extra industry sources of knowledge, Innovation , Technology spillovers, Appropriability, R&D spending, Technology opportunity	Cohen and Levinthal(1990)
Organizational Mechanisms, coordination capabilities, system capabilities, socialization capabilities	Jansen et al(2005)
Absorptive Capacity, Knowledge sources and Experience , Activation triggers, Social integration mechanisms , Regimes of appropriability, Competitive advantage	Zahra and George(2002)
Absorptive Capacity, Knowledge source, Prior knowledge, Power relationships, Activation triggers, Regimes of appropriability, Social integration mechanism, Recognize the value	Todorova and Durisin(2007)
Trust between IJV parents, Prior knowledge from foreign parents, Relatedness of IJV and foreign parents business, IJV flexibility and adaptability, Management support by foreign parents, Formal goals of IJV, Specialization of IJV's parents, Knowledge learned from foreign parents, IJV's business strategy, IJV's training competence	Lane et al(2001)
Information provision, Cumulative adopters, Past events ,Related practices, External incentives	Lenox and King(2004), Srivastava (2015)
Industry public knowledge, Transfer structures and routines, Individual absorptive abilities, Conducive knowledge content, Private knowledge, Knowledge creation	Mutasik and Heely 2005)
Training, Competence /performance appraisal, Merit based promotion, Performance based compensation, Internal	Minbaeva et al (2002), Van der Heiden (2015), Kuem et

communication, Employee ability, Employee motivation, Transfer of knowledge	ak (2016), Perlines and Araque(2015)
Knowledge bases, Problem set similarities, Inter- organizational learning	Lane and Lubatkin(1998)
Learning strategy, Learning intent, Absorptive Capacity, Knowledge outcome, Innovative outcome	Schneider(2011)
Individual level Absorptive Capacity, Unit level Absorptive Capacity, Organizational level Absorptive Capacity	Ndiege, Herselman and Flowerday(2012)
Prior related knowledge, Absorptive Capacity	King and Lakhani(2011)
Learning system, benchmark, Knowledge team, Corporate university, Absorptive capacity, Knowledge inflow, Business performance	Mahnke et al (2005), Bilgili et al (2016)
Market knowledge, Technology transfer, Application, Potential application in limited market	Lichtenthaler and Lichtenthaler(2010), Song (2014), Ahammad et al (2016)
Potential Absorptive Capacity, Realized Absorptive Capacity, Assimilated knowledge, External knowledge sources, Exploited knowledge, Innovation	Franco,Marzucchiand and Montresor (2011) ,Teigland et al (2014)
Prior related knowledge, Organizational form, Combinative capabilities, Absorptive capacity, Expectation formation, Exploitation /exploration path	Bossch,Volberda and Boer(1999), Qian and Acs (2013)

2.3.5 Organizational Mechanisms

2.3.5.1 Formalization

Formalization in research literature has been defined as the description of organizational routines and processes in the form of documents or written instructions. This means that the routines or processes are performed by the employees following pre-documented or instructions available with the organization. Taggart and Mays (1987) define Formalization as “well defined rules and regulations to govern the behavior of individuals so that actions within organization become

standardized" Khandwalla (1977) refers Formalization as the extent to which rules, procedures, instructions and communication are documented.

Generally, literature focuses on focal point that activities are performed by following written instructions or written procedure in document form. This refers to the behavior of employees expected by the managerial hierarchy while carrying out tasks in the organization. This gives employees a standardized set of instructions reducing the chances of error in implementation / performance of activities. Mintzberg (1979) presented the Formalization in three perspectives namely as:

a. Formalization by job
b. Formalization by work flow
c. Formalization by rules

Formalization by job refers to well defined instructions for handling the job. This means that facts of job are documented and complete description is available in the forms of well structured documents. Formalization by work flow are the written instructions while carrying out different activities in the organization and Formalization by rules refers to following the rules, regulations and policies while performing different tasks in the organization either related to job or employees themselves. This also includes different go and no go domains and do and do not's inside organization. Formalization has been discussed as a strong aspect / antecedent for execution of tasks and activities in the organization. Research literature argues that organizations with complex systems implement Formalization in their systems so that no ambiguities are found regarding performance of tasks.

In complex systems, the employees may generate misunderstanding and they misinterpret the procedures without proper and standardized procedures. Without documentations they often lose meanings of original work/procedure while communicating with each other. Levitt and March (1998) highlight that organizations may also forget the themes why they were created and with which goals and objectives. They further argue that through Formalization the meanings of objectives and their mission remains fixed and it becomes frame of reference for whole organization and they remain consistent with the original theme while developing for future objectives. Nonaka (1994) discusses that with Formalization, the employees in organization,

share standardized and valued information and is beneficial for knowledge sharing across teams and departments. As the standard operating procedures and procedural activities are available in documented from, it is easy for employees to learn quickly the ways of doing things and procedures. For knowledge base activities, the workers and management both know the procedure for dealing existing knowledge and align the new incoming knowledge with existing routines and activities.

Pandey and Scott (2002) refer Formalization as both in the form of codification as well as observation.Codification refers to converting rules, regulations, policies and procedures of the organization in understandable codes and instructions for employees and observation is the extent to which those written instructions and codes are informed to the employees in the organization.

In broader sense the Formalization provides guidelines to the employees and management expects employees to observe these guidelines to avoid any irregularity in execution. Mordent et al (1994) described Formalization as a part of organizational control to run in a prescribed way and thus reducing the chances of anomalies and abnormal behavior both in employees and supervisions.

The tasks performed by the employees in the organization make them confident and repeating the same tasks or following the similar pattern of tasks in other domains, the employees well conversant with the documented procedures feel confidence in execution of tasks and freely share the differences among themselves and thus their efficiency to perform tasks is increased.

Adler and Borys (1996) suggest that employees by following set of well defined procedures perform better as compared to the employees with unfocused tasks. They argue that Formalization leads them to do their jobs willingly thus contributing to their job satisfaction and organizational commitment. In the context of quality management, Formalization has a very dominant role as the quality enhancement is dependent on the precision of task and committing minimum errors. One of the main streams of quality insurance focuses on the concept of reduction of failures. Formalization helps the employees to enhance their skills and leads them to perform with precision and chances of error are less because basic theme of Formalization is doing the work by following pre defined procedures and instructions. Deming (1986) argue that

employees working on the theme of Formalization involve themselves in the habits of quality work. One school of thought in behavioral research argues that greater degree of Formalization decreases the efficiency of employees and Formalization after some limit becomes unnecessary. Organ and Greene (1982) suggest that too much Formalization reduces efficiency and hence employees become dissatisfied and their commitment level is lowered.

Augmenting the same argument Walton (1985) suggests that Formalization leads the employees to reduced efficiency. He argues that with high formalized structures, the employees become constrained as their execution of work is hampered because of this control mechanism i.e. Formalization. In knowledge management perspectives, certain routines and procedures are performed in a periodic way as a routine matter of organization; these tasks require specific instructions to be followed to undergo these activities effectively. In such environment, the Formalization plays positive role in enhancing effectiveness and efficiency of organization. Similarly the knowledge obtained from external environment but similar to the existing knowledge structure also needs certain degree of Formalization for execution of such knowledge and embed this knowledge to routines of organization.

Formalization helps the employees to couple the new knowledge with the existing knowledge as predefined set of procedures are already available with the organization. There is little need to change the cognitive and knowledge structures in such cases. Assimilation of new knowledge is easy if it is similar to new knowledge and dissimilarity between new and existing knowledge requires to slightly changing the knowledge structures (Zahra and George, 2002). Although there is need do enhance knowledge structures but still Formalization is required by organization for knowledge assimilation. In innovative environment the required knowledge almost comes from novel domains and pre defined procedures to handle such new knowledge do not work well here. Formalization in innovative environment negatively impacts the knowledge process activities. Innovation activities do not have any fixed pattern to follow for knowledge process or knowledge creation in the organization, however, at the same time some specific procedure needs to be followed although it may change frequently as a conclusion, Formalization at broad level only works here well because even innovation needs some general guidelines to be followed. Cohen and Levinthal (1990) suggest the importance of well structured cognitive and

communication structures for assimilation of new knowledge for innovative activities. The organizational procedures complement the knowledge activities well.

2.3.5.2 Cross Functional Integration

In management research literature, integration refers to the set of different activities converging to a single focal point. In elaborated form, process and activities being performed within the organization to accomplish an assigned task or assignment are often interlinked with each other. Close coordination among these activities by interacting with each other are known as integration. In the context of knowledge management, the activities referring to knowledge processes need to be integrated by the employees involved in this process.

Miller and Droge (1986) refer the integration as a simple solution to the complicated activities being performed by employees within organization. They argue that in complicated processes especially while dealing with novice /novel knowledge domains require close integration of employees. This is referred as Cross Functional Integration.

Huang et al (2001) view knowledge integration through cross functional teams in the form of collective process of construction and refinement of shared beliefs through social interaction of organizational members. Cross Functional Integration helps in exploring new ways to deal with complicated problems and is beneficial for problems solving of complicated situations. Knowledge activities are accelerated by social interaction of organizational members involved in these activities.

Theory of knowledge integration refers to competitiveness of organization based on the capacity of organization to integrate the knowledge in an effective manner (Grant, 1996). He argues that the organizations with greater integration capacity compete in the turbulent environment by focusing on diverse and strategic knowledge. He further argues that mechanisms followed by organization to couple special teams with core knowledge with other members of organization are major ingredients to cross functional knowledge integration. Thus effective routines of organization strengthen the social interaction and in turn strengthen the knowledge integration mechanism.

Nonaka and Takeuchi (1995) emphasize on the effective communication among the members of organization for better understanding of problem under study. They enhance understanding about knowledge creation within organization through a process of organized teams. They argue that the employees share their diverse experiences with each other and as a result new knowledge is created continuously in the organization and enhances knowledge base.

Grant (1996) argues that the integration of knowledge is not as simple interaction of members inside the organization, rather it is a systematic sequence through which the organization are able to get competitive position in the market. He suggests three issues (efficiency, scope and flexibility)related to integration to be addressed by organizations to attain competitive position in the market through knowledge integration as:

Organizational structure directly affects the knowledge process activities especially while dealing with the novel domains. Knowledge integration through cross functional teams requires strong communication structures and requires minimum channels thus vertical communication channels may restrict the knowledge activities as compared to horizontal knowledge structures which are fast in communication among members of organization.

Smaller units and small projects dealing with less intense knowledge will be efficient as compared to larger projects where the diverse knowledge is difficult to handle and also the interaction among employees becomes difficult, thus concentrated knowledge integration across functional teams is easy to manage as compared multiple units. Flexibility of integration refers to reconfiguring existing knowledge for innovation purposes. Flexibility allows the knowledge process to change the shapes as per requirement of organization thus provoking initiatives among employees for better performance in knowledge process activities.

In the development of new product development the Cross Functional Integration gathers all the resources at one place and similarly all the skills in the form of employees to execute the development of new product.

Ford and Randolph (1992) highlight the importance of Cross Functional Integration as they utilize the resources and share maximum experience about the job with each other. They argue

that the employees informally involved in the development of products use their initiative and use resources in an effective way.

Randolph and Posner (1992) highlight the importance of Cross Functional Integration in the perspective of frequency of communication and knowledge sharing within the organization by employees. Troy et al (2008) studied the development of new product in the context of Cross Functional Integration. Their results showed the positive contribution of Cross Functional Integration in the new product development. Integration of knowledge through cross functional teams may have different results in different contexts. Shared knowledge disseminated across the organization through communication is possible through social integration and management structures (Cohen &Levinthal, 1990) and they refer this Cross Functional Integration as a strong contributor to develop and enhance Absorptive Capacity of organization

2.3.5.3 Job Rotation

Job Rotation generally refers to the switching of employees between different jobs within the organization. Research literature has limited studies on account of Job Rotation thus lacking strong theoretical arguments in the context to this concept. Edwards (2005) refers the Job Rotation as assigning varying tasks to employees in the organization.

Traditional management structures resist shifting employees from one job to the other with the argument that the employees doing one job at one time may be more efficient than switching between tasks. Job Rotation may be taken in many contexts. For example, Job Rotation may be carried out to gain diverse knowledge about some specific domain. The information is gathered from different but related sources in order to strengthen any undergoing study. Job Rotation may be carried out to enhance the skills of employees in worker so that they are able to work in different field .For example, operator of different machines in the organization may be trained in office work for technical document handling. In such situations, the organizations are possession of diverse skills of same employees thus saving huge amount.

It may also be used to enhance the productivity and scope of organization overall. For example, Japanese organizations use manufacturing people to marketing or sales departments for effective promotion of their products. With regard to knowledge process activities, Job Rotation has been

emphasized to diversify the background knowledge of employees. Knowledge gained through the interaction of different jobs acts as a catalyst in problem solving mechanisms in the organization and provides a conceptual base for processing knowledge gained from different source in the organization (Cohen & Levinthal ,1990).

Employees in the organization through Job Rotation learn about different aspects of their jobs and at the same time become aware of differences and similarities with other related jobs. This leads to expand knowledge structures of organization and in turn organizational memory is enhanced. Good organizational memory base may lead the organization to utilize the knowledge effectively. McGrath (2001) argues that the organizations with diverse knowledge structures are able to exploit the knowledge well and employees have the opportunities to learn different facets of tasks and assignments. Cohen and Levinthal (1990) in their study suggest that diverse knowledge structures may acquire and assimilate new knowledge gained from external boundaries of organization. Noe and Ford (1992) argue that knowledge obtained by Job Rotation by employees is utilized in diversified routines and process thus contributing directly to build knowledge base of organization Job Rotation helps to develop understanding of different functions and routines of the organization (Campion et al, 1994).

Although research literature in different studies highlight different uses of Job Rotation in different contexts but Job Rotation in specific domains and contexts and its utilization in knowledge intensive environment especially in knowledge process activities still needs to be explored.

2.3.6 Human Behavior Mechanisms

2.3.6.1 Affective Commitment

Organizational commitment has been viewed in different perspectives in relation to behavior of employees towards their organization. Marsh and Mannari (1977) view organizational commitment as the attachment of employees irrespective of the status and rewards given to them by the organization. Hall et al (1970) suggest the organizational commitment as a process by which individual goals of employees are aligned with the organizational goals. Mowday et al (1982) argue the organizational commitment as the extent of involvement of individuals in the

routines and processes inside the organization. Organizational commitment is attributed to an attitude of employees towards their organization. In other words the extent of emotional attachment of employees with their organization and their willingness to work in all situations may be determined by the organizational commitment of employees. The nature and type of organizational commitment has been argued on different dimensions and perspectives. Allen and Meyer (1991) proposed three components of organizational commitment found in the employees in the organization based on their specific attitude and nature of relationship with their organization. They categorized organizational commitment in three dimensions namely as Affective Commitment, Continuance Commitment and Normative Commitment. Affective Commitment is attributed to the emotions of employees with the organization. The employees emotionally attached with their organization perform activities and continue their jobs because they are willing to do so.

Employees with high affective commitment perform better and they are satisfied with their jobs and system as employees are emotionally attached they are really concerned with the positive contribution in the organization. Literature highlights that affective commitment is developed in employees through recognition of value of organization along with its standards and positioning in its domain. Beck and Wilson (2000) argue that employees evaluate the organization in different perspectives before establishment of commitment with it.

In knowledge process activities the employees with high commitment with the organization perform better as compared to other employees in the organization. Based on the studies of knowledge management the involvement of employees in knowledge activities is critical to develop knowledge memory base of organizations. Employees are considered as the basic unit of knowledge process activities in the organization (Cohen & Levinthal, 1990). It is therefore, considered the employees have direct effect on absorptive capacity and its components in knowledge management domains. In knowledge intensive environment the employees and their behavior toward knowledge activities become even more important as flow of knowledge is more as compared to traditional knowledge environment. In this case the commitment of employees with the organization even become more important as the flow of knowledge in knowledge intensive environment is a continuous process and requires more focused efforts. It has been argued that employees with high organizational commitment are more involved in

knowledge activities. Bell (1999) suggests that high level of commitment of employees directly impacts knowledge processes. It is inferred that affective commitment directly contributes in development of absorptive capacity in knowledge intensive environment.

2.3.6.2 Tacit Knowledge Sharing

Knowledge is categorized in research literature as two hard boundaries namely as tacit knowledge and explicit knowledge. Tacit knowledge is hidden in the minds of individuals and is hard to articulate, whereas explicit knowledge is easy to interpret and easy to transfer among employees (Polanyi, 1962). Sharing of knowledge in the context of knowledge management is the mutual exchange of information among employees within the organization. There is no specific definition of knowledge sharing in literature. However, Nonaka (1991), in the context of knowledge management within organization describes knowledge sharing as the dissemination of information by employees obtained from different knowledge sources throughout the organization. Knowledge is accumulated from different sources in the organization through several modes. Some organizations adopt the methodology of transfer of technology, some go for training from different domains, some rely on the job training and others focus on formal teaching methods. All these modes do not operate in isolation rather every organization emphasizes on combination of modes. Employees in the organization share their experiences with each other and in turn they learn from each other. Explicit knowledge is discussed and easily transferred but the tacit component of knowledge is transferred either through on the job training and observation or through effective sharing of experiences (Cohen and Levinthal, 1990)

There are two schools of thoughts with regard to Tacit Knowledge Sharing and assimilation of knowledge with in the organization is concerned. Nonaka and Takeuchi (1995) argue that tacit knowledge must be first changed into explicit knowledge before assimilation into the routines and processes. They further describe the process for changing tacit into explicit as a function of mutual understanding and interaction of employees among each other. Other school of thought argues that tacit knowledge remains as tacit knowledge; however, it is transferred to other employees and in entire organization through different methods including interviews, observation and on the job training. These methods may be adopted by organizations either in isolation or in combination as per requirement of organizations. Normally different methods are

adopted by organizations based on their management structures and cognitive structures. This school of thought refers back to Polanyi's work (1966).In both aspects sharing of tacit knowledge is important for organization to enhance organizational memory.

Cohen and Levinthal (1990) highlight that external knowledge aimed to assimilate inside the organization may consist on both tacit and explicit knowledge. At the same time they emphasize that both type of knowledge are easily assimilated if the employees share common languages and organization has strong communication structures. In other way there is knowledge sharing culture in the organization. The social network for knowledge sharing, especially Tacit Knowledge Sharing may have different shapes. This may be based on self motivation of employees. This is the case where there is strong knowledge sharing culture and practices. This may be based on motivational factors such as incentive system within organization and this may be based on formal system designed by organization such as knowledge gate keepers of organization.

Employees in the organization come from different backgrounds with varying competences and behaviors. It is not easy to handle knowledge within organization due to different sub cultures and management structures including leadership. Literature views the hurdles in Tacit Knowledge sharing as:

a. Styles. Knowledge sharing becomes a complex phenomenon and Tacit Knowledge Sharing becomes even more complex. Haldin Herrgerd (2000) points out the difficulties of diffusion of tacit knowledge within organization.

b. Time. In the turbulent environment and fast changing knowledge structures due technological advances time shortage becomes a main hurdle to Tacit Knowledge Sharing. Employees are expected to follow technological pace.

c. Language. Tacit knowledge is difficult to articulate (Polanyi, 1966) and is not easily converted into understandable form because it is hidden in the minds of employees. It is difficult to perceive the right direction and intensity of tacit knowledge.

d. Value. It refers to tangible and intangible aspects of tacit knowledge which enhances with sharing and depletes if not shared.

2.3.6.3 Instrumental Ties

The concept of Instrumental Ties has emerged from social network theory. Two components of social network ties as suggested by Ibrara (1995) and Ibrara and Andrew (1993) are expressive and instrumental ties. This theory (social network theory) is deeply linked with theory of homophily which focuses on the development of network ties with different contexts and settings in the organization. Homophily theory argues that people with same characteristics work together and interact with each other effectively. Cook (2001) and Monge and Contractor (2003) suggest that people with similar characteristics and qualities work in close interaction with each other. It is one of the social ties mentioned in this theory. Instrumental ties are used to perform the tasks and these are developed to exchange information and resource exchange among employees. The employees in the organization with same qualities feel comfortable to work in close coordination and thus foster processes in organizations. Manev and Stevenson (2001) suggest that instrumental ties are used to gather information from employees in the organization specific to work related information. They further argue that instrumental ties are more useful where exchanges of resources of diverse nature are required. Therefore, instrumental ties are meant to exist where the diverse knowledge is being dealt and employees with different backgrounds establish such networks.

The employees with high instrumental ties are involved with knowledge activities and strengthen their communication with each other. In this way the communication gap is reduced and employees move toward the problem solving. In particular to knowledge intensive environment where inflow of knowledge is frequent the employees are more involved in knowledge activities and in turn enhance absorptive capacity of organization. Instrumental ties are established based on different perspectives and division of groups may be based on many facets and perspectives. The grouping may be based on gender, race, education, profession and social setup. The network ties may be directional or non directional. For example, person A gets advice from person B and person B gets advice from person C. the relationships between employees may be in close loop where every advice is shared with every one in the network. As there are number of actors in the network and each one is having different information to share, therefore, a wide span information is obtained form this type of network.

The quantity and quality of information depends upon the strength of ties among the actors in network. The strong network ties and weak network ties affect knowledge activities differently. Granovetter (1973) argue that weak ties are important when diverse and multifaceted information is required to be processed at the same time. The network ties (instrumental ties) may be established from individual to individual, group to group, organization to organization of combination and every set up has its own advantages and disadvantages and limitations.

Zahra and Georg (2002) have suggested these network ties among employees as social integration mechanisms. There are number of factors which contribute to enhance and establish these networks such as trust etc. theory of knowledge creation as argued by Nonaka (1994) suggests the interaction of employees with four different patterns for creation of new knowledge form existing and new incoming knowledge. Theory explains that instrumental ties play significant role in developing new knowledge in organization

2.3.7 Linking Absorptive Capacity and organizational mechanisms

Cross functional integration involves employees from different backgrounds to find solution of one problem or set of problems faced by firms. In knowledge intensive environment the knowledge process activities are carried out by the employees with sharing of experiences and knowledge exchange as highlighted by Gupta and Govindarajan (2000). These employees with strong communication with different backgrounds of knowledge bases generate new knowledge and hence they create abilities to acquire new knowledge. Cohen and Levinthal (1990) address this perspective in the form of overlapping of knowledge structures and employees with diverse knowledge background. This leads to acquire and indentify new knowledge required for the firms and its assimilation in to the routines and processes of firms. This exposition is supported by theory of knowledge integration (Badii & Sharif, 2002) which highlights the generation of new requirement of knowledge as the existing knowledge is integrated and similarly the assimilation of knowledge becomes easy when employees together participate in enhancing knowledge memory. This leads us to generate hypotheses regarding cross functional integration as:-

H1: Cross Functional Integration (INT) positively impacts Acquisition component of Absorptive Capacity in knowledge intensive environment.

H2: Cross Functional Integration (INT) positively impacts Assimilation component of Absorptive Capacity in knowledge intensive environment.

When employees from different knowledge backgrounds integrate their domains to develop new knowledge base their diverse experience help in this process. Zahra and George (2002) argue that employees with diverse knowledge background with prior abilities to deal with knowledge may link the old knowledge with new one with less effort. Kogut and Zander (1993), Hedberg (1981) argue that the knowledge creation is dependent upon the prior experience of employees in the organization followed by specific skills and capabilities to deal with knowledge process activities. These skills and abilities related to knowledge activities are enhanced when employees from different departments direct their efforts to one particular domain either to enhance knowledge or to create new knowledge from combination of new and old knowledge. This is referred as associative learning of employees for generating new knowledge of organization. The results of study carried out by Jansen et al (2005) highlight the impact of organizational mechanisms to have direct effect on absorptive capacity and its individual components. Knowledge processes and activities in knowledge intensive environment is a continuous process and new knowledge is obtained from outside the firms frequently. Generally the knowledge in knowledge intensive environment is handled by specific employees and special groups who operate in coherence for up gradation of knowledge by combining existing knowledge with newly acquired knowledge on regular basis. This further leads them to create new and updated knowledge memory in firms. This is referred as activation triggers in the organization by Zahra and George (2002) for dealing with new knowledge in the organization. They argue that similarity of knowledge between external knowledge and existing knowledge in the organization defines the activation triggers and greater the difference higher the intensity of triggers and greater the importance of cross functional roles of employees will be. With theses arguments our hypotheses regarding cross functional integration become as:

H3: Cross Functional Integration (INT) positively impacts Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

H4: Cross Functional Integration (INT) positively impacts Exploitation component of Absorptive Capacity in knowledge intensive environment.

Formalization is referred to as the routines and procedures in written or documented form. Degree to which the written instructions and rules are followed by the employees while performing their tasks is referred as formalization by Khandwalla (1977). In knowledge intensive environment the flow of knowledge from outside the boundaries of firms is very high and at the same time nature of knowledge acquired from outside the boundaries of firms in knowledge intensive environment is aligned with the existing knowledge. If the difference between existing and new knowledge is greater, then cognitive and knowledge structures need to be changed for process of new knowledge as suggested by Zahra and George (2002) in their study of re-conceptualization of absorptive capacity. Formalization acts as standardized procedures to be followed by the employees and in the context of knowledge intensive environment formalization need to be addressed while dealing with this knowledge. As the incoming new knowledge is aligned with existing knowledge and there is set procedure to process and upgrade in the knowledge intensive firms. Frequent flow of knowledge in firms and fast changing knowledge environment is time constrained and firms in this environment cannot afford to waste time in redefining the procedures to deal with incoming knowledge. Zahra and George (2002) argue that if there are slight differences in the existing knowledge and the knowledge acquired from the outside the boundaries of firms then this knowledge is assimilated and applied to processes without changing knowledge structures. In the similar way formalization refers to the control of behavior of employees in context to knowledge processes from established paths while enhancing knowledge memory of firm. In knowledge processes, the requirement of new knowledge is identified with the difference of obtained knowledge and knowledge required for further operations in firms (Aribi & Dupouet, 2016; Badii & Mothersole, 2006). In following established procedures to handle knowledge process activities the employees become more and more precise in defining the requirement of new knowledge for firms and its assimilation into routines and processes become efficient. Therefore, in knowledge intensive environment acquisition and assimilation capabilities are enhanced.

H5: Formalization (FORM) positively impacts Absorptive Capacity (ACQ component) in knowledge intensive environment.

H6: Formalization (FORM) positively impacts Absorptive Capacity (ASM component) in knowledge intensive environment.

In knowledge intensive environment the employees follow established procedures to process knowledge activities. Repeatedly dealing with knowledge in the same pattern helps the employees to link old and new knowledge easily. Zollo and Winter (2002) suggest that employees following established procedures may help them to transform knowledge easily. This means that employees dealing the knowledge with established path and procedure know well the way to transform knowledge by combining existing knowledge with new knowledge. Employees in knowledge intensive environment are familiar with routines and procedures and nature of knowledge because they deal this type of knowledge as their routine work. This enhances their capability of transformation. Employees dealing with knowledge in knowledge intensive environment follow best practices while performing repeated cycles of knowledge. They become more efficient in exploiting and generating new knowledge from acquired and assimilated knowledge.

H7: Formalization (FORM) positively impacts Absorptive Capacity (TFM component) in knowledge intensive environment.

H8: Formalization (FORM) positively impacts Absorptive Capacity (EXPL component) in knowledge intensive environment.

Employees in the organizations provide opportunity to increase their knowledge breaths by working on different jobs (Cohen and Levinthal, 2002; Jansen at al, 2005). Employees gain knowledge from different processes and increase their knowledge base. They provide diverse inputs to assimilation processes and transform new knowledge based on their wide experience (Sjodin & Frishammar,2015). This increases absorptive capacity of the organization especially in knowledge intensive organization where knowledge inflow is very fast. Minbaeva et al (2014). Acquisition of knowledge requires diverse experience of employees (Zahra & George, 2002) and assimilation of the knowledge different from existing one becomes easy and absorptive capacity is enhanced. Thus job rotation leads the employees to upgrade their knowledge base that directly contributes in absorbing new knowledge easily. Therefore, hypotheses related to job rotation are as:

H9: Job Rotation (JR) positively impacts Absorptive Capacity (ACQ component) in knowledge intensive environment.

H10: Job Rotation (JR) positively impacts Absorptive Capacity (ASM component) in knowledge intensive environment.

H11: Job Rotation (JR) positively impacts Absorptive Capacity (TFM component) in knowledge intensive environment.

H12: Job Rotation (JR) positively impacts Absorptive Capacity (EXPL component) in knowledge intensive environment.

2.3.8 Linking Absorptive Capacity and human behavior mechanisms

Knowledge is processed in the firm by employees based on learning and experience of other employees within the same firm as suggested by Levitt and March (1988). Knowledge obtained from outside the boundaries of the firms need to be transferred for better assimilation and exploitation within the firm. Absorptive capacity being an ability to deal with new knowledge is therefore dependent upon the mutual interaction of employees within themselves referred as knowledge transfer within the firms, Argote and Ingram (2000). The instrumental ties of employees play an important role in the development of Absorptive Capacity of firms especially in knowledge intensive environment as employees having close interaction with each other they become involved in knowledge activities and in turn they become familiar to new requirement of knowledge for their firms. Recognition of new knowledge and ability to acquire new knowledge for the firm is a function a nature and strength of relationships of employees with each other. Szulanski(1996) and Zollo and Reuer (2010) argue that nature of relationships along with other characteristics of personal and firms such as cognitive and social settings directly impact knowledge activities. Research literature points out that new dimension of knowledge are explored and new knowledge acquired is processed by mutual efforts of employees. Employees dealing with knowledge as a routine matter become familiar with specific pattern of knowledge flow and employees engaged in knowledge activities in slightly different domain may be requiring to that knowledge for their own processes. In knowledge intensive environment employees work in close interaction with each other and they become familiar the requirement each other which leads them to integrate acquired knowledge into routines and processes. Theory of knowledge creation highlights the creation of new knowledge by combining new and old knowledge through a reversible process of tacit to explicit and explicit to tacit knowledge

conversion. Cohen and Levinthal (1990) argue this perspective in the form of effective communication between employees in firms while dealing with new knowledge. They further argue that instrumental ties reduce knowledge gap between employees and in turn their abilities to deal with knowledge is increased. This means that instrumental ties are directly related to knowledge process activities and hence hypotheses related to Absorptive Capacity become as:-

H 13: Instrumental Ties (INST) positively impacts Acquisition (ACQ) component of Absorptive Capacity in knowledge intensive environment.

H 14: Instrumental Ties (INST) positively impacts Assimilation component of Absorptive Capacity in knowledge intensive environment.

H 15: Instrumental Ties (INST) positively impacts Transformation component (TFM) of Absorptive Capacity in knowledge intensive environment.

H 16: Instrumental Ties (INST) positively impacts Exploitation (EXPL) component of Absorptive Capacity in knowledge intensive environment.

In knowledge intensive environment employees are dependent upon each other in relation to performing knowledge activities. Closeness of employees helps to foster knowledge activities. Dealing with new knowledge becomes need as the knowledge acquired from outside resources is diverse and need to be combined. Diverse knowledge structures are aligned through mutual cooperation of employees with each other. This has been referred as mutual help and support in knowledge creation processes and interaction patterns in theory of knowledge creation given by Nonaka (1994). Zahra and George (2002) have suggested that activation triggers related to social mechanisms such mutual interaction and teamwork of employees foster the knowledge sharing activities. Employees willing to help other employees in knowledge process activities are found to have significant relationship with commitment with organization in research literature. In fast knowledge intensive environment the employees with good team work and with mutual support leads the firms to effective knowledge sharing. This has direct effect on affective commitment of employees in the organization in knowledge intensive environment.

H 17: Instrumental Ties (INST) positively impacts Affective Commitment (AFC) in knowledge intensive environment.

H 18: Instrumental Ties (INST) positively impacts Tacit Knowledge Sharing (TKS) in knowledge intensive environment.

Original model of Absorptive Capacity highlights as the individuals as the building blocks of knowledge process activities. Davenport and Prusak (1998) have suggested the same in their study. They argue that knowledge process activities are not possible without human involvement in such processes. This argument is supported by Milton (2005). Theory of knowledge creation given by Nonaka (1994) has suggested four interaction patterns for generating new knowledge in organization and employees being the key players in this knowledge creation loop. This means that employees interested in knowledge activities directly affect Absorptive Capacity of organization. Level of involvement (Bell, 1999) and commitment level of employees with their organization (affective commitment) directly impact knowledge process activities. Affective commitment being an emotional attachment of employees with organization (Markopoulos & Vanharanta, 2017) thus directly affects the absorptive capacity and its four components. The importance of commitment of employees with the organization in relation to knowledge activities has been be highlighted by the managers inside the boundaries of organization. Thompson and Heron (2005) argue the same point in the context of knowledge environment. They argue that practitioners in the organization but their theoretical and empirical insights are still be explored. Storey and Quintas (2001) have argued that emotional commitment of employees influence them to share their knowledge and perform knowledge processes with motivation. The employees with emotional commitment with their firms keep themselves involved in knowledge activities without considering the consequences and rewards. Overall Absorptive Capacity is directly influenced by the level of attachment of employees with the organization in knowledge intensive environment.

H 19: Affective Commitment (AFC) positively impacts Acquisition (ACQ) component of absorptive capacity in knowledge intensive environment.

H 20: Affective Commitment (AFC) positively impacts the Assimilation (ASM) component of Absorptive Capacity in knowledge intensive environment.

H 21: Affective Commitment (AFC) positively impacts Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

H 22: Affective Commitment (AFC) positively impacts Exploitation (EXPL) component of Absorptive Capacity in knowledge intensive environment.

Knowledge sharing is one of the basic parameters to deal with acquisition, its assimilation and further processes to firm's routines and practices. Knowledge sharing of employees enhances the ability to know what they actually want and willingly process on it. Cohen and Levinthal's study while developing framework for Absorptive Capacity and generating theory has focused importance of shared knowledge among employees. They further argue that employees with different background of knowledge with strong communication and interaction in relation to knowledge process activities directly affect the Absorptive Capacity of organization. Theory of knowledge creation by Nonaka (1994) discusses four interaction patterns of knowledge creation through knowledge conversion processes. In this pattern tacit to explicit and tacit to tacit pattern for knowledge creation are most important as they directly deal with the knowledge hidden in the minds of employees.

The absorptive capacity enhancement is directly affected by knowledge sharing of employees and especially in knowledge intensive environment where the inflow of knowledge is more intense as compared to traditional knowledge structures. This aspect of knowledge has been viewed as the speed, intensity and direction by Zahra and George (2002) and this aspect is attributed to acquisition component absorptive capacity. Original model of Absorptive Capacity given by Cohen and Levinthal (1990) argue that knowledge coming from the outside boundaries of organization is a step wise process and emerges to a level of organization through individuals. They further argue that mere exposure to the new knowledge is not sufficient for assimilation and exploitation rather cognitive structures along with sharing of knowledge this new knowledge by employees may enhance this process to absorb this new knowledge. The speed, direction and intensity of new knowledge may be maintained for acquisition if the knowledge is accumulated form minds of employees through knowledge sharing and sharing their job related tips which are referred to as tacit knowledge in literature.

Absorptive Capacity model suggested by Zahra and George (2002) have argued that absorptive capacity process with its four components is triggered by different mechanisms with the organization as well as external triggers. The internal triggers include social mechanisms. The social integration mechanisms as per their model increase the efficiency factor that is linking the potential absorptive capacity with the realized absorptive capacity. It is inferred that knowledge sharing and particularly the tacit knowledge sharing directly impact the four components of absorptive capacity. This argument is further supported by Nonaka (1991) who argues that

employees dealing with new knowledge do not passively receive this new knowledge rather they interpret, reinterpret and share with others before assimilation. Hence their absorptive capacity to deal with new incoming knowledge is increased and refreshed every time they share their ideas with others. Thus it is hypothesized as:-

H 23: Tacit Knowledge Sharing (TKS) positively impacts Acquisition component of Absorptive Capacity in knowledge intensive environment.

H 24: Tacit Knowledge Sharing positively impacts Assimilation component (ASM) of Absorptive Capacity in knowledge intensive environment.

H 25: Tacit Knowledge Sharing (TKS) positively impacts Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

H 26: Tacit Knowledge Sharing (TKS) positively impacts Exploitation (EXPL) component of Absorptive Capacity in knowledge intensive environment.

Knowledge sharing practices have been considered as strong predictor of commitment of employees with their organization. It is argued in research literature that behavior of sharing of experience and knowledge especially the ideas about the job and tips (Markopoulos& Vanharanta, 2015) for effective execution of knowledge processes may increase the commitment of employees with their firms. In research literature this particular knowledge is referred as tacit knowledge (Polanyi, 1966). Knowledge sharing practices both tacit and explicit (Nonaka, 1994) contribute to enhance behavior of employees towards knowledge process activities. Research literature shows knowledge sharing to have a strong positive contributor of organizational commitment. The studies of Porter et al (1974) and Chen and Francesco (2003) argue knowledge sharing practices to be a strong predictor of different facets of commitment to employees with their organizations.

H 27: Tacit Knowledge Sharing (TKS) positively impacts Affective Commitment (AFC) in knowledge intensive environment.

Employees with similar characteristics group themselves together in the organization. Theory of Homophily states that these groups while performing in close interaction show certain behavior towards knowledge activities and information sharing in the organization. Strong network ties lead the employees to show certain behavior to their organization. It is argued that employees with strong network ties are more committed to their groups such as family and friends and their organization, Granovetter (1973). Employees do interact with each other through their network

and theses instrumental ties are helpful in carrying out knowledge process activities. Network ties influence the enhancement of absorptive capacity and its four components. Although employees are more involved in knowledge activities more effectively but till the time employees are not loyal to organization these instrumental ties may not become effective. Affective commitment of employees is directly effected by the relationships of employees with each other. Stronger the relationship more commitment of employees with the organization will be. On the other hand the committed employees directly impact knowledge process activities and enhance the capabilities of employees to deal with new knowledge. Theory of knowledge creation given by Nonaka (1994) suggest that interaction pattern for creation of new knowledge is influenced by behavior of employees such as commitment level and knowledge sharing etc. instrumental ties and its intensity leads the employees to be loyal to organization for which they are working. Zahra and George (2002) argue that knowledge activities cannot be performed without activation triggers both social and organizational. Social network theory suggests that network ties and especially the instrumental ties terminate at specific behavior of employees. In other words the relationships of employees in the networks may be aligned with knowledge process activities through their commitment with the organization. These arguments lead us to generate following hypotheses:-

H 28: Affective Commitment mediates the relationship of Instrumental Ties and Acquisition component of Absorptive Capacity in knowledge intensive environment.

H 29: Affective Commitment (AFC) mediates the relationship of Instrumental Ties (INST) and Assimilation component of Absorptive Capacity in knowledge intensive environment.

H 30: Affective Commitment (AFC) mediates the relationship of Instrumental Ties (INST) and Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

H 31: Affective Commitment (AFC) mediates the relationship of Instrumental Ties (INST) and Exploitation (EXPL) component of Absorptive Capacity in knowledge intensive environment.

H 32: Affective Commitment (AFC) mediates the relationship of Tacit Knowledge Sharing (TKS) and Assimilation component (ASM) of Absorptive Capacity in knowledge intensive environment.

H 33: Affective Commitment (AFC) mediates the relationship of Tacit Knowledge Sharing and Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

Tacit knowledge is the personal property of employees (Nonaka, 1994) and the information processing in the organization is carried out in a closed loop form tacit to explicit and explicit to implicit (Nonaka & Toyama, 2015). They argue that knowledge sharing is the most important feature of creating knowledge; therefore, sharing of tacit knowledge becomes important for growth of organization (Panahi et al, 2013). Chaung et al (2016) argue that management of effective tacit knowledge leads the knowledge intensive teams to raise their knowledge bases thus they enhance absorptive capacity. Employees share formal and explicit knowledge but they, seldom share tacit knowledge (Yu et al, 2013) but through their instrumental ties employees manage internal sharing (Zhang and He, 2015). The employees through their communication and relationships with other employees share their personal experiences at social gatherings that they apply to their knowledge processes (Liu et al, 2014). The instrumental ties among the team members enhance trust and they share key points regarding knowledge processes thus enhancing absorptive capacity of the organization. Instrumental ties through tacit knowledge sharing raise absorptive capacity of the organization, thus it leads to generate following hypotheses:

H 34: Tacit Knowledge Sharing mediates the relationship of Instrumental Ties and Acquisition component of Absorptive Capacity in knowledge intensive environment.

H 35: Tacit Knowledge Sharing (TKS) mediates the relationship of Instrumental Ties (INST) and Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

Absorptive capacity has been argued as a function of employees in the origin study of Cohen and Levinthal (1990) followed by the huge literature highlighting the importance of different factors such as social integration factors (Todorva and Durisin,2007) , training (Peltokorpi,2017) and Human resource management (Voberda et el, 2010). There are extensive fields in different aspects which need to explore in context to absorptive capacity. Despite extensive literature on absorptive capacity in different aspects from the refinement of its definition to the establishment of its dimensions, this construct has been declared as black box (Aribi & Dupouet,2016). There is need to explore different factors attributing to the development of absorptive capacity related to management, employees and management. This study argues that there are different factors that attribute to develop absorptive capacity in knowledge intensive environment.

This construct has been argued as the process of sequence of activities (Zahra and George, 2002) which are well linked with one another as well as having feedback loop between them. The sequence of activities in the entire process form acquisition to the exploitation has been explored at macro level, however, there is need to explore micro level processes in the knowledge intensive environment that aligns different absorptive capacity processes. This study argues that transformation process in knowledge intensive environment is based on competence level of donors and recipients.

Role of employees especially boundary spanners have been argued in literature for the development of absorptive capacity in knowledge intensive environment. Extensive studies argue and emphasize the roles of boundary spanners in the development of absorptive capacity (Volberda et al,2010, Minbaeva et al,2014). Their roles have been discussed in broader perspective in the organization. This study argues that roles of middle managers have direct impact on absorptive capacity framework in knowledge intensive environment.

2.3.9 Conceptual framework

The conceptual framework of development of absorptive capacity in knowledge intensive environment is presented in figure 2.5.

This framework intends to explain the ways of developing absorptive capacity in knowledge intensive environment. Figure 2.5 highlights the impact of different antecedents of organization on absorptive capacity. This takes into account organizational mechanisms and human behavior mechanisms along with transformation process and critical success factors and middle managers' roles.

The framework formulated on the basis of research literature related to Absorptive Capacity highlights the contribution procedures (organizational mechanisms) and behavior (human mechanisms) in the development of absorptive capacity in knowledge intensive environment. Critical success factors, transformation process and middle managers' roles are also part of framework. This framework is aligned with the original work of absorptive capacity by Cohen and Levinthal (1990) and gaps identified in the studies carried out related to absorptive capacity by different authors in research literature. This framework has incorporated the variables which were either totally unidentified or indentified at macro level such as Zahra and George (2002) in

their study of absorptive capacity highlighted the activation triggers for future work. Lenox and King (2004) have recommended HR practices to be considered in relation to absorptive capacity. Similarly, Volberda et al (2010) highlight that micro systems both related to employees and systems may be incorporated in the study of absorptive capacity.

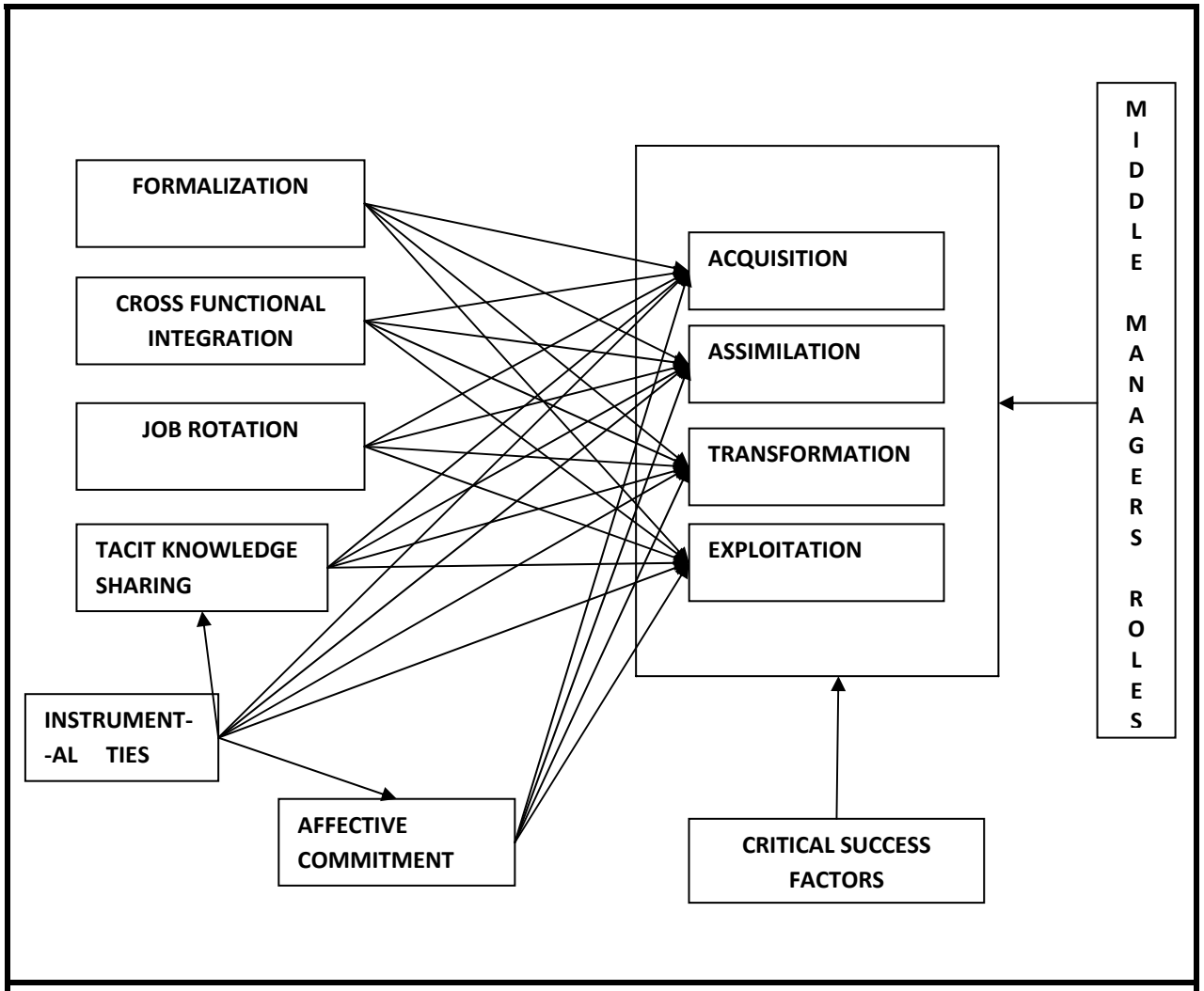

Figure 2.5 : Conceptual Framework

2.3.10 Summary of hypotheses of study

Table 2.4 gives summary of study hypotheses.

Table 2.4: Summary of hypotheses
H1: Cross Functional Integration (INT) positively impacts Absorptive Capacity (ACQ component).
H2: Cross Functional Integration (INT) positively impacts Absorptive Capacity (ASM component).
H3: Cross Functional Integration (INT) positively impacts Absorptive Capacity (TFM component).
H4: Cross Functional Integration (INT) positively impacts Absorptive Capacity (EXPL component).
H5: Formalization (FORM) positively impacts Absorptive Capacity (ACQ component).
H6: Formalization (FORM) positively impacts Absorptive Capacity (ASM component).
H7: Formalization (FORM) positively impacts Absorptive Capacity (TFM component).
H8: Formalization (FORM) positively impacts Absorptive Capacity (EXPL component).
H9: Job Rotation (JR) positively impacts Absorptive Capacity (ACQ component).
H10: Job Rotation (JR) positively impacts Absorptive Capacity (ASM component).
H11: Job Rotation (JR) positively impacts Absorptive Capacity (TFM component).
H12: Job Rotation (JR) positively impacts Absorptive Capacity (EXPL component).
H13: Instrumental Ties (INST) positively impacts Acquisition (ACQ) component of Absorptive Capacity in knowledge intensive environment.
H14: Instrumental Ties (INST) positively impacts Assimilation component of Absorptive Capacity in knowledge intensive environment.
H15: Instrumental Ties (INST) positively impacts Transformation component (TFM) of Absorptive Capacity in knowledge intensive environment.
H16: Instrumental Ties (INST) positively impacts Exploitation (EXPL) component of Absorptive Capacity in knowledge intensive environment.
H17: Instrumental Ties (INST) positively impacts Affective Commitment (AFC) in knowledge intensive environment.
H18: Instrumental Ties (INST) positively impacts Tacit Knowledge Sharing (TKS) in knowledge intensive environment.
H19: Affective Commitment (AFC) positively impacts Acquisition (ACQ) component of

absorptive capacity in knowledge intensive environment.

H20: Affective Commitment (AFC) positively impacts the Assimilation (ASM) component of Absorptive Capacity in knowledge intensive environment.

H21: Affective Commitment (AFC) positively impacts Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

H22: Affective Commitment (AFC) positively impacts Exploitation (EXPL) component of Absorptive Capacity in knowledge intensive environment.

H23: Tacit Knowledge Sharing (TKS) positively impacts Acquisition component of Absorptive Capacity in knowledge intensive environment.

H24: Tacit Knowledge Sharing positively impacts Assimilation component (ASM) of Absorptive Capacity in knowledge intensive environment.

H25: Tacit Knowledge Sharing (TKS) positively impacts Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

H26: Tacit Knowledge Sharing (TKS) positively impacts Exploitation (EXPL) component of Absorptive Capacity in knowledge intensive environment.

H27: Tacit Knowledge Sharing (TKS) positively impacts Affective Commitment (AFC) in knowledge intensive environment.

H 28: Affective Commitment mediates the relationship of Instrumental Ties and Acquisition component of Absorptive Capacity in knowledge intensive environment.

H 29: Affective Commitment (AFC) mediates the relationship of Instrumental Ties (INST) and Assimilation component of Absorptive Capacity in knowledge intensive environment.

H 30: Affective Commitment (AFC) mediates the relationship of Instrumental Ties (INST) and Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

H 31: Affective Commitment (AFC) mediates the relationship of Instrumental Ties (INST) and Exploitation (EXPL) component of Absorptive Capacity in knowledge intensive environment.

H 32: Affective Commitment (AFC) mediates the relationship of Tacit Knowledge Sharing (TKS) and Assimilation component (ASM) of Absorptive Capacity in knowledge intensive environment.

H 33: Affective Commitment (AFC) mediates the relationship of Tacit Knowledge Sharing and Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

H 34: Tacit Knowledge Sharing mediates the relationship of Instrumental Ties and Acquisition component of Absorptive Capacity in knowledge intensive environment.

H 35: Tacit Knowledge Sharing (TKS) mediates the relationship of Instrumental Ties (INST) and Transformation (TFM) component of Absorptive Capacity in knowledge intensive environment.

CHAPTER-3

RESEARCH METHODOLOGY

3.0 Introduction

Research methods being most important segment of research process are adopted on the basis of research questions of the study and purpose of study. Our research purpose influences us to choose research methods (Bryman & Bell, 2015; Creswell, 2012). We cannot choose the research methods till the time we have not defined our research problem as type of problem stated directly determines the methods to be used in research (Cress well, 2003). Thus nature of study determines the type of tools used for conducting research. Methodology of research segregates the particular study from other domains, and relates it with similar researches for better evaluation and comparison (Baxter, 1996).

This chapter introduces the research procedures and techniques and research approaches adopted in the different types of research work. After introducing the research techniques this chapter explains the research methodology adopted for this study. This chapter argues the techniques and procedures adopted followed by the pilot study conducted before collection of data for main study. The results and analysis of results of pilot study are presented in this study. Methods of data analysis adopted in this study are also presented. At the end of chapter before giving chapter summary a brief introduction of the studies conducted in this thesis have also been elaborated.

3.1 Research Procedure and Techniques

3.1.1 Data and Data Collection Techniques

The study may require quantitative or qualitative data or both for analysis to reach our conclusions or outcome of study. Data is plural of datum which literally means to give. Data is the basic unit of information for further analysis and measurements. Data itself is nothing but the strong source of perceptions of processes and behaviors in management research. Data is broadly categorized into primary and secondary.

Broadly in research there are two data collection techniques; primary and secondary data collection technique. Collection of data by means of questionnaires, experiments and observation of phenomenon contributes primary data technique whereas documents or stored information prior to conducting research referred to secondary data collection technique.

3.1.2 Primary Data

Data obtained directly from respondents and processes refers to primary data. As the primary data is directly linked to the respondents, it is considered valid. The primary data may be collected through experiments surveys questionnaires interviews and observation of phenomenon of any process.

3.1.2.1 Advantages of primary data

Primary data is more reliable and valid as compared to secondary because of strict control of research on its collection. The respondents are by choice (aligned with research questions) and therefore, the interpretation and analysis of on this data are more reliable and easy.

3.1.2.2 Disadvantages of primary data

The primary data collection is sometimes expensive especially when the respondents are scattered on long distances (geographic locations). Primary data collection may be time consuming as the respondents may not be available and in case of collection of through interviews the response rate is not appreciating. Interviews to be conducted with senior managers or executives may be lengthened because of non availability of interviews thus lengthening the research process. Time and additional resources are the main shortfalls of collecting data through this technique (primary data technique) as we want to generalize our findings /results on the basis of sample data to the population we need sufficient amount of respondents which directly contribute to time and resources.

3.1.3 Secondary Data

The primary data refers to the data already present in the form of documents written policies or already collected through other sources and is readily available.

Secondary data although not so reliable is used for specific purpose for example in banking sector the trend analysis and future expansion/decision is based on previously found data in data base. Other sources of data may be magazines; research already carried out in particular (related) field and even books.

The target of particular source depends upon the type of study for which required. Secondary data is time specific restricts us to generalize our results to future or past by studying in present time domain. Most efficient way to overcome this restriction is to use recent past secondary data published in journals and latest books.

Secondary data is useful for formulating new policies as it gives healthy input about the past. In Government sector the secondary data is readily available officially in the form of population statistics, health and related to policy matter decisions of past.

3.1.3.1 Advantages

The biggest advantage of secondary data is its convenient access which contributes to save time and resources as compared to primary data. Another advantage of secondary data is that the research question is easily aligned with data as researchers may directly approach the required data which is absolutely relevant to their study.

3.1.3.2 Disadvantages

One big disadvantage is that the researcher is not confident about the validity of secondary data on which he/she is working. Most of the time prime purpose of our research is to generalize the findings of specific study to whole population at least. Mostly, the data in the form of documents and records is contextual and time specific and we cannot be sure about its reliability. This restricts us to generalize the findings and interpretation of the results based on secondary data also becomes context specific and related to specific data.

Information obtained from secondary data may have missing links and which are not easy to cover. The context in which missing links were created is unable to perceive thus limiting the researcher to utilize data accurately. Researchers should always bear in mind that using past data for generalization purposes to present or future may not be valid due to time and context

constraint. Past data based on specific culture, technological and business environment and specific management structures may not be coherent because of dynamic changes of these aspects in present time.

3.1.4 Qualitative and Quantitative approach

Qualitative and quantitative are two major approaches found in the research literature. Neuman (2006) argues that research approaches are based on two philosophical assumptions; quantitative referring to conducting experiments and qualitative approach referring to conducting case studies. Research approaches are adopted for specific studies based on the purpose and objectives leading to main research question. Specific research methodologies are adopted for specific research approach. Generally, the theory development is carried out by adopting research methodologies aligned with qualitative research approach whereas, theory testing is carried out using research methodologies aligned with quantitative research approach. There are situations where neither qualitative approach only nor quantitative approach only suffices and the study is conducted adopting both approaches in combination. Specific methodology is adopted for this kind of approach. In conclusive terms, the research questions and objectives define our research approach.

3.1.4.1 Qualitative approach

Qualitative approach refers to analytical execution and analysis of phenomenon in the recurring themes and patterns of existing systems. Qualitative research approach is referred as the strong source of theoretical development of concepts and constructs as theses approaches dig more into the systems and interact with social setups. Therefore, qualitative approach focuses on explanations of phenomenon, cultural values and argues about the specific environmental settings in specific context. Creswell (2012) argues that qualitative approach helps to identify the patterns of data in specific context and may explain their measures. He further argues that explanation of such cultural settings often ends up to ethnographic study focusing on the ways of living of groups of people in specific context. Therefore, qualitative approach refers to determine the meanings about different human behaviors. Cooper and Schindler (2006) argue that qualitative approach aims to seek the specific behaviors in specific environment and answers the

"why" question related to human behaviors by using in depth interviews and interaction with them.

3.1.4.2 Quantitative approach

Quantitative research is applied to find the facts about certain phenomenon based on numerical data collected through different techniques. Quantitative approach is objective in nature. This approach is suitable to find facts and figures as it has specific requirements and predetermined set of measures and statistical tests are available to analyze the data collected from natural environment. In this approach researcher has limited involvement in data collection and its process and therefore, no personal judgments is made by the researcher. The suitable methodology and valid measures ensures the quality of research carried out in this approach. Quantitative research approach focuses on definitions and concepts and every variable under study is first defined in specific way. These operational definitions make us to conclude our findings in specific ways therefore; this approach is referred as more scientific in nature.

3.1.4.3 Difference between qualitative and quantitative approaches

Qualitative and quantitative approaches have their own strong arguments to be superior in their own domains. The major difference between two approaches attributes to the purpose of research. However, there are some fundamental boundaries based on which qualitative research approach differs from quantitative research approach. Table 3.1 gives general differences between these two approaches in research literature.

3.1.4.3 Mixed method approach

There are research studies which aim to address research questions at micro and macro level in the organization. These research questions may not be addressed through qualitative or quantitative approach alone. Such studies are carried out by using both approaches and resultant approach is termed as mixed method approach. Here the qualitative and quantitative approaches may not be taken as two extremes opposite to each other rather viewed as converging to one point addressing to the main objective or research question of study (Neuman & Benz, 1998).

Table 3.1: Difference between qualitative and qualitative approaches

Qualitative approach	Quantitative approach
Subjective	Objective
Context specific	Variables specific
Results may not be generalized always	Mostly results are generalized beyond sample
General approach to problem solving	Specific approach to problem solving
Interpretation of information of behaviors and phenomenon and making personal judgment about them	Interpretation is made on the facts and figures based on data collected through different techniques.
Why question is answered by exploring hidden meanings of contextual settings	How and when questions are answered by collecting numerical data about specific variables under study.
Variables are defined in general terms in explaining the relationship with each other.	Specific operational definitions are formulated before data collection and analysis.
May be considered as soft science	May be considered as hard science
This is used for theoretical development	This approach is used for testing the conceptual frameworks
Maximum involvement of researcher in research process is found.	Researcher is a separate entity and no involvement for personal judgment is found
Reports are produced in the form of description and interpretation based on personal judgment.	Reports are produced based on the statistical testes carried out on the collected data from respondents.

Mix method approach addresses the problem statement in an effective as it involves analysis based on both types of data i.e. qualitative and quantitative. The analysis based on mixed method approach strengthens the study as compared to analysis carried out based on one approach only (qualitative or quantitative) thus in certain cases it is more beneficial (Creswell, 2008).

3.2 Research Methods Adopted

3.2.1 Research design

This study is focused to find out the impact of organizational mechanisms and human behavior mechanisms on components of Absorptive Capacity along with internal process and views of employees related to absorptive capacity process. Research studies may be categorized in many perspectives and these categories may not be mutually exclusive all the times. However, Cooper and Schindler (2006) suggest that all the studies may be categorized into two broad categories on the basis of time taken to complete the study. The study which requires long time to complete is referred as longitudinal study and other type of the study which uses a snap shot technique and data is collected and analyzed only in a particular time frame is referred as cross sectional study. This study consists on mix method approach as the development of framework requires both quantitative as well as qualitative results. The organizational mechanisms and human behavior mechanisms will be part of quantitative portion of study similar to studies on absorptive capacity found in literature such as Zahra and Georg (2002), Szulanski (1996), Jansen et al (2005) etc. However, to address the issues related to knowledge processe, critical success factors and transformation process, qualitative studies will be conducted. The qualitative study will fill the gaps left in the quantitative as it is often carried out by direct interaction with human beings. This study overall combines both types of studies to address research questions and achieve the objectives.

3.2.2 Sample and procedures

3.2.2.1 Unit of analysis

Unit of analysis refers to the specific entities from which the data is collected for the study. Nature and type of study generally define the unit of analysis. However, research question and objectives of study directly define the focused unit of analysis. Basic purpose of selection of unit

of analysis is to gauge the variables of study. Neuman (1997) exposes the unit of analysis as the entities used for measuring the specific variables under study to answer the research question. This study aims to explore the impact of organizational and human behavior mechanisms on Absorptive Capacity and its components in knowledge intensive environment. In knowledge intensive environment (pharmaceutical companies) the knowledge process activities are mostly handled by supervisors, managers, general managers and specialists of the field. A comprehensive interview was carried out in this regard with senior managers of knowledge intensive companies of Pakistan and academia experts to further gain insights about the unit of analysis. Conclusively, the data was collected from employees, supervisors, managers at all levels and managers holding special managerial posts and designation such as plant engineer, production unit engineer, planning and control cell manager etc.

3.2.2.2 Data collection and management

The data for study is collected on some criterion and broad criteria as argued by Sekaran (2005) such as sample size required, cost, time, resources and type of study being conducted.

There are two major sampling design namely as probability and non probability sampling designs. The probability sampling design is used in situation when we want to gain generalizability from the results of sample data. Whereas, the non probability sampling design is used when we are constrained with time and resources and generalizability is not priority (Sekaran, 2005). The probability sampling design is further divided into categories. This study uses probability sampling (stratified random sampling) for quantitative portion and interviews and case studies for qualitative portion of study. In stratified random sampling the data is stratified and in each stratum random sampling is carried out. Segregation may be done on the basis of groups, types, distances or geographical locations. Knowledge intensive companies are concentrated in three geographical locations thus forming three strata for study. This research work collected data by stratified random sampling based on geographical locations.

The data collection was managed through multiple ways because respondents were stratified at wider geographical locations. The cost and time factors were considered and data collection was carried out in combination of different ways. Majority data was collected through mailed questionnaires and “drop and pick” methods. Although the self administered data collection

method has low response and chances of biasness also increase but the pre emptive measures for maximizing responses were adopted as suggested by Sekaran (2005). These include wording of instructions, clarity of questions, and convenience of respondents in answering questions through appearance of questionnaires. The mailed questionnaires were received back through e mail and through stamped envelopes sent with questionnaires. Drop and pick was another major data collection technique adopted for this research work. Personal contacts for management of data were used and healthy response was observed from respondents through this technique because the reminders about filling the questionnaires were given through contacts. This method was costly but proved to be more effective than any other techniques adopted for data collection.

First reminder was given fifteen to twenty days after distribution of questionnaire. In knowledge intensive companies the employees are committed to their jobs extensively and through in depth interviews with senior managers it was revealed that employees usually take such survey questionnaires to their homes and fill at their convenience. A gap of fifteen days was given to them so that they could give quality response in genuine way. Maximum questionnaires were returned by respondents after two to three reminders. A healthy portion of respondents filled the questionnaires after a few reminders but handed over very late because of administrative matters. Majority of such respondents were out of their work places and some were found out of city of abroad. In such cases the survey questionnaires were directly picked from them in person or through colleagues and other personal contacts. The response rate was ensured high through managing the collection of questionnaires in person. This added cost to research process but high response rate was achieved. Method of data collection through e mail was also adopted but the response rate was very low. Maximum response against mailed questionnaires was obtained and managed through prepaid and stamped envelopes and personal contacts to collect the questionnaires forms from respondents.

3.2.2.3 Sample and sample size

Sample size has been discussed extensively in research. Sufficient sample size leads the researchers to validate their finding and interpretation of results becomes easy. Based on sample size, results of the study are generalized to the whole population from which the sample comes.

The results of the study may only be generalized beyond sample if the sample is true reflection of population from which the sample comes.

Different types of studies require different types of sample. The size of the sample depends on number of factors. Hussey and Hussey (1997) and Neuman (1997) highlight accuracy required, number of variables in study, statistical tools used and type of population as contributors to decide the sample size for any study. This study uses regression analysis for its hypotheses testing. Sample size for studies based on regression analysis has been argued in research in different angles. As a general practice and rule of thumb in regression analysis 10 cases per variable (predictors) has been suggested. Second rule of thumb argues the 15 cases per predictor in regression analysis.

In fact the sample size depends upon the effect size that is to be detected. Greek (1991) suggest two rules of thumb for regression analysis to decide about sample size. In first case (50 plus 8K) is the formula and in second rule of thumb 104 plus k is used for minimum sample size for studies using regression analysis to answer research question. In both the cases the sample size will be used which gives greater value.

Despite all the rules and thumb, generally the research literature is unable to define sample size , however, greater sample size accurately produces results. This study aims to explore contribution of organizational and human behavior mechanisms in explaining Absorptive Capacity and uses greater sample size in all the studies of this work. Sample of more than 350 was used for every study which met each of the above mentioned criteria.

3.2.2.4 Hypotheses testing procedures

This study aimed to answer the general research question about the mechanisms inside the organization for development of Absorptive Capacity in knowledge intensive environment. This study further aimed to answer research objectives specific to organizational mechanisms and human behavior mechanisms in the organization. The hypotheses were generated in order to achieve objectives of study. Hypotheses were tested using multiple regression analysis in case of organizational mechanisms related to Formalization, Cross Functional Integration and Job

Rotation. The dependent variables were regressed on independent variables depending upon the hypotheses statements.

The hypotheses related to human behavior mechanisms were tested by using regression analysis and mediating testing procedure suggested by Barron and Kenny (1986) and Hayes (2013 & 2015). The procedure uses multiple regression equations for testing mediation effect of variables in the relationship of independent and dependent variables. The significance testing of mediators in the relationship of independent and dependent variables was carried out by using Sobel's test. The SPSS software was used in the hypotheses testing of study variables.

3.2.3 Measures of constructs of study

The measures of study were developed from the existing literature and were tested for its reliability and adjusted as per environment of knowledge intensive environment and in the context of knowledge intensive companies of Pakistan. During the development phase of measures a detailed discussion was carried out with professionals of this field. Pilot study was also conducted to see the validity of measures and problematic items in the measures were readjusted and modified measures were used for this study.

The measures for components of Absorptive Capacity were developed based on the measures developed by Jansen et al (2005). The Acquisition component was designed to capture the ability and aptitude of organization towards Acquisition process of knowledge. As in knowledge intensive companies' knowledge Acquisition is a continuous process. The companies having interaction within their departments and interactions outside the company acquire more knowledge as compared to companies without any interaction. The items of Acquisition measure were designed to tap the extent to which the employees in the organization interact with in and outside their companies.

Assimilation measure taps the opportunities and aptitude of companies to assimilate the new knowledge. New knowledge and its interpretation is the core theme of knowledge Assimilation capability. Transformation refers to the extent to the employees combine the existing knowledge to newly acquired knowledge. The items tapped the Transformation by focusing on the processes adopted by employees to deal with new knowledge and use the existing knowledge in

combination with new knowledge. The Exploitation was tapped by the items with the theme to exploit the acquired knowledge and existing knowledge for better utilization of knowledge within organization.

Affective Commitment was tapped by items focusing on emotional attachment of employees with the organization. Most of the items focused on liking of company and acceptance of company by employees. The items like “this organization has a great deal of personal meaning for me”, “I would be very happy to spend rest of my career with this organization” deal the extent of personal and emotional attachment of employees with their organization.

Tacit Knowledge Sharing was tapped by four items with the theme to find personal knowledge sharing of employees with employees inside the organization. Sharing of personal experience, ideas about work and hidden tips about the job were main focused dimensions to explore the employees to which extent they share tacit knowledge with others in the organization.

Measure for Instrumental Ties was also tapped with four items. The theme for designing these items was to find out the helping behavior of employees with other employees in the organization. Team work, sharing advice, provision of assistance to employees and mutual understanding attributed to the construction of this instrument.

Formalization was tapped with six items and instrument focused on the aspect to which the employees in the organization use written operating procedures for processing activities in the organization. The items like “the workers regularly follow written operating procedures” and “written job descriptions exist for most employees” directly tap the written procedures followed by employees in the organization.

Cross Functional Integration was measured with six items. The items focused on the extent to which the employees perform different functions within the organization the items like “cross functional teams are an important source of new ideas” and “cross functional teams are formed to solve problems” directly tap the Cross Functional Integration found in the company.

Job Rotation was taped with two questions stating that employees are rotated between different jobs and employees are rotated between different departments.

3.2.4 Reliability and validity

Reliability refers to the repeatability of the results by using same instruments across different studies. This study used Chronbach alpha to find the internal consistencies of items measuring the instrument. The 0.6 value of reliability statistic (Chronbach alpha) is sufficient for exploratory studies. The values of Chronbach alpha greater than 0.7 are considered very good. The values of Chronbach alpha for this study were observed above 0.7 for most of the measures.

Validity refers to instruments measuring what it was supposed to measure. The instrument is called a valid measure if it taps the concept in real sense. Measures for this study were developed from well validated instruments found in research followed by the review by experts of the field. It was expected to have sufficient validity. To find the validity of the measures of study factor analysis was performed. The details of the factor analysis are discussed in chapter 4.

3.3 Pilot Study

3.3.1 Introduction

The survey instruments were developed from well validated scales of all the variables constructs of this study. A pilot listing was carried out for validation of instrument in the context of this study. The items of measure were first evaluated through group of specialists, management faculty of management department and expert. The major focus was based on theme of study. The working style, contents pattern aspect of convenience of understanding by respondents and face validity was evaluated by the team. The experts suggested certain changes and minor adjustments in the instruments and after necessary corrections the instruments were finalized.

The readjusted instruments were further assessed through a small sample of 67 respondents. It was revealed that some of the items were not answered correctly. The instruments and the wording of specific instrument were changed where it was found ambiguous and the respondents found difficulty in answering such cases. All these cases were discussed with the experts as well as with the respondents in order to refine the final questionnaire. Majority of the questions in almost all the instruments were addressed correctly by respondents, however, few were re-worded and modified as per local settings and in Pakistani context. All the questions in the instruments were subjected to the respondents to get responses in pilot study.

The minor changes in the instruments were made after the pilot study and before using it for main study some of the item were deleted from the instruments as those were not pertaining to the knowledge intensive industry especially in case of Pakistani environment. Majority of the respondents put cross against such items and gave remarks as “not understood” or not applicable to our set up. This pilot study aimed to explore the weaknesses of instruments along with validity, therefore, respondents participating were approached personally were by the author to highlight the ambiguous and irrelevant items found in the instrument. The purpose of the study was explained to them, so that they should give genuine responses. The deletion of irrelevant items was aligned with finding of justification of the respondents and discussion with experts of the fields. Majority of respondents argued that in personal capacity they visit but formally and in professional aspects their views were neutral or to some extent ambiguous. Generally this item was not answered satisfactorily by respondents and overall views of respondents were diverse among respondents, all other items from the instruments were modified by following the same process. However, less ambiguous or less irrelevant items were included in the instruments of main study. As the sample size for this pilot study was small and it was collected from a specific area and questionnaires were explained to them in detail and they might have changed their views and they could not answer the items in an unbiased way. Therefore it was expected that as the sample size is increased and respondents from diverse experience are included, the issue of little ambiguity will be solved. Appendix-1 shows all the instruments used in this work.

Pilot study data was analyzed to see the general observation about the correlation between different independent and dependent variables. Descriptive statistics of main variables followed by inferential statistics such as correlation matrix and regression were produced by using SPSS software. Next section shows the results conducted on pilot study data.

3.3.2 Results

The results were produced on main variables only. Description of variables, correlation and regression results were obtained. Following sub sections describe the results generated by SPSS.

3.3.2.1 Descriptive statistics

Mean response of variables were produced with their standard deviations mean response of the Absorptive Capacity components i.e., Acquisition, Assimilation, Transformation and Exploitation were observed in the 4.49 to 4.59. Average response against Affective Commitment was observed as 4.71. However, mean response of variables i.e., Tacit Knowledge Sharing, and Formalization, Cross Functional Integration, Instrumental Ties and Job Rotation were observed in the range of 3.1 to 3.8 and standard deviation of all variables was observed below 1.**Table 3.2** show the results of descriptive statistics.

Table 3.2 : Descriptive Statistics of pilot study

Variable name	Mean value	Standard deviation
Acquisition	4.49	0.98
Assimilation	4.52	0.79
Transformation	4.59	0.90
Exploitation	4.55	0.81
Affective Commitment	4.71	0.86
Tacit Knowledge Sharing	3.76	0.59
Formalization	3.51	0.63
Cross Functional Integration	3.40	0.75
Instrumental Ties	3.81	0.71
Job Rotation	3.1	1.10

3.3.2.2 Correlation Matrix

Correlation matrix of study variables shows significant association of independent variables with dependent variables except Job Rotation with different components of Absorptive Capacity. Generally, the independent variables were shown to have positive association with different components of dependent variables. Table 3.3 shows the association of variables in the form of correlation matrix.

Table 3.3 : Correlation matrix of pilot study variables

		ACQ	ASM	TFM	EXPL	AFC	TKS	FORM	INT	INST	JR
ACQ	Pearson Correlation	1									
	Sig. (1-tailed)										
	N	67									
ASM	Pearson Correlation	.747**	1								
	Sig. (1-tailed)	.000									
	N	67	67								
TFM	Pearson Correlation	.676**	.543**	1							
	Sig. (1-tailed)	.000	.000								
	N	67	67	67							
EXPL	Pearson Correlation	.240*	.255*	.371**	1						
	Sig. (1-tailed)	.025	.018	.001							
	N	67	67	67	67						
AFC	Pearson Correlation	.590**	.540**	.650**	.319**	1					
	Sig. (1-tailed)	.000	.000	.000	.004						
	N	67	67	67	67	67					
TKS	Pearson Correlation	.239*	.203*	.310**	.151	.319**	1				
	Sig. (1-tailed)	.026	.049	.005	.111	.004					
	N	67	67	67	67	67	67				
FORM	Pearson Correlation	.231*	.191	.411**	.365**	.316**	.523**	1			
	Sig. (1-tailed)	.030	.060	.000	.001	.005	.000				
	N	67	67	67	67	67	67	67			
INT	Pearson Correlation	.593**	.558**	.571**	.506**	.568**	.337**	.567**	1		
	Sig. (1-tailed)	.000	.000	.000	.000	.000	.003	.000			
	N	67	67	67	67	67	67	67	67		
INST	Pearson Correlation	.211*	.182	.298**	.149	.411**	.523**	.383**	.416**	1	
	Sig. (1-tailed)	.043	.070	.007	.114	.000	.000	.001	.000		
	N	67	67	67	67	67	67	67	67	67	
JR	Pearson Correlation	.082	-.026	.107	.380**	-.061	-.135	.118	.205*	-.104	1
	Sig. (1-tailed)	.255	.417	.195	.001	.312	.138	.171	.048	.201	
	N	67	67	67	67	67	67	67	67	67	67

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

3.3.2.3 Regression Analysis

Data for this pilot study was subjected to multiple regression analysis for hypotheses testing in

Table 3.4. : Multiple regression results with Absorptive Capacity components as dependent variables and organizational mechanisms related to Formalization, Cross Functional Integration and Job Rotation as independent variables

model		Unstandardized coefficients		Standard coefficients	T	Sig
		B	Std. Error	Beta		
Acquisition as dependent variable						
1	(Constant)	2.087	.661		3.159	.002
	FORM	.258	.203	.154	1.271	.028
	INT	.965	.173	.689	5.590	.000
	JR	-.039	.096	.041	-.400	.690
Assimilation as dependent variable						
1	(Constant)	2.489	.745		3.343	.001
	FORM	.342	.229	.184	1.495	.040
	INT	.880	.195	.692	5.554	.000
	JR	.154	.109	-.146	1.415	.051
Transformation as dependent variable						
1	(Constant)	1.757	.577		3.043	.003
	FORM	.183	.177	.128	1.031	.030
	INT	.597	.151	.500	3.958	.000
	JR	-.009	.084	-.011	-.102	.919
Exploitation as dependent variable						
1	(Constant)	1.925	.521		3.695	.000
	FORM	.148	.160	.114	.924	.359
	INT	.415	.136	.383	3.047	.003
	JR	.210	.076	.288	2.762	.008

general terms as narrated in chapter 2.Although the data collected for pilot testing may not reflect true picture but it gives us rough view about the association of independent variables. This study shows only regression results of organizational mechanisms and it is shown to have positive impact on Absorptive Capacity components with varying intensities and significance level.

Table 3.4 shows the results of regression analysis in the context of organizational mechanisms related to Formalization, Cross Functional Integration and Job Rotation. The Absorptive Capacity components were regressed on organizational mechanisms.

3.3.2.4 Discussion and Analysis

Pilot study was based on small data set. Descriptive statistics show the responses of employees in knowledge intensive companies against individual variables of study. The regression results show the impact of organizational mechanisms to have positive impact on Absorptive Capacity overall. The results may not be generalized to population as small data set was used to find the association between different variables and contribution of organizational mechanisms in explaining the Absorptive Capacity. The results give us rough idea about the nature of relationships between variables. Organizational mechanisms were observed as positive contributors in explaining the Absorptive Capacity and its different components. Data collection was conducted with personal interaction of author with respondents of pilot study. The respondent might have become seasoned as they responded the questionnaires with full understanding where as, the actual data for main study was collected in natural environment. The aim of pilot study was to see any abnormality in the data and study variables. Overall, the results of regression analysis for relationship between different variables were aligned with the research question and objectives of study. The relationship between variables appeared to support the hypotheses in regard to independent and dependent variables as narrated in chapter2.

3.3.2.4 Conclusion

Based on the results of pilot study it may be concluded that the data may be collected for main study after minor adjustments in the measures of different variables.

3.4 Data analysis and methods adopted for main study

This study adopted multiple methods for analysis of data. In initial phase the data was analyzed through visual looks to see any abnormality of data followed by descriptive statistics including mean responses of employees, standard deviations and percentages of employees participating in the study. The data collected was divided into clusters and subjected to various tests such as ANOVA. Basic aim was to analyze data in perspective to find any differences between early and late respondents (non response bias). The data collected was subjected to different reliability and validity tests to see the trend of deviation from its original designs. Chronbach alpha was taken as statistic of reliability of different measures used in this study. Factor analysis was applied to items of different measures to see the convergence of these items to their respective factor. Principal component analysis and verimax rotation method were adopted to extract factors while performing factor analysis.

After carrying out the initial analysis, the data was subjected to inferential statistics. Correlation matrix was drawn to see association between different variables under study for discussion and analysis of objectives and research questions of study. The association between independent and dependent variables tells us nature and strength of association between variables. Scatter plot was produced by using SPSS software to see the general association, shape of association between variables and general trend in the data. Regression analysis was used as one of the methods to test different hypotheses of study. Regression analysis explains the impact of independent variables on dependent variables. Regression analysis explains the strength and direction of contribution of independent variable sin explaining dependent variable. The independent variables in this study were organizational mechanisms and human behavior mechanisms. To be more precise, impact of organizational mechanisms related to Cross Functional Integration, Formalization and Job Rotation was observed using regression equations on four components of Absorptive Capacity named as Acquisition, Assimilation, Transformation and Exploitation as dependent variable. Similarly, contribution of human behavior mechanisms related to Tacit Knowledge Sharing, Instrumental Ties and Affective Commitment was produced through regression equation across different studies in this thesis work. Mediation testing of certain human behavior mechanisms such as Affective Commitment was executed by using testing procedure for mediation by Barron & Kenny (1986). They explain the impact of indirect

effect of independent variable on dependent variable through other variable. The testing procedure follows three regression equations. In first equation the mediator is regressed on independent variable and results are analyzed. This result should be significant for further proceeding to test mediation testing. In second regression equation the dependent variable is regressed on independent variable. This should also produce significant results like first regression equation. In third equation dependent variable is regressed on independent variable and mediator in the same equation simultaneously. In this equation if the mediator shows significant results and impact of independent variable on dependent variable is reduced as compared to impact of independent variable on dependent variable on dependent variable in second equation then it is perceived that mediation effect is present in relationship of independent and dependent variable. Finally, the significance of mediation effect was observed by using Sobel's test for mediation testing for significance. Results were produced for diagnostics of regression analysis in different equation to see whether regression analysis meets the assumptions of regression analysis or not.

3.4.1 General trend of data

Data was collected for study variables to test different hypotheses of study as presented in chapter2.

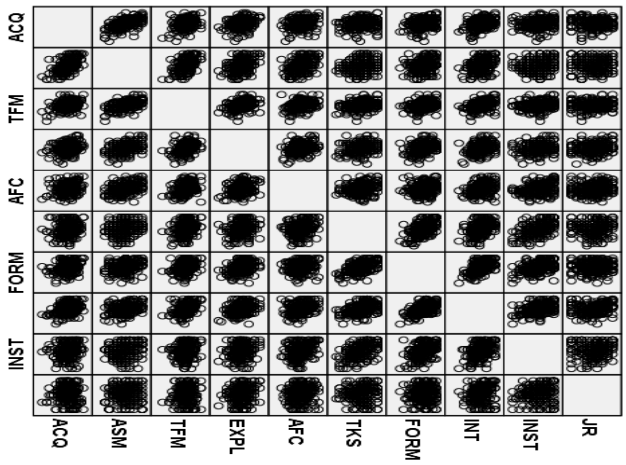

Figure 3.1 : scatter plot of pilot study variables

It was compulsory to inspect data in different perspectives and first of all data was tabulated in SPSS software and dealt with missing values. The data was subjected to different test such as frequency tables, maximum and minimum values to see any anomalies in data. To answer research objectives hypotheses were tested using regression analysis. It was necessary to see the graphical look of association between different variables included in this study. Scatter plot was produced for this purpose. Scatter plot in figure 3.1 shows relationship between variables of study.

Table 3.5 : The t test of early and late respondents

variable	T value	significance
Acquisition	2.13	0.413
Assimilation	0.20	0.212
Transformation	1.92	0.290
Exploitation	2.31	0.119
Formalization	1.82	0.611
Cross Functional Integration	1.01	0.220
Job Rotation	1.99	0.310
Tacit Knowledge Sharing	2.87	.199
Instrumental Ties	1.87	.091
Affective Commitment	3.03	.082

3.4.2 Sampling Biasness

The data collected from different respondents is assumed that the respondents who responded this survey may have views different from the respondents who did not respond to this survey. This is referred as non response bias in research literature. This issue is addressed in different

ways in research. Armstrong & Overton (1977) suggest three ways to resolve this issue. First, non response bias may be estimated by using the known values found in the real scenario. Second, it may be estimated by estimations and third by using extrapolation of the values. As the actual population parameters are impossible to discover accurately and therefore, subjective approach in estimating the non response bias may also not be accurately estimated. The method suggested and practiced in research is to compare the responses of early and late respondents of study. Table 3.5 shows the t test results of early and late respondents against different variables of study.

Highly non significant results (t test) show that there are no differences in the responses between the respondents who responded the survey early and the respondents who responded the survey late. This provides us sufficient evidence that respondents and non respondents do not differ in their responses towards study variables.

3.5 Studies conducted

This thesis work aimed to develop absorptive capacity framework in knowledge intensive environment (pharmaceutical companies) and conducted both quantitative and qualitative studies. The data was collected from pharmaceutical companies of Pakistan. The impact of organizational mechanisms and human behavior mechanisms was studied and analyzed by using regression analysis and other related statistical tests. The contribution of organizational mechanisms and human behavior mechanisms on four components of Absorptive Capacity were studied in different studies. The hypothesis testing was carried out in different studies based on the data collection from knowledge intensive companies of Pakistan. Four quantitative and three qualitative studies were conducted in this work. Study1 related to organizational mechanisms and potential absorptive components named as Acquisition and Assimilation. Study 2 focuses on the impact of organizational mechanisms related to Formalization, Cross Functional Integration and Job Rotation on realized Absorptive Capacity components named as Transformation and Exploitation. Study 3 was conducted to find the impact of human behavior mechanisms related to Tacit Knowledge Sharing, Instrumental Ties and Affective Commitment on potential Absorptive Capacity components named as Acquisition and Assimilation. Study 4 focused on impact of human behavior mechanisms related to Tacit Knowledge Sharing, Instrumental Ties

and Affective Commitment on realized Absorptive Capacity components named as Transformation and Exploitation. First study of qualitative portion(Study 5) was conducted to explore the critical success factors, second study of qualitative portion (study 6) aimed to explore the transformation process in and third qualitative study (study 7) focused on the roles of middle managers as boundary spanners. Following sub sections briefly introduce these studies conducted in pharmaceutical companies of Pakistan:-

3.5.1 Study 1: Study of relationship between organizational mechanisms related to Formalization, Cross Functional Integration and Job Rotation and potential Absorptive Capacity (Acquisition and Assimilation Components)

This study explores the impact of organizational mechanisms i.e. Formalization, Integration and Job Rotation on two components of Potential Absorptive Capacity i.e., Acquisition component and Assimilation component. This is the quantitative study which evaluates the extent to which organizational mechanisms contributing to develop Absorptive Capacity.

Data was collected through questionnaires through stratified random sampling technique from three strata of our study population of knowledge intensive companies based on geographical locations. As in knowledge intensive environment the knowledge process activities are handled by supervisors, managers, general managers and specialists such as plant managers' special task handling employees thus forming unit of analysis for this study. Data collected for this study consisted on respondents from different educational background, age groups, managerial positions and different work experiences along with other demographics such as gender etc.

Survey questionnaires were managed to get data from respondent through mail, e-mail and "drop and pick" methods. Response of respondents who were sent questionnaires through e-mail responded with low percentage, however, rest techniques worked well. Feed back and follow ups were made a regular feature to get maximum response in all data collection methods adopted in this study. Regular reminders were sent to respondents to fill the questionnaires at earliest. Maximum survey questionnaires were filled by respondents after first and second reminder.

Data analysis was conducted through different statistical tests. Data was visually inspected for any abnormality. After initial analysis data was subjected to inferential statics such as

correlation matrix for checking the strength and direction of association between variables. Scatter matrix plot was produced to see the general shape of association between independent and dependent variables. In the alignment of reaearch question and objectives the hypotheses tasting was carried out by using multiple regression analysis. Tests for assumptions of linear multiple regression analysis were also conducted. The analysis was carried out on the collected data by using SPSS software.

3.5.2 Study 2: Study of relationship between organizational mechanisms related to Formalization, Cross Functional Integration Job Rotation and potential Absorptive Capacity (Transformation and Exploitation)

This study explores the impact of organizational mechanisms i.e. Formalization, Integration and Job Rotation on two components of Realized Absorptive Capacity i.e., Transformation and Exploitation component. This is the quantitative study which evaluates the extent to which organizational mechanics contribute in building Absorptive Capacity of organization.

Data was collected through questionnaires through stratified random sampling technique from three strata of our study population of pharmaceutical companies based on geographical locations. As in knowledge intensive environment the knowledge process activities are handled by supervisors, managers, general managers and specialists such as plant managers' special task handling employees thus forming unit of analysis for this study. Data collected for this study consisted on respondents from different educational background, age groups, managerial positions and different work experiences along with other demographics such as gender etc.

Survey questionnaires were managed to get data from respondent through mail, e-mail and "drop and pick" methods. Response of respondents who were sent questionnaires through e-mail responded with low percentage, however, rest techniques worked well. Feed back and follow ups were made a regular feature to get maximum response in all data collection methods adopted in this study. Regular reminders were sent to respondents to fill the questionnaires at earliest. Maximum survey questionnaires were filled by respondents after first and second reminder.

Data analysis was conducted through different statistical tests. Data was visually inspected for any abnormality. After initial analysis data was subjected to inferential statics such as

correlation matrix for checking the strength and direction of association between variables. Scatter matrix plot was produced to see the general shape of association between independent and dependent variables. In the alignment of research question and objectives the hypotheses tasting was carried out by using multiple regression analysis. Tests for assumptions of linear multiple regression analysis were also conducted. The analysis was carried out on the collected data by using SPSS software.

3.5.3 Study 3: study of relationship between human behavior mechanisms related Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment and Absorptive Capacity (Acquisition and Assimilation components)

This study explores the impact of human behavior mechanisms related to Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment on two components of Potential Absorptive Capacity i.e, Acquisition and Assimilation components.. This is the quantitative study which evaluates the extent to which human behavior mechanisms contribute in building Absorptive Capacity of organization.

Data was collected through questionnaires based stratified random sampling technique. Data was collected from three strata of our study population of knowledge intensive companies based on geographical locations. As in knowledge intensive environment the knowledge process activities are handled by supervisors, managers, general managers and specialists such as plant managers' special task handling employees thus forming unit of analysis for this study. Data collected for this study consisted on respondents from different educational background, age groups, managerial positions and different work experiences along with other demographics such as gender etc.

Survey questionnaires were managed to get data from respondent through mail, e-mail and "drop and pick" methods. Response of respondents who were sent questionnaires through e-mail responded with low percentage, however, rest techniques worked well. Feed back and follow ups were made a regular feature to get maximum response in all data collection methods adopted in this study. Regular reminders were sent to respondents to fill the questionnaires at earliest. Maximum survey questionnaires were filled by respondents after first and second reminder.

Data analysis was conducted through different statistical tests. Data was visually inspected for any abnormality. After initial analysis data was subjected to inferential statics such as correlation matrix for checking the strength and direction of association between variables. Scatter matrix plot was produced to see the general shape of association between independent and dependent variables. In the alignment of research question and objectives the hypotheses tasting was carried out by using multiple regression analysis. Tests for assumptions of linear multiple regression analysis were also conducted. The analysis was carried out on the collected data by using SPSS software. Mediation effects of variables were tested by using testing procedure suggested by Barron and Kenney (1986). They used multiple regression equations for mediation testing. Three regression equations are used for mediation testing of one mediator in the relationship of independent and dependent variable. The mediation effect and its significant contribution in the relationship of independent and dependent variables was tested by Sobel's testing procedure of significance testing of mediators.

3.5.4 Study 4: study of relationship between human behavior mechanisms related Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment and Absorptive Capacity (Acquisition and Assimilation components)

This study explores the impact of human behavior mechanisms related to Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment on two components of Potential Absorptive Capacity i.e., Acquisition and Assimilation components.. This is the quantitative study which evaluates the extent to which human behavior mechanisms contribute in building Absorptive Capacity of organization.

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SPSS software was used to factor analyze the instruments of study variables both independent and dependent variables. After checking the validity and reliability of measures of variables the data was analyzed in SPSS software for testing hypotheses.

Data analysis was conducted through different statistical tests. Data was visually inspected for any abnormality. After initial analysis data was subjected to inferential statics such as correlation matrix for checking the strength and direction of association between variables. Scatter matrix plot was produced to see the general shape of association between independent and dependent variables. In the alignment of research question and objectives the hypotheses tasting was carried out by using multiple regression analysis. Tests for assumptions of linear multiple regression analysis were also conducted. The analysis was carried out on the collected data by using SPSS software. Mediation effects of variables were tested by using testing procedure suggested by Barron and Kenny (1986). They used multiple regression equations for mediation testing. Three regression equations are used for mediation testing of one mediator in the relationship of independent and dependent variable. The mediation effect and its significant contribution in the relationship of independent and dependent variables was tested by Sobel’s testing procedure of significance testing of mediators.

3.5.5 Study 5: Identification of critical success factors attributing to development of absorptive capacity.

In this study qualitative study informal interview technique was adopted to get insights of absorptive capacity and critical factors. New insights may be explored by using a step wise thematic analysis with inductive approach and in-depth interviews. The informal interviews with open ended questions led to get quick and quality data from respondents.

The data was collected from participants involved in knowledge activities (absorptive capacity). This study was conducted in two phases. In phase 1 the interviews were conducted with the main focus to explore the views of respondents at all levels and in entire process of absorptive capacity by following thematic analysis approach the responses were analyzed and interpreted into to tap themes and sub themes. In phase 2 the refinement of these themes and generation of subthemes was carried out in two focus group interviews. The feedback process was conducted through informal conversations with all levels of employees.

3.5.6 Study 6: Processing knowledge (Transformation Process) in pharmaceutical companies

This study aimed to explore transformation process based on the competence level of donors and recipients. The competence level of the employees of two departments, manufacturing and R& D was evaluated in the transformation process. The transformation process was evaluated in three stages. Individual interviews were conducted in first stage. In second stage the focus group interviews were conducted and in third stage a case study was conducted to validate the results of these two stages.

In individual interviews the transformation process was evaluated and donors and recipients in the transformation process were identified. In stage 2, two focus group interviews were conducted in order to evaluate the level of technology transformation in context to competence level of both donors and recipients in pharmaceutical companies. The respondents were given opening narrative with clear objective (to discuss the transformation process) of transformation process. The arrangements of sitting were planned such that they could clearly respond each other. The researcher controlled the discussion and used to intervene when the discussion became out of scope. The case study with two pronged approach (observation and informal interviews with stake holders) was also conducted. The pattern of flow of activities was observed and the executers were interviewed when the need was felt in order to understand the transformation process.

3.5.7 Study 7: Roles of middle managers in development of absorptive capacity

The objective focused on identification of role of middle managers in knowledge intensive organizations in the context of absorptive capacity. More specifically, commonality and conflicts about the roles of middle managers perceived by employees, middle managers themselves and decision makers are identified, with the aim of broadening the concepts of absorptive capacity by identifying the micro systems of companies.

Keeping focus on quality data collection, initial interviewees were asked to suggest of names of employees, managers and decision makers across pharmaceutical organizations, best suited for this study. This saved our time and resources and we achieved the saturated views of employees, middle managers and decision managers in minimum sessions.

This study was conducted in four phases. The respondents in four phases consisted on both the genders with different qualification levels and different age groups. Pharmaceutical companies in Pakistan are male dominant therefore; proportionally more males were part of this study than females. At the same time, qualification and age groups were taken into consideration and specialists with more than 40 years covered healthy portion of data of this study.

Using Semi structured, open ended interviews it was explored how employees, middle managers and decision makers perceive the role of middle managers in knowledge intensive pharmaceutical companies in context to the absorptive capacity process. Interviews were conducted in English and native language was only used to support understanding and clarity of communication on both sides. Most of the interviews were conducted at the work place of respondents yet a healthy portion of respondents opted to be interviewed off site. A few number of respondents refused to be interviewed yet a negligible portion regretted to be interviewed being irrelevant to the subject. The respondents were approached again for clarity of responses in ambiguous cases though small in number. Thematic analysis was performed on transcribed information retrieved from respondents. The four phases of this study are as:

Phase1: **Roles of Middle Managers perceived by decision makers (DM), middle managers (MM) and employees (EMPL)**

This phase of study was conducted to explore the role of middle managers in context to absorptive capacity process. The data was collected from decision makers, middle managers themselves and employees in parallel without sharing the responses between these three categories to achieve independent responses. The interviews were conducted with informal

discussion in the start and ended up with a specific research question focusing on the role of middle managers.

The interviews were continued till achievement of theoretical saturation. Theoretical saturation is achieved when no additional data is achieved and new information from the respondents do not create further codes as repeated responses are obtained. To achieve saturation point respondents were objectively selected for our study with special focus on homogeneity of sample, therefore, respondents from similar background, qualification and length of service were included. The data was collected in three rounds.

Thematic analysis led to identify the roles of middle managers from three categories of respondents in the management hierarchy from employees to middle managers to decision makers. It was observed that the roles of middle managers perceived by employees, middle managers and decision makers ranged from commonalities and conflicts from one another.

Phase 2: Extent to which employees (EMPL) agree to the perception of decision makers (DM) and middle managers (MM) about the roles of middle managers

In this phase of study perception of employees were tapped about the middle managers as perceived by middle managers and decision makers. Specifically, employees were asked the extent to which they agreed with the perception of roles by middle managers and decision makers. Their degree of agreement was recorded in four shades as low, medium, high and very high.

Phase 3: Extent to which middle managers (MM) agree to the perception of decision makers (DM) and employees (EMPL) about the roles of middle managers

The degree of agreement of middle managers like phase2 was also tapped with four shades as low, medium, high and very high. They were asked the extent to which they were agreed to the roles of middle managers identified by employees and decision makers.

Phase 4: **Extent to which decision makers (DM) agree to the perception of employees (EMPL) and middle managers (MM) about the roles of middle managers**

This phase was also conducted on the same pattern as phase2 and phase3. The extent of agreement of decision makers with the perceived roles of employees and middle managers were studied in this phase with four shades namely as low, medium, high and very high.

3.6 Chapter Summary

This chapter describes the research methodology used for this thesis work. The research being based on mix method approach, the data was collected through multiple methods such as questionnaires, interviews, case study, focus group and process observation. A stratified random sampling technique was used for data collection in qualitative studies and qualitative data collection techniques (interviews etc) were adopted to collect data in qualitative studies. Before collection of data for main study a pilot study was conducted to see the validity of measures of study. Based on pilot study measures were readjusted and refined. Mailed, e-mailed and “drop and pick” methods were used for data collection from respondents. Survey data was analyzed keeping in view the objectives of study is SPSS software. Multiple regression analysis and mediation testing procedures were used for hypotheses testing as described in study. Descriptive and inferential statistics were narrated for analysis and discussion of results.

CHAPTER- 4

RESULTS

4.0 Introduction

This chapter describes the results of studies conducted in order to answer the research questions and objectives as described in chapter 1. The results highlight the impact of two mechanisms from inside the organization namely as organizational mechanisms and human behavior mechanisms on four components of Absorptive Capacity. The contributions of antecedents related to these two mechanisms in knowledge intensive environment were determined by applying different statistical tests in SPSS software. Data collected from employees from knowledge intensive companies (pharmaceutical companies) was analyzed in the light of research objectives. Multiple regression analysis was applied to find the impact of different independent variables on Absorptive Capacity components. To be more precise, relationships of organizational mechanisms related to Formalization, Cross Functional Integration and Job Rotation and human behavior mechanisms related to Tacit Knowledge Sharing, Instrumental Ties and Affective Commitment with Absorptive capacity were discussed in the context of knowledge intensive environment. Collected data was described with different demographics and work environment. Descriptive analysis was carried out to see the general trend of data and to explore the anomalies in it. Visual inspection by producing scatter plots was carried out. Data was further subjected to different statistical tests based on the hypotheses and objectives of study. Multiple regression analysis, mediation tests through procedure suggested by Barron and Kenny (1986) were carried out. The significance testing of the mediators in the relationship of independent and dependent variables was conducted by using Sobel's test criterion in addition to mediation testing with boot strapping testing procedure. Next four sections discuss the results of different studies carried out in this thesis work.

4.1 Study 1

Impact of Organizational Mechanisms (Formalization, Cross Functional Integration and Job Rotation) on Potential Absorptive Capacity (Acquisition and Assimilation components)

4.1.1 Introduction

This study explores the impact of organizational mechanisms i.e. Formalization, Cross Functional Integration and Job Rotation on two components of Potential Absorptive Capacity i.e., Acquisition component and Assimilation component. This is the quantitative study which evaluates the extent to which organizational mechanisms contribute in building Absorptive Capacity of firm.

4.1.2 Sample and procedure

Target population for this was knowledge intensive companies. Data was collected through questionnaires using stratified random sampling technique based on geographical locations. Data was collected from three strata of knowledge intensive industries of Pakistan as most of the industries are concentrated on three strata. The unit of analysis for this study was senior supervisors, managers, general managers and specialists such as plant managers' special task handling employees. Rationale for collecting the data from specific segments of knowledge intensive companies was that the maximum knowledge process activities are handled by supervisors, managers and specialists of the knowledge intensive industry. The employees with different educational background and having wide span of experience on a continuum and with different age groups participated in the study. The respondents from diverse background and experience were selected so that the sample results could be generalized to entire population. The major portion of survey questionnaires was distributed to respondents through mail and personal contacts and a few through e-mails. First reminder after distributing the questionnaires was given to the respondents at a time span of 15 days. Majority of the respondents returned the questionnaires duly filled after 10-15 days of first reminder. Rest of the respondents were reminded again on telephone and e-mail. A certain percentage of respondents returned the filled questionnaires after 3-4 repeated reminders yet some percentage of respondents did not respond at all. Of 590 distributed questionnaires 449 were returned by respondents. Out of 449 responded questionnaires 35 were not worth enough to be included for analysis because most of questionnaires were partially filled or returned with a lot of missing data. However after evaluating responded questionnaires, 414 were considered for conducting the statistical

processes. This makes response rate as 70.16%. SPSS software was used to factor analyze the instruments of study variables both independent and dependent variables. After checking the validity and reliability of measures of variables the data was analyzed in SPSS software for testing the conceptual model of study and testing the hypotheses related to different variable of study.

4.1.3 **Characteristics of Sample Respondents**

Data for this study was collected from genders i.e., males and females. Of 414 respondents 77% were males and 23% were females. The distribution of data attributing to gender is shown in Table 4.1.1.

The age of respondents participating in the study ranged on a wide continuum. Minimum age of respondents was 20 years and maximum was seventy years. Majority of the respondents ranged from 26-30 years of age, contributing about 60% of total respondents. 27% (114) of respondents ranged from 31-40 years of age. 7% fell in the range of 41-50 years and 5% ranged from 51-60 brocket of age. A few in the uppermost bracket participated in the study, 1 % (7) came from this bracket.

Respondents from diverse educational background were included in the study and ranged from under graduate to the doctoral and specialist of different fields. However number of participants on the extremes i.e. under graduates and respondents with doctoral degree or specialist degrees/certificates/courses were few in number. graduates respondents with graduates degree holders covered about half of study population (51.7%). 46 under graduates participated in this study covering 11.1% of the study population. 13 doctoral degree holders and 30 respondents with specialized degrees such as plant engineer, professional certifications etc participated in this study contributing 3.1% of space and 7.2% in the sample of study.

The sample in the study came from employees holding different positions in the knowledge intensive companies. 114 (34.8%) managers and 145 (35%) respondents holding special positions in

Table 4.1.1 : Characteristics of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
GENDER	MALE	316	76.3	76.3	76.3
	FEMALE	98	23.7	23.7	100.0
	Total	414	100.0	100.0	
AGE OF RESPONDENT	20-30	247	59.7	59.7	59.7
	31-40	114	27.5	27.5	87.2
	41-50	27	6.5	6.5	93.7
	51-60	19	4.6	4.6	98.3
	60-70	7	1.7	1.7	100.0
	Total	414	100.0	100.0	
QUALIFICATION	UNDER GRADUATE	46	11.1	11.1	11.1
	GRADUATE	214	51.7	51.7	62.8
	MASTERS	111	26.8	26.8	89.6
	PHD	13	3.1	3.1	92.8
	OTHERS	30	7.2	7.2	100.0
	Total	414	100.0	100.0	
DESIGNATION	SUPERVISORS	100	24.2	24.2	24.2
	MANAGER	144	34.8	34.8	58.9
	GENERAL MANAGER	25	6.0	6.0	65.0
	OTHERS	145	35.0	35.0	100.0
	Total	414	100.0	100.0	
JOB TYPE	PERMANENT	297	71.7	71.7	71.7
	CONTRACT	117	28.3	28.3	100.0
	Total	414	100.0	100.0	
LENGTH OF SERVICE	Below 5	65	15.7	15.7	15.7
	5-10	62	15.0	15.0	30.7
	11-15	206	49.8	49.8	80.4
	16-20	52	12.6	12.6	93.0
	21-25	15	3.6	3.6	96.6
	26-30	9	2.2	2.2	98.8

	>30	5	1.2	1.2	100.0
	Total	414	100.0	100.0	
AGE OF ORGANIZATION	1-10	35	8.5	8.5	8.5
	11-20	175	42.3	42.3	50.7
	21-30	79	19.1	19.1	69.8
	31-40	92	22.2	22.2	92.0
	41-50	33	8.0	8.0	100.0
	Total	414	100.0	100.0	
NO OF EMPLOYEES	1-500	306	73.9	73.9	73.9
	501-1000	48	11.6	11.6	85.5
	1001-1500	15	3.6	3.6	89.1
	1501-2000	19	4.6	4.6	93.7
	2001-2500	13	3.1	3.1	96.9
	Above 2500	13	3.1	3.1	100.0
	Total	414	100.0	100.0	

Managerial hierarchy participated in the study. 100 supervisors and 25 general managers participated in the study contributing 24.2% and 6% to the sample data respectively.

The respondents were approached with a focus to study the Absorptive Capacity in knowledge intensive environment. As large number of employees in knowledge intensive industry work on contract bases, so it was necessary to consider both permanent and contracted employees for study. Majority of the data came from permanent employees (71.7%) and 28.3% employees working on contract bases participated in the study.

Data for the study was collected from the respondents of different service brackets. Major portion of the data (49.8%) came from the respondents having service between 11 and 15 years. 65 (15.7%) respondents having service below 5 years participated in this study. The employees having 5-10 years of service were 62 (15%) in number. Respondents with 16-20 years of service consisted on 12.6% (52) of the sample of this study. 21-25, 26-30 and above 30 years of service together contributed 7% to the sample in this study.

Generally, the older organizations invest more on knowledge process activities to compete in the market. Therefore Absorptive Capacity may be different in older organization from the new ones or with less age. The data therefore, was collected from the organizations having wide range of age. The age of organization ranged from 1 to 50 years. Majority of the data (42.3%) came from organizations having age of 11-20 years. Companies with 1-10 years of age contributed 2.5% in the sample and similarly the upper bracket of company age (41-50 yeas) contributed 8% to the study population. Companies with 21-30 years and 31-40 years of age consisted on 79 (19.1%) and 92 (22.2%) of the sample data.

Data was collected from diverse companies however, having employees below 100 were not included in this study. Majority of companies consisted on employees from 100 to 1000. Therefore healthy portion of our sample came from companies having employees 100-500 and covered 73.9% of sample. The companies having employees 501-1000 consisted on 11.6% of the sample of study. Rest of the data (14.5 %) came from companies having employees with in range of 1001to range of above 2500 in number.

4.1.4 Factor Analysis

Factor analysis was carried out to check for the reliability and validity of instrument. Different items highlighting different dimensions/ facets of a measure must show uni-dimensionality of items. If all the items show the dimensionality then it is considered that the measure is a valid measure and it will measure for which it is meant to measure. Among different ways to measure the validity of the instrument factor analysis is considered most effective way. In factor analysis the items are allowed to load on different factors and components of the instrument. The items in the instrument load themselves on to different components with different factor loadings and these factor loadings of the items on a factor decide whether the specific item is worthy enough to be included for measuring the particular variable.

Factor extraction and factor rotation are two important dimensions/considerations to be taken care while performing factor analysis. Generally, principal component analysis (PCA) is applied as factor extraction method and different rotation methods are applied for rotation of factors for finding meaningful factors. Tabachnick and Fidell (2007) recommended rotated matrix for simple interpretation of results of factor analysis. Literature indicates that factor loadings 0.7 or

greater are considered excellent, however, the factor loadings below .4 are considered bad and the items with factor loading less than 0.4 should be dropped from measure if the literature does not pose any restriction some authors such as Comrey and Lee (1992) suggest threshold value as .63. Factor loadings depend upon many factors and one of the most important factors for retaining and rejecting the items from the instrument is the sample size of the study. Stevens (2002) suggests that for a sample size of 300, the factor loadings of items should be greater than 0.298

Before factor analysis or other statistical tests are conducted on data collected, statistics such as sampling adequacy (Kaiser-Meyer-Olkin) and test of sphericity (Bartlett's Tests of sphericity) must be significant. Kaiser-Meyer-Olkin test statistic of sampling adequacy varies between 0 and 1. Values close to 0 means that sum of partial correlations are larger as compared to sum of correlations which in turn indicate diffusion of patterns of correlations. In this case the factor analysis is appropriate to be conducted. Conversely values close to 1 refers that patterns of correlations are compact and valid factors are likely to be produced by factor analysis. However, Kaiser (1974) suggest that values below .5 are unacceptable however, Hutcheson and Sofroniou (1999) argue that values between 0.5 and 0.7 are fair, values between 0.7 and 0.8 are considered good and values between 0.8 and 0.9 are great and above 0.9 are considered as superb. Factor analysis was conducted on the data collected for this study by using principal component analysis (PCA) as extraction method and varimax method was used as rotation method.

4.1.4.1 Kaiser- Meyer- Olkin (KMO) and Bartlett Test of Sphericity

Before conducting factor analysis, two statistics (sampling adequacy statistic-- Kaiser- Meyer-Olkin (KMO) and statistic of Bartlett's Test of Sphercity) need to be significant. Values of two statistics were checked i.e. sampling adequacy and Bartlett's test of spherecity and both statistics were found significant. Kaiser Meyer-Olkin (KMO) for sample in the study was observed as KMO = .837 where as Bartlett's test of sphericity was also observed significant at .001 level of significance which means a confidence internal (C I =99.9%). Table 4.1.2 shows the results of Kaiser- Meyer-Olkin for sampling adequacy and Bartlett's test of sphericity. The test statistic for sampling adequacy (KMO) for individual variables was also calculated and all values were observed well above the acceptable range.

Table 4.1.2 : KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.837
Bartlett's Test of Sphericity	Approx. Chi-Square	3583.657
	Df	253
	Sig.	.000
Extraction Method: Principal Component Analysis.		

The value of sampling adequacy (KMO) for individual variables ranged from .529 to .872 . All the values of Bartlett's test of Sphericity were observed significant at a significance level of .001. Table1 (Anx - A) shows the values of both statistics (KMO and Bartlett's test of sphericity) of all the variables. After both the statistics were found significant the factor analysis was conducted to refine the measures for variables of study based on factor loadings.

4.1.4.2 Interpretation of results of Factor Analysis

Table 4.1.3 shows the results of factor analysis of study variables. The items of individual variables were analyzed on the basis of factor loadings on their respective factors. The items with low factor loadings were dropped from the measures and with satisfactory values were retained for further analysis. Acquisition (ACQ) was subjected to factor analysis and it was found that some items loaded high on one factor whereas, the other items loaded low.

items for Formalization (FORM) ranged from .615 to .827. The factor loading of items FORM1, FORM2, FORM3 and FORM4 were observed as .615, .762, .779 and .827 respectively.

The values of factor loadings of FORM5 and FORM6 were observed as .724 and .629 respectively. Similar to factor loading of items of Formalization (FORM), the factor loadings of the Cross Functional Integration (INT) were observed high for their respective factor. The factor loading of items of Cross Functional Integration (INT) ranged from .639 (factor loading of INT6) to .779(factor loading of INT2). The factor loadings of items INT1 on its respective factor was observed as .674. The factor loadings of INT3, INT4 and INT5 on their respective factor

Table 4.1.3 : Factor loadings of individual items on their respective measures

	Component				
	1	2	3	4	5
ACQ1	**.838**				
ACQ2	**.239**				
ACQ3	**.608**				
ACQ4	-.256				
ACQ5	**.605**				
ACQ6	-.106				
ASM1		-.205			
ASM2		**.784**			
ASM3		**.739**			
FORM1			**.615**		
FORM2			**.762**		
FORM3			**.779**		
FORM4			**.827**		
FORM5			**.724**		
FORM6			**.629**		
INT1				**.674**	
INT2				**.779**	
INT3				**.647**	
INT4				**.664**	
INT5				**.745**	
INT6				**.639**	
JR1					**.849**
JR2					**.827**

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

were observed as .647, .664 and .745 respectively. The items of Job Rotation (JR) loaded high on their respective factor with factor loadings of .849 and .827 for JR1 and JR2 respectively.

The communalities (Table 2, Anx - A) of almost all the items were observed greater than .5. The factor loading of the items of all the individual variables on the factors other than their own factors are shown (Table 3, Anx - A) in the rotated component matrix. Principal component analysis was used as extraction method and varimax rotation method was used for rotation of components in this factor analysis.

4.1.4.3 Summary of Factor Analysis

Factor loadings with low values are required to be dropped from the measure for better validity and reliability of the instrument. The research literature recommends that items with low factor loadings (.298) with sample size of 300 should be dropped from the measure, Stevens (2002). The factor loadings of all the items were analyzed through component matrix and rotated component matrix in the light of theoretical understanding of the constructs. The items with low factor loading were dropped from the measures. The table of thresh hold points were discussed and analyzed keeping in view the research literature. It was observed that the reliabilities of the measures increased after dropping the items with low factor loadings for example, reliability of Absorptive Capacity (ACQ and ASM) increased from the value before dropping the items (below .6) to the value greater than .7 (after dropping the low factor loading items). However, the items with high factor loadings showed good reliabilities of the measure. For example, reliabilities of Formalization (FORM) and Cross Functional Integration (INT) were observed as .87 and .85 respectively. Table 4.1.3 shows the factor loadings of individual items on their respective measures.

4.1.5 Result of study of relationship between Formalization, integration and job rotation and potential Absorptive Capacity (Acquisition component)

4.1.5.1 Descriptive statistics.

Mean responses of employees against all the variables were tabulated to see the overall response of employees against each variable. Table 4.1.4 shows the mean responses of dependent variable (DV) and independent variables of this study. Mean response of Acquisition (ACQ) was

observed as 4.6 with standard deviation of .7. Mean response of Formalization (FORM) was observed as 3.7 with standard deviation of .77. Cross Functional Integration (INT) was responded with mean of 3.57 and standard deviation of .71. Mean response of employees of the sample data for Job Rotation (JR) was observed as 3.2 and standard deviation was observed as .99.

Table 4.1.4 : Descriptive Statistics of study variables

	N	Minimum	Maximum	Mean	Std. Deviation
ACQ	414	2.33	6.83	4.5688	.74906
ASM	414	2.50	7.00	4.9420	.7369
FORM	414	1.00	5.00	3.7158	.77855
INT	414	1.00	5.00	3.5761	.71245
JR	414	1.00	5.00	3.2319	.99483

Mean responses of the respondents with different demographics were also observed. Table 4.1.5 gives summary of descriptive statistics (mean responses) of employees with different demographics.

On the average males and females responded uniformly except a few variables. Mean response of 4.58 was observed for a male which was little higher as compared to the mean response of females for Acquisition who responded Acquisition with mean of 4.52. Mean response of males for Formalization (FORM) was observed was observed as 3.68 and 3.83 for males and females respectively. Mean response of males and females for Cross Functional Integration (INT) was observed as 3.53 and 3.73 respectively. Job Rotation was responded by males and females with mean values of 3.15 and 3.51 respectively.

The mean responses of study variables were also observed against the respondents with different age groups. Mean response for Acquisition was observed highest for the respondents having age groups 31-40 years of age with mean value of 4.69. Whereas minimum mean response (Mean=3.45) against Acquisition (ACQ) was observed for the respondents of age groups of 61-70 years. Mean responses of respondents of age groups 20-30 years and 31-40 years for Acquisition were observed as 4.55 and 4.69 respectively. These age brackets (20-30 years and

31-40 years) responded Formalization (FORM) and Cross Functional Integration (INT) with means of 3.65, 3.84, 3.59 and 3.61 respectively.

The respondents of age groups of 20-30 years and 31-40 years responded Job Rotation (JR) with mean values of 3.22 and 3.23 respectively. Mean responses of employees of age group of 51-60 years and 61-70 years for Acquisition were observed as 4.00 and 3.45 respectively. Mean responses of employees with 51-60 years were observed as 3.40, 3.10 and 2.90 for Formalization (FORM), Cross Functional Integration (INT) and Job Rotation (JR) respectively. Mean responses for Acquisition (ACQ), Formalization (FORM), Cross Functional Integration (INT) and Job Rotation (JR) were observed as 3.45, 3.55, 2.71 and 2.00 respectively for age group of 61-70 years.

Mean response of graduates and master degree holders was observed as 4.59 and 4.55 respectively for Acquisition. Whereas, mean response of undergraduates was observed as 4.47 for Acquisition (ACQ) and doctoral degree holders responded Acquisition with mean of 4.92 and for specialists, the mean value of 4.45 was observed for Acquisition (ACQ).

Mean response of under graduates, graduates and specialists for Formalization (FORM) was observed as 3.80, 3.67 and 3.49 respectively. Master degree holders responded the Formalization (FORM) with the mean response of 3.73. Mean response of doctoral degree holders for Formalization (FORM) was observed as 3.90. Mean response of undergraduates, graduates and master degree holders for Cross Functional Integration (INT) was observed as 3.25, 3.59 and 3.69 respectively. Doctoral degree holders and employees holding specialist qualification responded Cross Functional Integration (INT) with mean values of 3.65 and 3.49 respectively. Mean response of employees with under graduates; graduates and masters degrees responded Job Rotation (JR) with mean values of 3.05, 3.32 and 3.03 respectively. The employees holding specialist education and doctoral degrees responded Job Rotation (JR) with mean values of 3.50 and 3.58 respectively.

Mean response (4.70) of general managers for Acquisition (ACQ) was observed highest among all managerial positions. Mean response of supervisors and managers for Acquisition (ACQ) was observed as 4.68 and 4.61 respectively. Whereas, general managers responded Acquisition

(ACQ) with mean values of 4.68 and mean response (4.43) was given by mangers holding special positions.

Table 4.1.5 : Descriptive Statistics (Mean responses) of demographics

		ACQ	ASM	FORM	INT	JR
GENDER	MALE	4.58	4.98	3.68	3.53	3.15
	FEMALE	4.52	4.82	3.83	3.73	3.51
AGE OF RESPONDENT	20-30	4.55	4.95	3.65	3.59	3.22
	31-40	4.69	5.04	3.84	3.61	3.23
	41-50	4.66	5.21	3.88	3.65	3.61
	51-60	4	3.50	3.40	3.10	2.90
	61-70	3.45	3.64	3.55	2.71	2.00
QUALIFICATION	UNDER GRADUATE	4.47	4.60	3.80	3.25	3.05
	GRADUATE	4.59	5.12	3.67	3.59	3.32
	MASTERS	4.55	4.84	3.73	3.69	3.03
	PHD	4.92	5.08	3.90	3.65	3.58
	OTHERS	4.45	4.53	3.82	3.49	3.50
DESIGNATION	SUPERVISORS	4.68	5.21	3.85	3.49	3.18
	MANAGER	4.61	4.85	3.81	3.75	3.23
	GENERAL MANAGER	4.68	4.94	3.61	3.48	3.48
	OTHERS	4.43	4.84	3.54	3.48	3.23
JOB TYPE	PERMANENT	4.65	4.99	3.76	3.70	3.31
	CONTRACT	4.36	4.83	3.59	3.26	3.03
LENGTH OF SERVICE	Below 5	4.53	4.96	3.63	3.53	3.27
	5-10	4.64	4.93	3.73	3.59	3.04
	11-15	4.54	4.81	3.91	3.57	3.24
	16-20	4.57	5.04	4.01	3.87	3.75
	21-25	4.58	5.38	4.13	3.92	4.13
	26-30	4.50	4.50	4.25	4.00	3.50
	Above 30	4.47	5.20	3.93	3.80	4.40

Mean response of supervisors, managers and general managers for Formalization (FORM) was observed as 3.85, 3.81 and 3.61 respectively. Mean response of 3.54 of managers holding special managerial position in knowledge intensive companies was observed. Cross Functional Integration (INT) was responded with mean values of 3.49, 3.75 and 3.48 against supervisors, managers and general managers respectively. The managers holding special positions in management chain responded Cross Functional Integration (INT) with mean value of 3.48. Supervisors, managers and general managers responded Job Rotation with mean values of 3.18, 3.23 and 3.48 respectively. The employees with special managerial positions responded Job Rotation (JR) with mean value of 3.23.

Mean response for employees having different job categories were also observed. The job categories included permanent jobs and jobs on contract bases. The mean response of employees with permanent jobs for Acquisition (ACQ) was observed as 4.65 and employees with contracted jobs responded Acquisition (ACQ) with mean value of 4.36. Mean responses of employees with permanent and contracted jobs for Formalization (FORM) were observed as 3.76 and 3.59 respectively. Means of 3.70 and 3.26 for Cross Functional Integration (INT) were observed against permanent and contracted employees. The employees holding status of permanent job responded the Job Rotation (JR) with mean value of 3.31 and employees with contracted jobs responded with mean value of 3.03.

The employees with length of service of less than five years and over 30 years responded Acquisition with mean values of 4.53 and 4.47 respectively. The employees with 5-10, 11-15 and 16-20 years of service responded for Acquisition (ACQ) with mean values of 4.64, 4.54 and 4.57 respectively. The respondents with 21-25 years and 26-30 years of service responded Acquisition (ACQ) with mean values of 4.58 and 4.50 respectively. The employees having service of more than 30 years responded Acquisition (ACQ) with mean value of 4.47. The employees with service below 5 years and above 30 years responded Formalization (FORM) with mean values of 3.63 and 3.93 respectively.

The employees with 5-10 years and 11-15 years of service responded with means of 3.73 and 3.91 respectively. The mean values of employees with 16-20 years, 21-25 years and 26-30 years of service were observed as 4.01, 4.13 and 4.25 for Formalization. Employees with service of

below 5 and above 30 years responded Cross Functional Integration (INT) with mean values of 3.53 and 3.80 respectively. The employees with 5-10 years and 11-15 years of service responded with means of 3.59 and 3.57 respectively. The mean values of employees with 16-20 years , 21-25 years and 26-30 years of service were observed as 3.87, 3.92 and 4.00 respectively for Cross Functional Integration (INT). Job Rotation (JR) was responded with mean values of 3.27 and 4.40 for employees having less than 5 years service and above 30 years service respectively. Employees with 5-10 years, 11-15 years and 16-20 years of service responded Job Rotation (JR) with mean values of 3.04, 3.24 and 3.75 respectively. Mean responses of 4.13 and 3.50 were observed for Job Rotation (JR) against employees with 21-25 years and 26-30 years of service.

4.1.5.2 Pearson Correlation Matrix

Pearson correlation was applied to the independent and dependent variables. As the research hypotheses of this study were directional therefore, directional or one tailed test was applied. The results of the association between variables are shown in table 4.1.6. On the average, based on the sample of 414 respondents from knowledge intensive companies of Pakistan, significant correlation between Acquisition capability and Formalization was observed.

Table 4.1.6 : Correlation matrix of study variables (ACQ, FORM, INT and JR)

		ACQ	FORM	INT	JR
ACQ	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	414			
FORM	Pearson Correlation	.315**	1		
	Sig. (1-tailed)	.000			
	N	414	414		
INT	Pearson Correlation	.336**	.625**	1	
	Sig. (1-tailed)	.000	.000		
	N	414	414	414	
JR	Pearson Correlation	.192**	.074	.210**	1
	Sig. (1-tailed)	.000	.131	.000	
	N	414	414	414	414

**. Correlation is significant at the 0.01 level (1-tailed)

Correlation with correlation coefficient(r = .315) between Acquisition (ACQ) and Formalization (Form) was observed significant at .01 level of significance. Confidence interval (99%) shows

that there are only 1 percent chances that the correlation between Acquisition (ACQ) and Formalization (FORM) with correlation coefficient (r = .315) occurs by chance. Similarly, on the basis of sample obtained from knowledge intensive companies of Pakistan, a significant relationship between potential Absorptive Capacity (Acquisition) and Cross Functional Integration (INT) was observed significant with correlation coefficient (r= .336) at .01 level of significance(r = .336, p<.01). on the basis of sample data obtained from knowledge intensive companies of Pakistan and correlation coefficient with 99% confidence interval , there are only 1 percent chance that the correlation with correlation coefficient (r = .336) occurs by chance. Correlation results based on sample data shows significant association between Potential Absorptive Capacity (ACQ component) and Job Rotation (JR) with correlation coefficient of r = .177. Confidence interval of 99 % shows that there are only 1 percent chance that this correlation coefficient (r= .177) between Acquisition (ACQ) and Job Rotation (JR) occurs by chance.

4.1.5.3 Scatter plot of study variables

Scatter plot between two variables gives a pattern of data scattered in a plane and in turn we get an idea about the relationship of two variables. This visual representation of data in a plane helps us to conduct furthers analysis on the data such as regression analysis. Scatter plot provides the fair idea about the nature of relationship between variables that is it is helpful in determining whether the relationship between variables is linear or not.

Figure 4.1.3 shows the results of scatter plot. Generally, the Formalization (FORM) shows the linear relationship with Absorptive Capacity (ACQ component).the cylindrical position of scatter plot between Acquisition (ACQ) and Formalization (FORM) shows the linear relationship between them and with less scattered data.

The scatter plot between Cross Functional Integration (INT) and Acquisition (ACQ) was also observed linear. The pattern of data scattered in the plane in this relationship (INT and ACQ) was observed slightly different from the scattered data in the plane attributing to the relationship between Acquisition (ACQ) and Formalization (FORM). In former relationship the slightly more scattered data was observed but the relationship is still linear and it allows us to conduct further analyses on it. However, the scatter plot (Figure 4.1.1) shows that the pattern of scattered data in the plane, attributing to the correlation between Acquisition (ACQ) and Job Rotation (JR) is

different from patterns of scattered data resulted from relationship of Acquisition (ACQ), Formalization (FORM) and Cross Functional Integration (INT). The pattern of data indicates that Acquisition (ACQ) and Job Rotation (JR) may not have strong linear relationship and results in the weak association between these two variables.

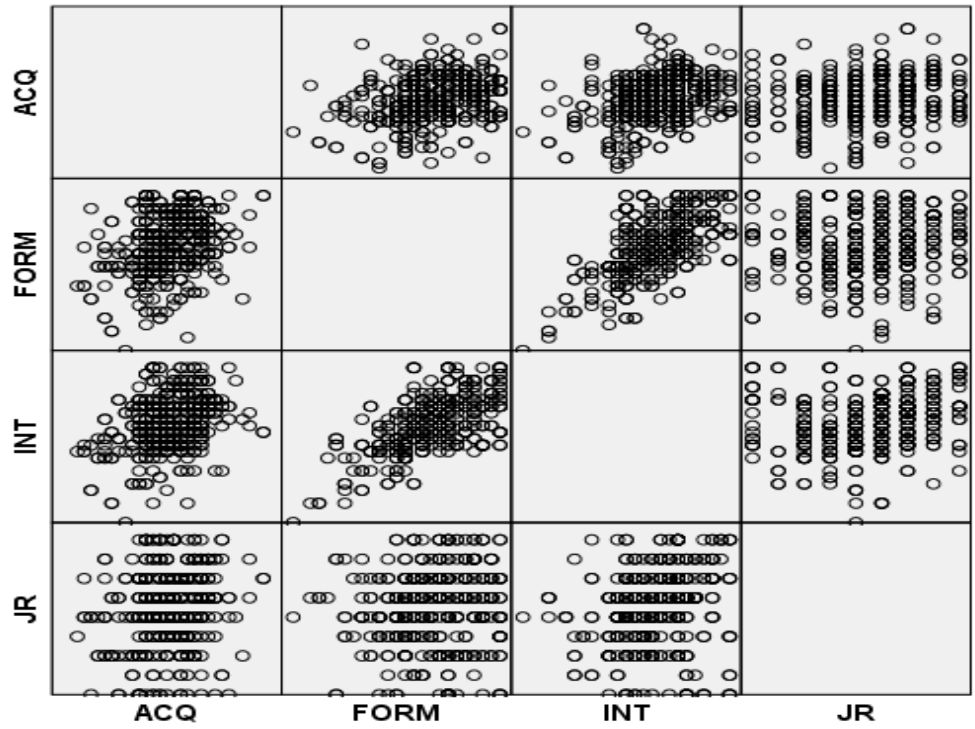

Figure 4.1.1 : scatter plot of study variables (ACQ, FORM, INT and JR)

4.1.5.4 Multiple Regression Analysis

The Absorptive Capacity (Acquisition component) was analyzed by regressing it on study variables (Formalization, Cross Functional Integration and Job Rotation). The multiple regression analysis was carried out in three steps. First the Potential Absorptive Capacity was regressed on cross functional (INT) and in the second step Cross Functional Integration (INT) and Formalization (FORM) was regressed on Acquisition and at the last all three independent variables were regressed on Acquisition (ACQ). The results were analyzed at each step. The introduction of independent variables in various steps in multiple regression analysis gives

insights of contribution of each variable and its impact in the presence and absence of other variables of study. It was observed that that at each step of hierarchical regression the significant results were obtained. Overall the good fit of the model was observed.

4.1.5.4.1 Regression Analysis—Model Summary

Acquisition (ACQ) was regressed on independent variables in three different models. In Model 1 only one variable (INT) was entered to evaluate its impact on dependent variable (ACQ). In model 2 second variable (FORM) was entered in the regression equation with the first variable (INT) and the impact of INT and FORM was evaluated together on ACQ. Model 3 was evaluated by regressing Acquisition (ACQ) on all the independent variables (INT, FORM, and JR). Table 4.1.7 gives summary of all the models. Overall the association of Cross Functional Integration (INT) with dependent variable (Acquisition, ACQ) was observed as R= .336 when only one variable was entered in regression equation.

Table 4.1.7: Model summary of regression analysis with ACQ as dependent variable and independents as FORM, INT and JR.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.336[a]	.113	.110	.70647	1.924
2	.362[b]	.131	.127	.70000	
3	.381[c]	.145	.139	.69511	

a. Predictors: (Constant), INT b. Predictors: (Constant), INT, FORM c. Predictors: (Constant), INT, FORM, JR

The standard error of estimate was observed as .70. the strength of association becomes R= .362 (with standard error of estimate of .7) on introduction of second variable (Formalization, FORM) in the regression equation . when all the independent variables were entered in the regression equation the strength of association between independent variables and dependent variable enhanced to R= .381. Durbin-Watson test for independent errors was observed as 1.924. The value of test statistic of independent errors (Durbin –Watson statistic) ranges from 0 to 4. The values close to zero indicate that the error is independent of each other. Berry (1993) argues that for any two observations the residual terms should be uncorrelated (or independent) to draw conclusions based on the sample from the population by using regression equations.

In regression analysis this is tested by Durbin-Watson test. This test statistic can have range from 0 to 4 the values around of mean that residuals are uncorrelated. Values above 2 reflect a negative correlation between adjacent residuals and the values below 2 show negative correlation. Durbin Watson (1951) suggests that values below 1 and above 3 are problematic and are a cause of concern.

Model summary gives overall picture of regression analysis and importantly, the test of independent of errors are qualified which is one of the important assumptions of multiple regression analysis.

4.1.5.4.2 Regression Analysis—Overall Model Fit

Table 4.1.8 shows overall fit of model (ANOVA). Analysis of variance (ANOVA) tests whether the model significantly explains the relationship between independent and dependent variables or not. F-values of ANOVA test indicate the significance level the goodness of fit of model.

Table 4.1.8 : Overall model fit (ANOVA[a])

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.101	1	26.101	52.296	.000[b]
	Residual	205.631	412	.499		
	Total	231.732	413			
2	Regression	30.344	2	15.172	30.963	.000[c]
	Residual	201.389	411	.490		
	Total	231.732	413			
3	Regression	33.629	3	11.210	23.199	.000[d]
	Residual	198.104	410	.483		
	Total	231.732	413			

a. Dependent Variable: ACQ b. Predictors: (Constant), INT c. Predictors: (Constant), INT, FORM

d. Predictors: (Constant), INT, FORM, JR

F-ratio is calculated by dividing average improvement due to the model by error in the model. If the F values is greater than 1 then regression model explains the data well (good fit) and the significance value highlights the un-likeliness of this F-value to occur by chance. The results of overall model fit (Table 4.1.8) show that in all cases model fits the data well and highly

significant ANOVA results show that there are least chances that such relationships occur by chance. Table 4.1.8 summarizes the F values and significance values of analysis of variance (ANOVA) test

4.1.5.4.3 Regression Analysis – Regression Parameters (individual contribution of variables in explaining the outcome variable, (ACQ)

Table 4.1.9 shows the regression model parameters b. values in the table provides us the contribution percentage in explaining the outcome variable by holding all other variables constant. The numerical value gives us strength of relationship between independent and outcome variable whereas the positive or negative sign reflects the direction of relationship between variables every b-values has associated standard error showing the extension of these values (b values) across different samples. Basically these errors decided whether the b-values are significantly different zero or not. For this significance testing of b-values SPSS uses t-test. T-test shows whether the predictors (independent variables) explain the outcome variable or not.

Table 4.1.9 : Contribution of individual variables(Coefficients) in explaining the dependent variable(ACQ)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			Tolerance
1	(Constant)	3.307	.178		18.588	.000	
	INT	.353	.049	.336	7.232	.000	1.000
2	(Constant)	3.095	.190		16.246	.000	
	INT	.239	.062	.227	3.858	.000	.609
	FORM	.167	.057	.173	2.943	.003	.609
3	(Constant)	2.880	.206		13.961	.000	
	INT	.204	.063	.194	3.250	.001	.582
	FORM	.178	.056	.185	3.150	.002	.606
	JR	.192	.035	.122	5.407	.009	.950

On the basis of our sample data of 414 respondents from knowledge intensive industries of Pakistan, Cross Functional Integration (INT), on the average contributes 35.5% in explaining the

variation in the Potential Absorptive Capacity (Acquisition component) when entered in the regression equation without other independent variables .The contribution of Integration (INT) significant at .001 level of significance (t= 7.232, P<.001). The contribution of Cross Functional Integration (INT) on introduction of Formalization (FORM) becomes 23.9 % and this contribution is still significant at .001 level of significance (t = 3.858, p<.001). The unique contribution of 16.7 % in explaining the Acquisition (ACQ) in this equation is attributed to Formalization (FORM). The contribution of Formalization (FORM) is significant at .005 level of significance (t = 2.943, p<.005). The unique contribution of the contribution of Integration (INT) significant at .001 level of significance (t= 7.232, P<.001). The contribution of Cross Functional

Integration (INT) on introduction of Formalization (FORM) and Job Rotation (JR) becomes 20.4 % and this contribution is still highly significant at .005 level of significance (t = 3.250, p<.005). The unique contribution of 17.8 % in explaining the Acquisition (ACQ) in this equation is attributed to Formalization (FORM). The contribution of Formalization (FORM) is significant at .005 level of significance (t = 3.150, p<.005). The unique contribution of Job Rotation (JR) in explaining the Acquisition (ACQ) in this equation becomes 19.2 %. The contribution made by Job Rotation (JR) is highly significant at .01 level of significance (t=2.607, p< .01).

4.1.5.4.4 Regression Analysis - Diagnostics of Regression Model

To assess the reliability of regression model, various assumptions for the regression analysis were checked. The independent variables in regression model should not be highly correlated (.8 or above) with each other. As the multi collinearity blurs the unique contribution of independent variables in explaining the outcome variable. Two statistics in regression models named as variance inflation factor (VIF) and Tolerance (T) are meant to decide the state of multi collinearity in independent variables. Both statistics start from zero and may go very high. Bowerman & 0' Connell (1990) suggest that values of VIF greater than 10 are problematic. Menard (1995) suggest that values of tolerance (T) below 0.2 highlight potential problem, whereas tolerance values (T) less than 0.1 may cause serious problem. Both the statistics were produced by using SPSS software for checking the assumption of multi collinearity of regression models of this study. It was observed that the values of both statistics were well within acceptable range (VIF<10 and T>.2). Table 4 (Anx - A) shows the results of both statistics.

Variance inflation factor (VIF) and Tolerance (T) values for Cross Functional Integration (INT) were observed as 1.717 and .582 respectively which are well in acceptance range of both statistics. Formalization (FORM) was having Variance inflation factor (VIF=1.650) which is well below the problematic point (VIF=10) where as the Tolerance (T) against Formalization (FORM) was observed as T=.606 which is well above the minimum acceptable limit (T =.2) Similarly the variance inflation factor (VIF) and Tolerance (T) for Job Rotation were observed within range (VIF = 1.052, T= .950).

The assumption of normality refers to the distribution of residual terms of dependent variable in multiple regression analysis. The assumption of normality of residuals of dependent variable was checked by subjecting the residual terms to histogram with normal curve and normal probability plot (P-P plot). Figure 1 (Anx - A) shows the results of both tests (histogram and p-p plot). The bell shaped distribution of the residual and tight closeness of the expected and observed cumulative probabilities show that that the normality assumption of regression model is met. The normality assumption was verified by producing the results of one sample Kolmogorov – Smirnov test of normality. Figure 2 (Anx - A) shows the results. Highly non significant results show that the residual terms of the dependent variable are not significantly different from normal distribution. Hence the normality assumption is met.

Homoscedasticity and Linearity. Regression analysis with more than one independent variable assumes the independent variables are linearly related with outcome variable and for every level of independent variable there is homogeneous variance. These assumptions are referred as linearity and homoscedasticity. These assumptions are tested by producing graph between regression standardized predicted values (ZPRED) and regression standardized residuals (ZRES). If the values scatter around zero then the assumption of linearity and homoscedasticity is said to be met. Figure 1 (Anx - A) shows the results of homoscedasticity and linearity assumptions. Scattered data around zero shows that the assumption of homoscedasticity and linearity is met.

4.1.6 Result of study of relationship between Formalization (FORM), Cross Functional Integration (INT) Job Rotation (JR) and Potential Absorptive Capacity (Assimilation component)

4.1.6.1 Descriptive Statistics

From descriptive statistics table 4.1.4, mean response of employees from knowledge intensive companies for Assimilation (ASM) was observed as 4.94 with standard deviation of .73 (table 4.1.4). Mean responses of employees with different demographics was observed. Table 4.1.5 shows the mean responses of employees with different demographics. Mean response of male and females for Assimilation (ASM) was observed as 4.98 and 4.82 respectively.

Mean response of employees with 20-30 years and 31-40 years of age responded Assimilation (ASM) was observed as 3.65 and 3.84 respectively. Respondents with age groups of 41-50 years and 51-60 years responded with mean values of 3.88 and 3.40 respectively. Assimilation (ASM) was responded with mean value of 3.64.

Under graduates, graduates and masters responded Assimilation (ASM) with mean values of 4.60, 5.12 and 4.84 respectively. The employees with doctoral degrees responded Assimilation (ASM) with mean value of 5.08. The employees holding specialist education (professional certifications, specialist courses, specific to job etc) responded with mean value of 4.53.

The responses of employees holding different managerial positions in the management hierarchy were also observed. Mean response of supervisors and managers were observed as 5.21 and 4.85 respectively. General Managers and managers holding special managerial positions responded Assimilation (ASM) with mean values of 4.94 and 4.84 respectively.The employees with permanent and contracted jobs responded with mean values of 4.99 and 4.83 respectively.

Employees with length of service below 5 years and above 30 years responded with mean values of 4.96 and 5.20 respectively. Employees with 5-10, 11-15 and 16-20 years of service responded Assimilation (ASM) with mean values of 4.93, 4.81 and 5.04 respectively. The employees with 21-25 years and 26-30 years of service responded with mean values of 5.38 and 4.50 respectively.

4.1.6.2 Pearson Correlation Matrix.

Pearson correlation was applied to the independent and dependent variables. As the research hypotheses of this study were directional therefore, directional or one tailed test was applied.

Table 4.1.10 : correlation matrix of study variables (ASM, FORM, INT and JR)

		ASM	FORM	INT	JR
ASM	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	414			
FORM	Pearson Correlation	.232**	1		
	Sig. (1-tailed)	.000			
	N	414	414		
INT	Pearson Correlation	.275**	.625**	1	
	Sig. (1-tailed)	.000	.000		
	N	414	414	414	
JR	Pearson Correlation	.133**	.074	.210**	1
	Sig. (1-tailed)	.003	.065	.000	
	N	414	414	414	414

****. Correlation is significant at the 0.01 level (1-tailed).**

The results of the association between variables (ASM, FORM, INT and JR) are shown in table 4.1.10. On the average, based on the sample of 414 respondents from knowledge intensive companies of Pakistan, significant correlation between Assimilation (ASM) and Formalization (FORM) was observed. Correlation coefficient (r = .232) between Assimilation (ASM) and Formalization (Form) was observed significant at .01 level of significance. Confidence interval (99%) shows that there are only 1 percent chances that the correlation between Assimilation (ASM) and Formalization (FORM) with correlation coefficient (r = .232) occurs by chance. Similarly, on the basis of sample obtained from knowledge intensive companies of Pakistan, a significant relationship between Assimilation(ASM) and Cross Functional Integration (INT) was observed significant with correlation coefficient (r= .275) at .01 level of significance (r =

.275, p<.01). on the basis of sample data obtained from knowledge intensive companies of Pakistan and correlation coefficient with 99% confidence interval , there are only 1 percent chance that the correlation with correlation coefficient (r = .336) between Assimilation(ASM) and Cross Functional Integration (INT) occurs by chance. Correlation results based on sample data shows significant association between Assimilation (ASM) and Job Rotation (JR) with correlation coefficient of r = .003. The correlation coefficient is not significant. Hence weak association was observed between Assimilation (ASM) and Job Rotation (JR).

4.1.6.3 Scatter Plot of Study Variables**.**

Scatter plot matrix was drawn of study variables. Figure 4.1.2 shows the results of scatter plot.

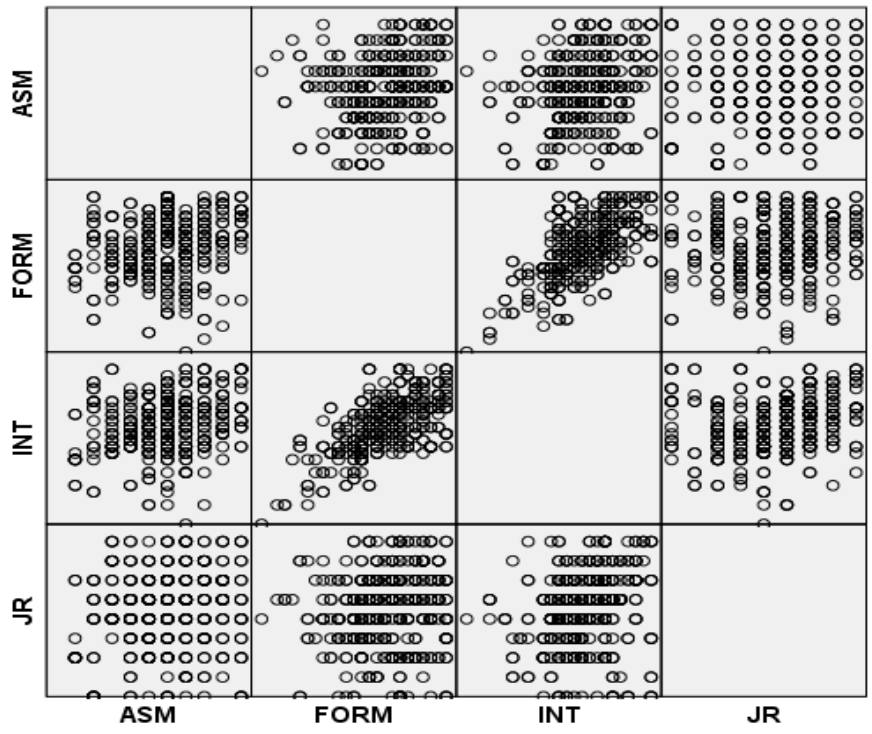

Figure 4.1.2 : Scatter plot of study variables (ASM, FORM, INT and JR)

Generally, the Formalization (FORM) shows the linear relationship with Assimilation (ASM).The cylindrical position of scatter plot between Assimilation (ASM) and Formalization (FORM) shows the linear relationship between them and with less scattered data. Scatter plot between Cross Functional Integration (INT) and Assimilation (ASM) was also observed linear.

The pattern of data scattered in the plane in this relationship (INT and ASM) was observed slightly different from the scattered data in the plane attributing to the relationship between Assimilation (ASM) and Formalization (FORM). In former relationship more scattered data was observed but the relationship is still linear and it allows us to conduct further analyses on it. However, the scatter plot shows that the pattern of scattered data in the plane, attributing to the correlation between Assimilation (ASM) and Job Rotation (JR) is different from patterns of scattered data resulted from relationship of Assimilation(ASM), Formalization (FORM) and Cross Functional Integration (INT). The pattern of data indicates that Assimilation (ASM) and Job Rotation (JR) between them.

4.1.6.4 Multiple Regression Analysis

The Absorptive Capacity (Assimilation component) was analyzed by regressing it on study variables (Formalization, Cross Functional Integration and Job Rotation). The multiple regression analysis was carried out in three steps. First the Potential Absorptive Capacity (ASM component) was regressed on Cross Functional (INT) and in the second step Cross Functional (INT) and Formalization (FORM) was regressed on Assimilation (ASM) and at the last all three independent variables were regressed on Assimilation (ASM). The results were analyzed at each step. The introduction of independent variables in various steps in multiple regression analysis provided insights of contribution of each variable and its impact in the presence and absence of other variables of study. It was observed that at each step of hierarchical regression the significant results were obtained in most of the cases.

4.1.6.4.1 Regression Analysis —Model Summary

Assimilation (ASM) was regressed on independent variables in three different models. In Model 1 only one variable (INT) was entered to evaluate its impact on dependent variable, Assimilation (ASM). In model 2 second variable (FORM) was entered in the regression equation with the first variable (INT) and the impact of INT and FORM was evaluated together on Assimilation (ASM). Model 3 was evaluated by regressing Assimilation (ASM) on all the independent variables (INT, FORM, and JR). Table 4.1.11 gives summary of all the models. Overall the association of Cross Functional Integration (INT) with dependent variable, Assimilation (ASM)) was observed as R= .275 when only one variable was entered in regression equation. The standard error of estimate was observed as1.03.

Table 4.1.11: model summary of regression analysis with ASM as dependent variable and independents as FORM, INT and JR.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.275[a]	.076	.073	1.03351	2.059
2	.286[b]	.082	.077	1.03142	
3	.298[c]	.089	.082	1.02878	

a. Predictors: (Constant), INT b. Predictors: (Constant), INT, FORM c. Predictors: (Constant), INT, FORM, JR

The strength of association becomes R= .286 (with standard error of estimate of 1.03) on introduction of second variable (Formalization, FORM) in the regression equation. when all the independent variables were entered in the regression equation the strength of association between independent variables and dependent variable enhanced to R= .298. Durbin-Watson test for independent errors was observed as 2.059. The value of test statistic of independent errors (Durbin –Watson statistic) ranges from 0 to 4. The values close to zero indicate that the errors are independent of each other. Berry (1993) argues that for any two observations the residual terms should be uncorrelated (or independent) to draw conclusions based on the sample from the population by using regression equations. In regression analysis this is tested by Durbin-Watson test. This test statistic can have range from 0 to 4. The values of the test statistic around mean show that residuals are uncorrelated. Values above 2 reflect a negative correlation between adjacent residuals and the values below 2 show positive correlation. Durbin Watson (1951) suggests that values below 1 and above 3 are problematic and are a cause of concern.

Model summary gives overall picture of regression analysis and importantly, the test of independent of errors are qualified which is one of the important assumptions of multiple regression analysis.

4.1.6.4.2 Regression Analysis—Overall Model Fit

Table 4.1.12 shows overall fit of model (ANOVA). Analysis of variance (ANOVA) tests whether the model significantly explains the relationship between independent and dependent

variables or not. F-values of ANOVA test indicate the significance level the goodness of fit of model.

Table 4.1.12 : overall model fit (ANOVA[a])

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.031	1	36.031	33.732	.000[b]
	Residual	440.078	412	1.068		
	Total	476.109	413			
2	Regression	38.873	2	19.436	18.270	.000[c]
	Residual	437.236	411	1.064		
	Total	476.109	413			
3	Regression	42.171	3	14.057	13.282	.000[d]
	Residual	433.938	410	1.058		
	Total	476.109	413			

a. Dependent Variable: ASM b. Predictors: (Constant), INT c. Predictors: (Constant), INT, FORM d. Predictors: (Constant), INT, FORM, JR

F-ratio is calculated by dividing average improvement due to the model by error in the model. If the F values is greater than 1 then regression model explains the data well (good fit) and the significance value highlights the unlikeliness of this F-value to occur by chance. The results of overall model fit (table 4.1.12) show that in all cases model fits the data well and highly significant ANOVA results show that there are least chances that such relationships occur by chance. F values in ANOVA test for model1, model2 and model3 were observed as 33.732, 18.270 and 13.282 respectively. Table 4.1.12 summarizes the F values and significance values of analysis of variance (ANOVA) test.

4.1.6.4.3 Regression Analysis – Regression parameters (individual contribution of variables in explaining the outcome variable, Assimilation (ACQ)

Table 4.1.13 shows the regression model parameters. The b values in the table provide us the contribution of each variable in explaining the outcome variable by holding all other variables constant.

The numerical value gives us strength of relationship between independent and outcome variable whereas the positive or negative sign reflects the direction of relationship between variables. Every b-value has associated standard error showing the extension of these values (b values) across different samples. Basically these errors decided whether the b-values are significantly

different zero or not. For this significance testing of b-values SPSS uses t-test. T-test shows whether the predictors (independent variables) explain the outcome variable or not.

Table 4.1.13 : Contribution of individual variables(Coefficients) in explaining the dependent variable(ASM)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			Tolerance
1	(Constant)	3.459	.260		13.292	.000	
	INT	.415	.071	.275	5.808	.000	1.000
2	(Constant)	3.286	.281		11.706	.000	
	INT	.321	.091	.213	3.522	.000	.609
	FORM	.136	.084	.099	1.634	.0103	.609
3	(Constant)	3.071	.305		10.057	.000	
	INT	.287	.093	.190	3.080	.002	.582
	FORM	.148	.084	.107	1.766	.015	.606
	JR	.092	.052	.085	1.765	.078	.950

On the basis of our sample data of 414 respondents from knowledge intensive industries of Pakistan, Cross Functional Integration (INT), on the average contributes 41.5% in explaining the variation in the Potential Absorptive Capacity (Assimilation component) when entered in the regression equation without other independent variables .The contribution of Cross Functional Integration (INT) was significant at .001 level of significance (t= 5.808, P<.001). the contribution of Cross Functional Integration (INT) in explaining Assimilation (ASM) on introduction of Formalization (FORM) becomes 32.1 % and this contribution is still significant at .001 level of significance(t = 3.522 , p<.001). The unique contribution of 13.6 % in explaining the Assimilation (ASM) in this equation is attributed to Formalization (FORM). The contribution of Formalization (FORM) is significant at .05 level of significance (t = 1.634, p<.05). The contribution of Cross Functional Integration (INT) on introduction of Formalization (FORM) and Job Rotation (JR) becomes 28.7 % and this contribution is still highly significant at .005 level of significance(t = 3.080 , p<.005). The unique contribution of 10.7 % in explaining the

Assimilation (ASM) in this equation is attributed to Formalization (FORM). The contribution of Formalization (FORM) is significant at .005 level of significance ($t = 3.150$, $p<.05$). The unique contribution of Job Rotation (JR) in explaining the Assimilation (ASM) in this equation becomes 8.5 %. The contribution made by Job Rotation (JR) is non significant ($t=1.765$, $p> .05$).

4.1.6.4.4 Regression analysis - Diagnostics of Regression Model

Both the statistics were produced by using SPSS software for checking the assumption of multi collinearity of regression models of this study. It was observed that the values of both statistics were well within acceptable range (VIF<10 and T>.2). Table 4 (Anx - A) shows the results of both statistics.

Variance inflation factor (VIF) and Tolerance (T) values for Cross Functional Integration (INT) were observed as 1.717 and .582 respectively which are well in acceptance range of both statistics. Formalization (FORM) was having Variance inflation factor (VIF=1.650) which is well below the problematic point (VIF=10) where as the Tolerance (T) against Formalization (FORM) was observed as T=.606 which is well above the minimum acceptable limit (T =.2) Similarly the variance inflation factor (VIF) and Tolerance (T) for Job Rotation were observed within range (VIF = 1.052., T= .950).

The assumption of normality refers to the distribution of residual terms of dependent variable in multiple regression analysis. The assumption of normality of residuals of dependent variable was checked by subjecting the residual terms to histogram with normal curve and normal probability plot (P-P plot). Figure 1 (Anx - B) shows the results of both tests (histogram and p-p plot). The bell shaped distribution of the residual and tight closeness of the expected and observed cumulative probabilities show that that the normality assumption of regression model is met. The normality assumption was verified by producing the results of one sample Kolmogorov – Smirnov test of normality. Figure 2 (Anx - B) shows the results. Highly non significant results show that the residual terms of the dependent variable are not significantly different from normal distribution. Hence the normality assumption is met.

Homoscedosticity and Linearity. These assumptions were tested by producing graph between regression standardized predicted values (ZPRED) and regression standardized residuals

(ZRES). If the values scatter around zero then the assumption of linearity and homoscedasticity is said to be met. Figure 1 (Anx - B) shows the results of homoscedasticity and linearity assumptions. Scattered data around zero shows that the assumption of homoscedasticity and linearity is met.

4.1.7 Discussion

In this study the hypotheses relating to impact of organizational mechanisms on the Potential Absorptive Capacity (Acquisition and Assimilation components) were tested. Hypothesis 1 states that Cross Functional Integration (INT) positively impacts the Acquisition (ACQ) component of Absorptive Capacity. The main effect of organizational mechanism relating to Cross Functional Integration (INT) on Acquisition (ACQ) was tested. Table 4.1.9 shows that the impact of Cross Functional Integration (INT) was positive and statistically significant (b= .353, p<.001). Thus hypothesis 1 is supported. Hypothesis 2 (H2) states that there is positive impact of Cross Functional Integration (INT) on Assimilation (ASM) component of Absorptive Capacity. Result of regression analysis (table 4.1.13) shows that Cross Functional Integration (INT) has positive impact on Assimilation (ASM) component of Absorptive Capacity and the impact is statistically significant (b= .415, p< .001). This leads us to support research hypothesis that Cross Functional Integration (INT) positively impacts Assimilation (ASM). Hypothesis 5 (H5) of the study states the positive contribution of Formalization (FORM) in explaining the Acquisition (ACQ) component of Absorptive Capacity. The Formalization was entered in the regression equation along with Cross Functional Integration (INT) to see the impact of Formalization (FORM) in the presence of Cross Functional Integration (INT). results of table 4.1.9 shows that there is positive contribution of Formalization (FORM) in explaining the Acquisition component of Absorptive Capacity and more over this contribution is statistically significant(b= .167, p < .005). Thus hypothesis 5 (H5) is supported.

Hypothesis 6 (H6) states that there is positive contribution of Formalization (FORM) in explaining the Assimilation (ASM) component of Absorptive Capacity. The Formalization was entered in the regression equation along with Cross Functional Integration (INT) to see the impact of Formalization (FORM) in the presence of Cross Functional Integration (INT). Results of table 4.1.13 shows that there is positive contribution of Formalization (FORM) in explaining

the Assimilation (ASM) of Absorptive Capacity and more over this contribution is statistically significant on the margin of .05 level of significance (b= .148, p = .05). Thus hypothesis 6 (H6) is supported.

Hypothesis 9 (H: 9) states that Job Rotation (JR) positively impacts Acquisition (ACQ) component of Absorptive Capacity. Table 4.1.9 shows the result of regression analysis relating to Job Rotation (JR) and Acquisition component of Absorptive Capacity. Regression analysis shows that Job Rotation (JR) positively impacts Acquisition component (ACQ) of Absorptive Capacity and this contribution of Job Rotation (JR) in explaining the Acquisition (ACQ) is statistically significant at .01 level of significance (b= .092, p< .01). Thus hypothesis 9 is supported. Hypothesis 10 (H: 10) states that Job Rotation (JR) positively impacts Assimilation (ASM) component of Absorptive Capacity. Table 4.1.13 shows the result of regression analysis relating to Job Rotation (JR) and Acquisition component of Absorptive Capacity. Regression analysis shows that Job Rotation (JR) positively impacts Assimilation (ASM) component of Absorptive Capacity. However, the contribution is not statistically significant at 0.05 level of significance rather this is significant at .1 level of significance. (b= .092 p < .1). Thus hypothesis 10 (H: 10) is supported but with low significance level.

4.2 Study 2

Impact of organizational mechanisms (Formalization, Cross Functional Integration and Job Rotation) on Realized Absorptive Capacity (Transformation and Exploitation)

4.2.1. Introduction

This study explores how the organizational mechanisms i.e. Formalization Cross Functional Integration and Job Rotation, impact on two components of realized Absorptive Capacity i.e. Transformation and Exploitation. The study is based on sample data from knowledge intensive companies of Pakistan and thus to be quantitative in nature.

4.2.2 Sample and Procedure.

Conceptual/target population for this was knowledge intensive industries of Pakistan. Data was collected through questionnaires. Stratified random sampling technique based on geographical

locations was adopted to collect the relevant data for this study. Data was collected from three strata of knowledge intensive industries of Pakistan as most of the industries are concentrated on three strata. Data was collected from senior supervisors, managers, general managers and specialists such as plant managers' special task handling employees. Rationale for collecting the data from specific segments off knowledge intensive industries was that the maximum knowledge process activities were handled by supervisors, managers and specialists of the knowledge intensive industry. Diverse range of employees participated in the study. The employees with different educational background diverse experience and different age group participated in the study. The respondents from diverse background and experience were selected so that the sample results could be generalized to entire population. The survey questionnaires were distributed to respondents through mail, drop in person and a few through e-mails. First reminder after distributing the questionnaires was given to the respondents at the time span of 15 days. Majority of the respondents returned the questionnaires duty filled after 10-15 days of first reminder. Rests of the respondents were reminded again on telephone e-mail. A certain percentage of respondents returned the filled questionnaires after 3-4 repeated reminders yet some percentage of respondents did not respond at all of 605 distributed questionnaires 475 were returned by respondents out of 475 responded questionnaires 44 were not worth enough to be included for analysis because most of questionnaires out of 44 partially fitted were returned unfilled and with demographic data filled only. Rests of questionnaires out of 44 were partially filled. However after evaluating responded questionnaires 431 were considered for conducting the statistical processes this makes response rate as 70% SPSS software was used to factor analyze the instruments/measurements of study variables both independent and dependent. After checking the validity and reliability of measures of variables the data was analyzed in SPSS software for testing the conceptual model of study and testing the hypotheses related to different variable of study.

4.2.3. Characteristics of Sample.

Data for this study was collected from genders i.e., males and females. Of 431 respondents 76% were males and 24% were females. The distribution of data attributing to each gender is shown in Table 4.2.1.

The age of respondents participating in the study ranged on a wide continuum. Minimum age of respondents was 20 years and maximum was seventy years. Majority of the respondents ranged from 20-30 years of age, contributing about 57% of total respondents. 29.2% (126) of respondents ranged from 31-40 years of age. 7.4% fell in the range of 41-50 years and 5% ranged from 51-60 brocket of age. A few in the uppermost bracket participated in the study, 1.6 % (7) came from this bracket.

Respondents from diverse educational background were included in the study. The respondents in the study ranged from under graduate background to the doctoral and specialist educational background. However number of participants on the extremes i.e. under graduates and respondents with doctoral degree or specialist degrees/certificates/courses were few in number. Graduates degree holders covered about half of study population (50.8%). 46 under graduates participated in this study covering 10.7% of the study population. 13 doctoral degree holders and 37 respondents with specialized degrees such as plant engineer, professional certifications etc participated in this study contributing 3.0% of space and 8.6% respectively in the sample of study.

The sample in the study came from employees holding different positions in the knowledge intensive companies. 154 (35.78%) managers and 145 (33.6%) respondents holding special positions in managerial hierarchy participated in the study. 107 supervisors and 25 general managers participated in the study contributing 24.8% and 5.8% to the sample data respectively. The respondents were approached with a focus to study the Absorptive Capacity in knowledge intensive environment and knowledge intensive companies were chosen. As large number of employees in knowledge intensive industry work on contract bases, so it was necessary to consider both permanent and contracted employees for study. Majority of the data came from permanent employees (71.2%) and 28.8% employees working on contract bases participated in the study.

Data for the study was collected from the respondents of different service brackets. Major portion of the data (49%) came from the respondents having service between 11 and 15 years. 65 (15.1%) respondents having service below 5 years participated in this study. The employees having 5-10 years of service were 67(15.5 %) in number. Respondents with 16-20 years of

service consisted on 13.7% (59) of the sample of this study. 21-25, 26-30 and above 30 years of service together contributed 7% to the sample in this study.

Table 4.2.1 : Characteristics of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
GENDER	MALE	331	76.8	76.8	76.8
	FEMALE	100	23.2	23.2	100.0
	Total	431	100.0	100.0	
AGE OF RESPONDENT	20-30	247	57.3	57.3	57.3
	31-40	126	29.2	29.2	86.5
	41-50	32	7.4	7.4	94.0
	51-60	19	4.4	4.4	98.4
	60-70	7	1.6	1.6	100.0
	Total	431	100.0	100.0	
QUALIFICATION	UNDER GRADUATE	46	10.7	10.7	10.7
	GRADUATE	219	50.8	50.8	61.5
	MASTERS	116	26.9	26.9	88.4
	PHD	13	3.0	3.0	91.4
	OTHERS	37	8.6	8.6	100.0
	Total	431	100.0	100.0	
DESIGNATION	SUPERVISORS	107	24.8	24.8	24.8
	MANAGER	154	35.7	35.7	60.6
	GENERAL MANAGER	25	5.8	5.8	66.4
	OTHERS	145	33.6	33.6	100.0
	Total	431	100.0	100.0	
		307	71.2	71.2	71.2
JOB TYPE	PERMANENT	307	71.2	71.2	71.2
	CONTRACT	124	28.8	28.8	100
	Total	431	100	100	
LENGTH OF SERVICE	Below 5	27	6.2	6.2	6.2
	6-10	11	2.6	2.6	8.8
	11-15	59	13.7	13.7	22.5

	16-20	30	7	7	29.5
	21-25	116	27	27	56.5
	26-30	133	31	31	87.5
	>30	55	12.5	12.5	100
	Total	431	100	100	
AGE OF ORGANIZATION	1-10	115	26.7	26.7	26.7
	11-20	150	20.0	34.8	61.5
	21-30	92	21.3	21.3	82.8
	31-40	60	14	7.7	96.8
	41-50	14	3.2	3.2	100
	Total	431	100	100	
NO OF EMPLOYEES	1-500	350	81.2	81.2	81.2
	501-1000	52	12	12	93.2
	1001-1500	20	4.6	4.7	97.9
	Above1500	9	2.1	2.1	100
	Total	431	100.0	100.0	

Generally, the older organizations invest more on knowledge process activities to compete in the market. Therefore Absorptive Capacity may be different in older organization from the new ones or with less age. The data therefore, was collected from the organizations having wide range of age. The age of organization ranged from 1 to 50 years. Majority of the data (42.9%) came from organizations having age of 11-20 years. Companies with 1-10 years of age contributed 8.1% in the sample and similarly the upper bracket of company age (41-50 yeas) contributed 7.7% to the study population. Companies with 21-30 years consisted on 86 (20%) and 31-40 years of age consisted on 92 (21.3%) of the sample data.

Data was collected from diverse companies however, having employees below 100 were not included in this study. Majority of companies consisted on employees from 100 to 1000. Our healthy portion of sample came from companies having employees 1-500 and covered 72.2% of sample. The companies having employees 501-1000 consisted on the data 12.3% of the sample of study. Rest of the data (15.5 %) came from companies having employees within range of 1001to range of above 2500 in number.

4.2.4 Factor Analysis

Factor analysis was conducted on the data collected for this study by using principal component analysis (PCA) as extraction method and varimax method was used as rotation method.

4.2.4.1 Kaiser- Meyer- Olkin (KMO) and Bartlett Test of Sphericity

Before conducting factor analysis, two statistics (sampling adequacy statistic-- Kaiser- Meyer-Olkin (KMO) and statistic of Bartlett's Test of Sphercity) need to be significant. Values of two statistics were checked i.e. sampling adequacy and Bartlett's test of sphericity and both statistics were found significant. Kaiser Meyer-Olkin (KMO) for sample in the study was observed as KMO = .871 where as Bartlett's test of sphericity was also observed significant at .001 level of significance which means a confidence internal (C I =99.9%). Table 4.2.2 shows the results of Kaiser- Meyer-Olkin for sampling adequacy and Bartlett's test of sphericity.

Table 4.2.2 : KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.871
Bartlett's Test of Sphericity	Approx. Chi-Square	4058.921
	df	325
	Sig.	.000
Extraction Method: Principal Component Analysis.		

The test statistic for sampling adequacy (KMO) for individual variables was also calculated and all values were observed well above the acceptable range. The value of sampling adequacy (KMO) for individual variables ranged from .529 to .872. All the values of Bartlett's test of Sphericity were observed significant at a significance level of .001. Table 5 (Anx - A) shows the values of both statistics (KMO and Bartlett's test of sphericity) of all the variables. After both the statistics were found significant the factor analysis was conducted to refine the measures for variables of study based on factor loadings.

4.2.4.2 Interpretation of results of Factor Analysis

Table 4.2.3 shows the results of factor analysis of study variables.

Table 4.2.3 : Factor loadings of individual items on their respective measures

	Components				
	1	2	3	4	5
TFM1	**.680**				
TFM2	**.699**				
TFM3	**.687**				
TFM4	**-.088**				
TFM5	**.683**				
TFM6	**.743**				
EXPL1		**.293**			
EXPL2		**.115**			
EXPL3		**.334**			
EXPL4		**.687**			
EXPL5		**-.278**			
EXPL6		**.723**			
FORM1			**.552**		
FORM2			**.740**		
FORM3			**.731**		
FORM4			**.821**		
FORM5			**.737**		
FORM6			**.569**		
INT1				**.635**	
INT2				**.751**	
INT3				**.694**	
INT4				**.621**	
INT5				**.794**	
INT6				**.713**	
JR1					**.864**
JR2					**.856**

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

The items of individual variables were analyzed on the basis of factor loadings on their respective factors. The items with low factor loadings were dropped from the measures and with

satisfactory values were retained for further analysis. Transformation (TFM) was subjected to factor analysis and it was found that some items loaded high on one factor whereas, the other items loaded low. The items TFM1, TFM2, TFM3, TFM5 and TFM6 loaded high on this factor with factor loadings as .680, .699, .687 , .683 and .743 respectively.TFM4 loaded low(-.088) with negative value highlighting that the item to be dropped from the measure. Most of the items of the Exploitation (EXPL) loaded high on their respective factor. The items EXPL1, EXPL3, EXPLE4 and EXPL6 loaded high with factor loadings .293, .334, .687 and .723 respectively. However, items EXPL2 and EXPL5 loaded low on the same factor. The item EXPL2 loaded with factor loading of .115 on its factor whereas, EXPL5 loaded low with negative value of -.278 on the same factor. Factor loadings of the items of Formalization (FORM) were observed high on their respective factor. The factor loadings of items for Formalization (FORM) ranged from .552 to .821. The factor loading of items FORM1, FORM2, FORM3 and FORM4 were observed as .552, .740, .731 and .821 respectively. The values of factor loadings of FORM5 and FORM6 were observed as .737 and .569 respectively. Similar to factor loading of items of Formalization (FORM), the factor loadings of the Cross Functional Integration (INT) were observed high for their respective factor. The factor loading of items of Cross Functional Integration (INT) ranged from .621 (factor loading of INT4) to .794(factor loading of INT5). The factor loadings of items INT1, INT2 and INT3 were observed as .635, .751 and .694 respectively.

The factor loading of INT6 was observed as .713. The items of Job Rotation (JR) loaded high on their respective factor with factor loadings of .864 and .856 for JR1 and JR2 respectively. The communalities (Table 6, Anx - A) of the almost all the items were observed greater than .5.

The factor loading of the items of all the individual variables on the factors other than their own factors are shown (Table 7, Anx - A) in the rotated component matrix. Principal component analysis was used as extraction method and varimax rotation method was used for rotation of components in this factor analysis.

4.2.4.3 Summary Factor Analysis

The table of thresh hold points were discussed and analyzed keeping in view the research literature. It was observed that the reliabilities of the measures increased after dropping the items with low factor loadings for example, reliability of Absorptive Capacity (TFM and EXPL)

increased from the value before dropping the items (below .6) to the value greater than .7(after dropping the low factor loading items). However, the items with high factor loadings showed good reliabilities of the measure. For example, reliabilities of Formalization (FORM) and Cross Functional Integration (INT) were observed as .87 and .85 respectively. Table 4.2.3 shows the factor loadings of individual items on their respective measures.

4.2.5 Result of study of relationship between Formalization, integration and job rotation and Realized Absorptive Capacity (Transformation component)

4.2.5.1 Descriptive statistics.

Mean responses of employees against all the variables were tabulated to see the overall response of employees against each variable. Table 4.2.4 shows the mean responses of dependent variable (DV) and independent variables of this study. Mean response of Transformation (TFM) was observed as 4.93 with standard deviation of .9. Mean response of Formalization (FORM) was observed as 3.74 with standard deviation of .77. Cross Functional Integration (INT) was responded with mean of 3.60 and standard deviation of .71. Whereas mean response of employees of the sample data for Job Rotation (JR) was observed as 3.2 and standard deviation was observed as .90.

Table 4.2.4 : Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
TFM	431	1.80	7.00	4.9313	.90431
EXPL	431	2.50	7.00	5.0760	.85293
FORM	431	1.00	5.17	3.7405	.77553
INT	431	1.00	5.00	3.6029	.71374
JR	431	1.00	5.00	3.2193	.97948

Mean responses of the respondents with different demographics were also observed. Table 4.2.5 gives summary of descriptive statistics (mean responses) of employees with different demographics.

On the average males and females responded uniformly except a few variables.

Table 4.2.5: Descriptive Statistics (Mean responses) of demographics						
		TFM	**EXPL**	**FORM**	**INT**	**JR**
GENDER	MALE	4.91	5.07	3.71	3.57	3.13
	FEMALE	4.99	5.11	3.84	3.73	3.51
AGE OF RESPONDENT	20-30	5.02	5.06	3.69	3.63	3.21
	31-40	4.89	5.21	3.85	3.63	3.22
	41-50	5.07	5.14	3.88	3.65	3.61
	51-60	3.62	4.28	3.40	3.10	2.90
	61-70	3.40	4.32	3.55	2.71	2.00
QUALIFICATION	UNDER GRADUATE	4.57	4.80	3.80	3.25	3.06
	GRADUATE	5.00	5.18	3.68	3.61	3.31
	MASTERS	4.93	4.94	3.76	3.72	3.02
	PHD	4.60	4.87	3.90	3.65	3.58
	OTHERS	5.06	5.33	3.91	3.62	3.42
DESIGNATION	SUPERVISORS	5.16	5.25	3.88	3.53	3.17
	MANAGER	4.82	5.10	3.85	3.79	3.20
	GENERAL MANAGER	4.70	4.96	3.61	3.48	3.48
	OTHERS	4.92	4.94	3.54	3.48	3.23
JOB TYPE	PERMANENT	4.99	5.12	3.78	3.72	3.30
	CONTRACT	4.80	4.97	3.63	3.31	3.03
LENGTH OF SERVICE	Below 5	5.01	5.06	3.68	3.59	3.24
	5-10	4.83	5.03	3.73	3.59	3.04
	11-15	4.75	5.23	3.91	3.57	3.24
	16-20	4.91	5.20	4.01	3.87	3.75
	21-25	5.15	5.00	4.13	3.92	4.13
	26-30	5.40	5.00	4.25	4.00	3.50
	Above 30	5.72	5.40	3.93	3.80	4.40

Mean response of 4.91 was observed for a male which was little lower as compared to the mean response of females for Transformation (TFM) who responded Acquisition with mean of 4.99. Mean response of males for Formalization (FORM) was observed was observed as 3.71 and 3.84 for males and females respectively. Mean response of males and females for Cross Functional Integration (INT) was observed as 3.57 and 3.73 respectively. Job Rotation was responded by males and females with mean values of 3.13 and 3.51 respectively.

The mean responses of study variables were also observed against the respondents with different age groups. Mean response for Acquisition was observed highest for the respondents having age groups 31-40 years of age with mean value of 4.89. Whereas minimum mean response (Mean=3.40) against Transformation (TFM) was observed for the respondents of age groups of 61-70 years. Mean responses of respondents of age groups 20-30 years and 31-40 years for Transformation (TFM) were observed as 5.02 and 4.89 respectively. These age brackets 20-30 years responded Formalization (FORM) and Cross Functional Integration (INT) with means of 3.69 and 3.85respectively. Respondents with age 31-40 years responded Formalization and Cross Functional Integration with means 3.63 and 3.63 respectively. The respondents of age groups of 20-30 years and 31-40 years responded Job Rotation (JR) with mean values of 3.21 and 3.22 respectively. Mean responses of employees of age group of 51-60 years and 61-70 years for Transformation (TFM) were observed as 3.62 and 3.40 respectively.

Mean responses of employees with 51-60 years were observed as 3.40, 3.10 and 2.90 for Formalization (FORM), Cross Functional Integration (INT) and Job Rotation (JR) respectively.

Mean responses for Transformation (TFM), Formalization (FORM), Cross Functional Integration (INT) and Job Rotation (JR) were observed as 3.40, 3.55, 2.71 and 2.00 respectively for age group of 61-70 years.

Mean response of graduates and master degree holders was observed as 5.00 and 4.93 respectively for Transformation (TFM). Whereas, mean response of undergraduates was observed as 4.57 for Transformation (TFM) and doctoral degree holders responded with mean of 4.60 and for specialists, the mean value of 5.06 was observed for Transformation (TFM). Mean response of under graduates, graduates and specialists for Formalization (FORM) was observed as 3.80, 3.68 and 3.91 respectively. Master degree holders responded the Formalization (FORM)

with the mean response of 3.76. Mean response of doctoral degree holders for Formalization (FORM) was observed as 3.90. Mean response of undergraduates, graduates and master degree holders for Cross Functional Integration (INT) was observed as 3.25, 3.61 and 3.72 respectively. Doctoral degree holders and employees holding specialist qualification responded Cross Functional Integration (INT) with mean values of 3.65 and 3.62 respectively. Mean response of employees with under graduates; graduates and masters degrees responded Job Rotation (JR) with mean values of 3.06, 3.31 and 3.02 respectively. The employees holding specialist education and doctoral degrees responded Job Rotation (JR) with mean values of 3.42 and 3.58 respectively.

Mean response of supervisors and managers for Transformation (TFM) was observed as 5.16 and 4.82 respectively. Mean response of general managers for Transformation (TFM) was observed as 4.70. Mangers holding special positions in managerial hierarchy responded Transformation (TFM) with mean value of 4.92. Mean response of supervisors, managers and general managers for Formalization (FORM) was observed as 3.88, 3.85 and 3.61 respectively. Mean response of managers holding special managerial position in knowledge intensive companies was observed as 3.54. Cross Functional Integration (INT) was responded with mean values of 3.53, 3.79 and 3.48 against supervisors, managers and general managers respectively.

The managers holding special positions in management chain responded Cross Functional Integration (INT) with mean value of 3.48. Supervisors, managers and general managers responded Job Rotation with mean values of 3.17, 3.20 and 3.48 respectively. The employees with special managerial positions responded Job Rotation (JR) with mean value of 3.23.

Mean response for employees having different job categories were also observed. The job categories included permanent jobs and jobs on contract bases. The mean response of employees with permanent jobs for Transformation (TFM) was observed as 4.99 and employees with contracted jobs responded Transformation (TFM) with mean value of 4.80. Mean responses of employees with permanent and contracted jobs for Formalization (FORM) were observed as 3.78 and 3.63 respectively. Means of 3.72 and 3.31 for Cross Functional Integration (INT) were observed against permanent and contracted employees. The employees holding status of

permanent job responded the Job Rotation (JR) with mean value of 3.30 and employees with contracted jobs responded with mean value of 3.03.

The employees with length of service of less than five years and over 30 years responded Transformation (TFM) with mean values of 5.01 and 5.72 respectively. The employees with 5-10, 11-15 and 16-20 years of service responded for Transformation (TFM) with mean values of 4.83, 4.75 and 4.91 respectively. The respondents with 21-25 years and 26-30 years of service responded Transformation (TFM) with mean values of 4.15 and 5.40 respectively. The employees with service below 5 years and above 30 years responded Formalization (FORM) with mean values of 3.68 and 3.93 respectively. The employees with 5-10 years and 11-15 years of service responded with means of 3.73 and 3.91 respectively. The mean values of employees with 16-20 years, 21-25 years and 26-30 years of service were observed as 4.01, 4.13 and 4.25 for Formalization. Employees with service of below 5 and above 30 years responded Cross Functional Integration (INT) with mean values of 3.59 and 3.80 respectively. The employees with 5-10 years and 11-15 years of service responded with means of 3.59 and 3.57 respectively. The mean values of employees with 16-20 years, 21-25 years and 26-30 years of service were observed as 3.87, 3.92 and 4.00 respectively for Cross Functional Integration (INT). Job Rotation (JR) was responded with mean values of 3.24 and 4.40 for employees having less than 5 years service and above 30 years service respectively. Employees with 5-10 years, 11-15 years and 16-20 years of service responded Job Rotation (JR) with mean values of 3.04, 3.24 and 3.75 respectively. Mean responses of 4.13 and 3.50 were observed for Job Rotation (JR) against employees with 21-25 years and 26-30 years of service. Figure 4.2.2 shows the graphical representation of descriptive statistics with different demographics.

4.2.5.2 Pearson Correlation Matrix

Pearson correlation was applied to the independent and dependent variables. As the research hypotheses of this study were directional therefore, directional or one tailed test was applied. The results of the association between variables are shown in table 4.2.6. On the average, based on the sample of 431 respondents from knowledge intensive companies of Pakistan, significant correlation between Transformation (TFM) and Formalization was observed.

Table 4.2.6 : Correlations matrix of study variables

		TFM	FORM	INT	JR
TFM	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	431			
FORM	Pearson Correlation	.308**	1		
	Sig. (1-tailed)	.000			
	N	431	431		
INT	Pearson Correlation	.317**	.635**	1	
	Sig. (1-tailed)	.000	.000		
	N	431	431	431	
JR	Pearson Correlation	.085*	.063	.191**	1
	Sig. (1-tailed)	.038	.097	.000	
	N	431	431	431	431

**. significant at the 0.01 level (1-tailed). *. significant at the 0.05 level (1-tailed).

The correlation with correlation coefficient(r = .308) between Transformation (TFM) and Formalization (Form) was observed significant at .01 level of significance. Confidence interval (99%) shows that there are only 1 percent chances that the correlation between Transformation (TFM) and Formalization (FORM) with correlation coefficient (r = .308) occurs by chance. Similarly, on the basis of sample obtained from knowledge intensive companies of Pakistan, a significant relationship between potential Absorptive Capacity, Transformation (TFM) and Cross Functional Integration (INT) was observed significant with correlation coefficient (r= .317) at .01 level of significance (r = .317, p<.01). on the basis of sample data obtained from knowledge intensive companies of Pakistan and correlation coefficient with 99% confidence interval , there are only 1 percent chance that the correlation between Transformation (TFM) and Cross Functional Integration (INT) with correlation coefficient (r = .317) occurs by chance. The correlation matrix (table 4.2.6) shows significant association between Transformation (TFM) and Job Rotation (JR) with correlation coefficient of r = .085. Confidence interval of 95 % shows that there are only 5 percent chances that this correlation coefficient (r = .177) between

Transformation (TFM) and Job Rotation (JR) occurs by chance. Moreover, the correlation between Transformation (TFM) and Job Rotation (JR) was observed weak.

4.2.5.3 Scatter plot of study variables

Scatter plot matrix was drawn of study variables. Figure 4.2.1 shows the results of scatter plot.

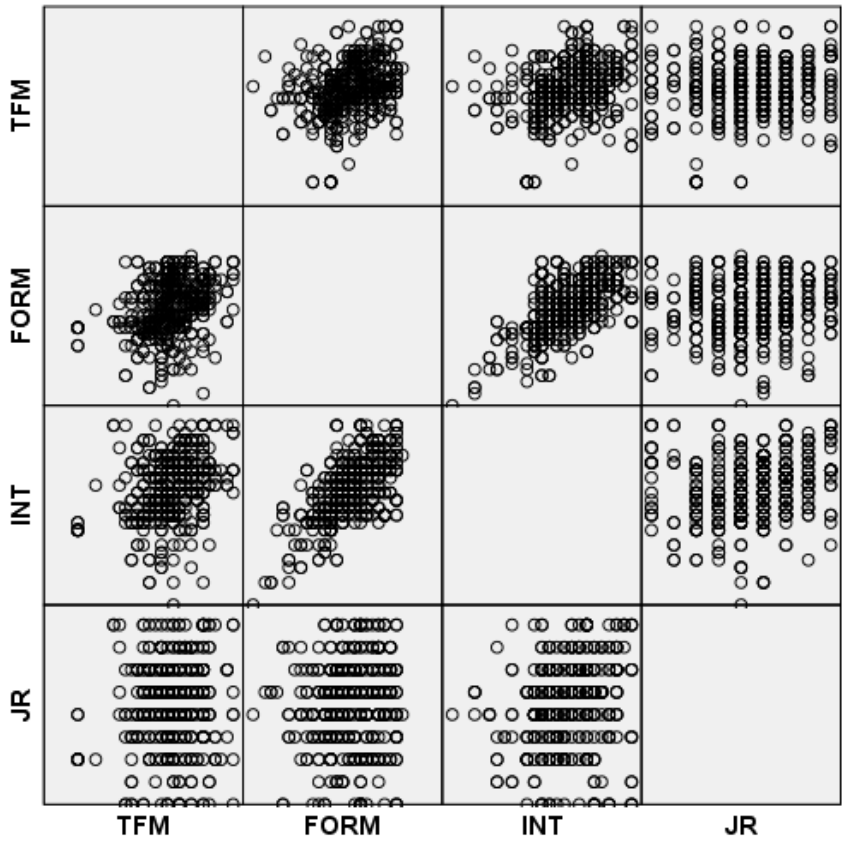

Figure 4.2.1: scatter plot of study variables

Generally, the Formalization (FORM) shows the linear relationship with Transformation (TFM). The cylindrical position of scatter plot between Transformation (TFM) and Formalization (FORM) shows the linear relationship between them and with less scattered data. The scatter plot between Cross Functional Integration (INT) and Transformation (TFM) was also observed linear. The pattern of data scattered in the plane in this relationship (INT and TFM) was

observed slightly different from the scattered data in the plane attributing to the relationship between Transformation (TFM) and Formalization (FORM). In later relationship the slightly more scattered data was observed but the relationship is still linear and it allows us to conduct further analyses on it. However, the scatter plot shows that the pattern of scattered data in the plane, attributing to the correlation between Transformation (TFM) and Job Rotation (JR) is different from patterns of scattered data resulted from relationship of Transformation (TFM), Formalization (FORM) and Cross Functional Integration (INT).

The pattern of data indicates that Transformation (TFM) and Job Rotation (JR) may not have strong linear relationship and results in the weak association between these two variables.

4.2.5.4 Multiple Regression Analysis

The Absorptive Capacity (Transformation component) was analyzed by regressing it on study variables (Formalization, Cross Functional Integration and Job Rotation). The multiple regression analysis was carried out in three steps. First the Potential Absorptive Capacity, Transformation (TFM) was regressed on cross functional (INT) and in the second step Cross Functional Integration (INT) and Formalization (FORM) was regressed on Transformation (TFM) and at the last all three independent variables were regressed on Transformation (TFM). The results were analyzed at each step. The introduction of independent variables in various steps in multiple regression analysis gives insights of contribution of each variable and its impact in the presence and absence of other variables of study. It was observed that that at each step of hierarchical regression the significant results were obtained.

4.2.5.4.1 Regression Analysis—Model Summary

Transformation (TFM) was regressed on independent variables in three different models. In Model 1 only one variable (INT) was entered to evaluate its impact on dependent variable (TFM).

In model 2 second variable (FORM) was entered in the regression equation with the first variable (INT) and the impact of INT and FORM was evaluated together on Transformation (TFM). Model 3 was evaluated by regressing Transformation (TFM) on all the independent variables (INT, FORM, and JR). Table 4.2.7 gives summary of all the models. Overall the association of

Cross Functional Integration (INT) with dependent variable (Transformation, TFM) was observed as R= .317 when only one variable was entered in regression equation.

The standard error of estimate was observed as .85. The strength of association becomes R= .346 (with standard error of estimate of .85) on introduction of second variable (Formalization, FORM) in the regression equation. when all the independent variables were entered in the regression equation the strength of association between independent variables and dependent variable enhanced to R= .348. Durbin-Watson test for independent errors was observed as 1.804. The value of test statistic of independent errors (Durbin –Watson statistic) ranges from 0 to 4.

Table 4.2.7 :Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.317[a]	.101	.099	.85857	
2	.346[b]	.120	.116	.85038	
3	.348[c]	.121	.115	.85076	1.804

a. Predictors: (Constant), INT b. Predictors: (Constant), INT, FORM c. Predictors: (Constant), INT, FORM, JR d. Dependent Variable: TFM

The values close to zero indicate that the errors are independent of each other. Berry (1993) argues that for any two observations the residual terms should be uncorrelated (or independent) to draw conclusions based on the sample from the population by using regression equations. In regression analysis this is tested by Durbin-Watson test. This test statistic can have range from 0 to 4 the values around of mean that residuals are uncorrelated. Values above 2 reflect a negative correlation between adjacent residuals and the values below 2 show negative correlation. Durbin Watson (1951) suggests that values below 1 and above 3 are problematic and are a cause of concern.

Model summary gives overall picture of regression analysis and importantly, the test of independence of errors is qualified which is one of the important assumptions of multiple regression analysis.

4.2.5.4.2 Regression Analysis—Overall Model Fit

Table 4.2.8 shows overall fit of model (ANOVA). Analysis of variance (ANOVA) tests whether the model significantly explains the relationship between independent and dependent variables or not. F-values of ANOVA test indicate the significance level the goodness of fit of model.

F-ratio is calculated by dividing average improvement due to the model by error in the model. If F values is greater than 1 then regression model explains the data well (good fit) and the significance value highlights the unlikeliness of this F-value to occur by chance. Results of overall model fit (table 4.2.8) show that in all cases model fits the data well and highly significant ANOVA results show that there are least chances that such relationships occur by chance. Table 4.2.8 summarizes the F values and significance values of analysis of variance (ANOVA) test.

Table 4.2.8 : Overall Model Fit (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.415	1	35.415	48.044	.000[b]
	Residual	316.232	429	.737		
	Total	351.647	430			
2	Regression	42.137	2	21.069	29.134	.000[c]
	Residual	309.510	428	.723		
	Total	351.647	430			
3	Regression	42.588	3	14.196	19.614	.000[d]
	Residual	309.059	427	.724		
	Total	351.647	430			

a. Dependent Variable: TFM b. Predictors: (Constant), INT c. Predictors: (Constant), INT, FORM
d. Predictors: (Constant), INT, FORM, JR

4.2.5.4.3 Regression Analysis – Regression Parameters (individual contribution of variables in explaining the outcome variable, Transformation (TFM)

Table 4.2.9 shows the regression model parameters (b values). The regression parameters in the table provide us the contribution percentage in explaining the outcome variable by holding all other variables constant. The numerical value gives us strength of relationship between

Independent and outcome variable whereas the positive or negative sign reflects the direction of relationship between variables every b-values has associated standard error showing the extension of these values (b values) across different samples. Basically these errors decided whether the b-values are significantly different zero or not. For this significance testing of b-values SPSS uses t-test. T-test shows whether the predictors (independent variables) explain the outcome variable or not.

Table 4.2.9 : Contribution of individual variables(Coefficients) in explaining the dependent variable(TFM)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			Tolerance
1	(Constant)	3.483	.213		16.346	.000	
	INT	.402	.058	.317	6.931	.000	1.000
2	(Constant)	3.221	.228		14.134	.000	
	INT	.258	.074	.204	3.474	.001	.597
	FORM	.209	.068	.179	3.049	.002	.597
3	(Constant)	3.138	.251		12.527	.000	
	INT	.247	.076	.195	3.250	.001	.574
	FORM	.213	.069	.182	3.099	.002	.594
	JR	.034	.043	.037	.790	.430	.958

On the basis of our sample data of 431 respondents from knowledge intensive industries of Pakistan, Cross Functional Integration (INT), on the average contributes 40.2% in explaining the

variation in the realized Absorptive Capacity (Transformation component) when entered in the regression equation without other independent variables.

The contribution of Cross Functional Integration (INT) was significant at .001 level of significance (t= 6.931, P<.001). The contribution of Cross Functional Integration (INT) on introduction of Formalization (FORM) becomes 25.8 % and this contribution is still significant at .005 level of significance (t = 3.474, p<.005). The unique contribution of 20.9 % in explaining the Transformation (TFM) in this equation is attributed to Formalization (FORM). The contribution of Formalization (FORM) is significant at .005 level of significance (t = 3.049, p<.005). The contribution of Cross Functional Integration (INT) on introduction of Formalization (FORM) and Job Rotation (JR) becomes 24.7 % and this contribution is still highly significant at .005 level of significance(t = 3.250 , p<.005). The unique contribution of 21.3 % in explaining the Transformation (TFM) in this equation is attributed to Formalization (FORM). The contribution of Formalization (FORM) is significant at .005 level of significance (t = 3.099, p<.005). The unique contribution of Job Rotation (JR) in explaining the Transformation (TFM) in this equation becomes 3.4 %. The contribution made by Job Rotation (JR) in explaining Transformation (TFM) was observed non significant (t=.790, p>.1).

4.2.5.4.4 Regression Analysis - Diagnostics of Regression Model

Both (VIF and T) statistics were produced by using SPSS software for checking the assumption of multi collinearity of regression models of this study. It was observed that the values of both statistics were well within acceptable range (VIF<10 and T>.2). Table 8 (Anx - A) shows the results of both statistics.

Variance Inflation Factor (VIF) and Tolerance (T) values for Cross Functional Integration (INT) were observed as 1.741 and .574 respectively which are well in acceptance range of both statistics. Formalization (FORM) was having Variance inflation factor (VIF=1.684) which is well below the problematic point (VIF=10) where as the Tolerance (T) against Formalization (FORM) was observed as T=.594 which is well above the minimum acceptable limit (T =.2) Similarly the variance inflation factor (VIF) and Tolerance (T) for Job Rotation were observed within range (VIF = 1.044, T= .958).

The assumption of normality refers to the distribution of residual terms of dependent variable in multiple regression analysis. The assumption of normality of residuals of dependent variable was checked by subjecting the residual terms to histogram with normal curve and normal probability plot (P-P plot). Figure 3 (Anx - B) shows the results of both tests (histogram and p-p plot). The bell shaped distribution of the residual and tight closeness of the expected and observed cumulative probabilities show that that the normality assumption of regression model is met. The normality assumption was verified by producing the results of one sample Kolmogorov – Smirnov test of normality. Figure 4 (Anx - B) shows the results. Highly non significant results show that the residual terms of the dependent variable are not significantly different from normal distribution. Hence the normality assumption is met.

Homoscedosticity and Linearity. Regression analysis with more than one independent variable assumes the independent variables are linearly related with outcome variable and for every level of independent variable there is homogeneous variance. These assumptions are referred as linearity and homoscedasticity. These assumptions are tested by producing graph between regression standardized predicted values (ZPRED) and regression standardized residuals (ZRES). If the values scatter around zero then the assumption of linearity and homoscedasticity is said to be met. Figure 3 (Anx - B) shows the results of homoscedasticity and linearity assumptions. Scattered data around zero shows that the assumption of homoscedasticity and linearity is met.

4.2.6 Result of study of relationship between Formalization (FORM), Cross Functional Integration (INT), Job Rotation (JR) and Realized Absorptive Capacity (Exploitation component)

4.2.6.1 Descriptive Statistics

From descriptive statistics table 4.2.4, mean response of employees from knowledge intensive companies for Exploitation (EXPL) was observed as 5.08 with standard deviation of .85 (table 4.1.4). Mean responses of employees for Exploitation (EXPL) with different demographics was observed. Table 4.2.5 shows the mean responses of employees with different demographics. Mean response of male and females for Exploitation (EXPL) was observed as 5.07 and 5.11 respectively.

Mean response of employees with 20-30 years and 31-40 years of age responded Exploitation (EXPL) was observed as 5.06 and 5.21 respectively. Respondents with age groups of 41-50 years and 51-60 years responded with mean values of 5.14 and 4.28 respectively. Exploitation (EXPL) was responded by employees with age bracket of 61-70 years with mean value of 4.32.

Under graduates, graduates and masters responded Exploitation (EXPL) with mean values of 4.80, 5.18 and 4.94 respectively. The employees with doctoral degrees responded Exploitation (EXPL) with mean value of 4.87. The employees holding specialist education (professional certifications, specialist courses, specific to job etc) responded with mean value of 5.33.

The responses of employees holding different managerial positions in the management hierarchy were also observed. Mean response of supervisors and managers were observed as 5.25 and 5.10 respectively. General Managers and managers holding special managerial positions responded Exploitation (EXPL) with mean values of 4.96 and 4.94 respectively.

The employees with permanent and contracted jobs responded with mean values of 5.12 and 4.97 respectively.

Employees with length of service below 5 years and above 30 years responded with mean values of 5.06 and 5.40 respectively. Employees with 5-10, 11-15 and 16-20 years of service responded Exploitation (EXPL) with mean values of 5.03, 5.23 and 5.20 respectively. The employees with 21-25 years and 26-30 years of service responded with mean values of 5.00.

4.2.6.2 Pearson Correlation Matrix.

Pearson correlation was applied to the independent and dependent variables. As the research hypotheses of this study were directional therefore, directional or one tailed test was applied. The results of the association between variables (EXPL, FORM, INT and JR) are shown in table 4.2.10. On the average, based on the sample of 431 respondents from knowledge intensive companies of Pakistan, significant correlation between Exploitation (EXPL) and Formalization (FORM) was observed.

Correlation coefficient($r = .370$) between Exploitation (EXPL) and Formalization (Form) was observed significant at .01 level of significance. Confidence interval (99%) shows that there are

only 1 percent chances that the correlation between Exploitation (EXPL) and Formalization (FORM) with correlation coefficient (r = .370) occurs by chance. Similarly, on the basis of sample obtained from knowledge intensive companies of Pakistan, a significant relationship between Exploitation (EXPL) and Cross Functional Integration (INT) was observed significant with correlation coefficient (r = .295) at .01 level of significance (r = .295, p<.01).

Table 4.2.10 : Correlations

		EXPL	FORM	INT	JR
EXPL	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	431			
FORM	Pearson Correlation	.370**	1		
	Sig. (1-tailed)	.000			
	N	431	431		
INT	Pearson Correlation	.295**	.635**	1	
	Sig. (1-tailed)	.000	.000		
	N	431	431	431	
JR	Pearson Correlation	.171**	.063	.191**	1
	Sig. (1-tailed)	.006	.097	.000	
	N	431	431	431	431

**. Correlation is significant at the 0.01 level (1-tailed).

on the basis of sample data obtained from knowledge intensive companies of Pakistan and correlation coefficient with 99% confidence interval , there are only 1 percent chance that the correlation with correlation coefficient (r = .336) between Exploitation (EXPL) and Cross Functional Integration (INT) occurs by chance. Correlation results based on sample data shows significant association between Exploitation (EXPL) and Job Rotation (JR) with correlation coefficient of r = .121.

4.2.6.3 Scatter Plot of Study Variables**.**

Scatter plot between two variables gives a pattern of data scattered in a plane and in turn we get an idea about the relationship of two variables. This visual representation of data in a plane helps us to conduct furthers analysis on the data such as regression analysis. Scatter plot provides the fair idea about the nature of relationship between variables that is it is helpful in determining whether the relationship between variables is linear or not.

Scatter plot matrix was drawn of study variables. Figure 4.2.2 shows the results of scatter plot.

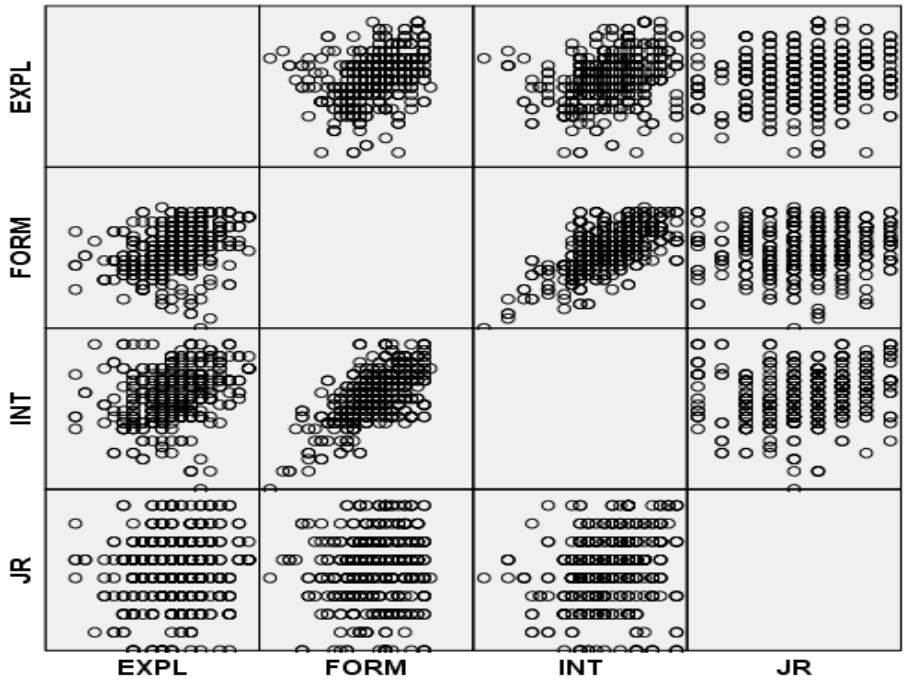

Figure 4.2.2 : scatter plot of study variables

Generally, the Formalization (FORM) shows the linear relationship with Exploitation (EXPL).the cylindrical position of scatter plot between Exploitation (EXPL) and Formalization (FORM) shows the linear relationship between them and with less scattered data. The scatter plot between Cross Functional Integration (INT) and Exploitation (EXPL) was also observed linear. The pattern of data scattered in the plane in this relationship (INT and EXPL) was observed slightly different from the scattered data in the plane attributing to the relationship between Exploitation (EXPL) and Formalization (FORM). In later relationship more scattered data was observed but the relationship is still linear and it allows us to conduct further analyses on it.

However, the scatter plot shows that the pattern of scattered data in the plane, attributing to the correlation between Exploitation (EXPL) and Job Rotation (JR) is different from patterns of scattered data resulted from relationship of Exploitation (EXPL), Formalization (FORM) and Cross Functional Integration (INT). The pattern of data indicates that Exploitation (EXPL) and Job Rotation (JR) have weak association between them.

4.2.6.4 Multiple Regression Analysis

The Absorptive Capacity (Exploitation component) was analyzed by regressing it on study variables (Formalization, Cross Functional Integration and Job Rotation). The multiple regression analysis was carried out in three steps. First EXPL was regressed on Cross Functional (INT) and in the second step regression of Cross Functional (INT) and Formalization (FORM) was checked on Exploitation (EXPL) and at the last all three independent variables were regressed on Assimilation (ASM). The results were analyzed at each step. The introduction of independent variables in various steps in multiple regression analysis provided insights of contribution of each variable and its impact in the presence and absence of other variables of study. It was observed that at each step of hierarchical regression the significant results were obtained in most of the cases.

4.2.6.4.1 Regression Analysis - Model Summary

Exploitation (EXPL) was regressed on independent variables in three different models. In Model 1 only one variable (INT) was entered to evaluate its impact on dependent variable, Exploitation (EXPL). In model 2 second variable (FORM) was entered in the regression equation with the first variable (INT) and the impact of INT and FORM was evaluated together on Exploitation (EXPL).Model 3 was evaluated by regressing Exploitation (EXPL) on all the independent variables (INT, FORM, and JR). Table 4.2.11 gives summary of all the models. Overall the association of Cross Functional Integration (INT) with dependent variable, Assimilation (ASM) was observed as R= .295 when only one variable was entered in regression equation. The standard error of estimate was observed as .81.

The strength of association became R= .378 (with standard error of estimate of .79) on introduction of second variable (Formalization, FORM) in the regression equation. when all the independent variables were entered in the regression equation the strength of association between

independent variables and dependent variable enhanced to R= .387. Durbin-Watson test for independent errors was observed as 1.905. The value of test statistic of independent errors (Durbin –Watson statistic) ranges from 0 to 4. The values close to zero indicate that the errors are independent of each other. Berry (1993) argues that for any two observations the residual terms should be uncorrelated (or independent) to draw conclusions based on the sample from the population by using regression equations. In regression analysis this is tested by Durbin-Watson test. This test statistic can have range from 0 to 4. The values around of mean show that residuals are un correlated.

Table 4.2.11: Model summary of regression analysis with EXPL as dependent variable and independents as FORM, INT and JR.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.295[a]	.087	.085	.81581	1.905
2	.378[b]	.143	.139	.79141	
3	.387[c]	.150	.144	.78908	

a. Predictors: (Constant), INT b. Predictors: (Constant), INT, FORM c. Predictors: (Constant), INT, FORM, JR

Values above 2 reflect a negative correlation between adjacent residuals and the values below 2 show positive correlation. Durbin Watson (1951) suggests that values below 1 and above 3 are problematic and are a cause of concern.

Model summary gives overall picture of regression analysis and importantly, the test of independent of errors is qualified which is one of the important assumptions of multiple regression analysis.

4.2.6.4.2 Regression Analysis—Overall Model Fit

Table 4.2.12 shows overall fit of model (ANOVA). Analysis of variance (ANOVA) tests whether the model significantly explains the relationship between independent and dependent variables or not.

F-values of ANOVA test indicate the significance level the goodness of fit of model.

F-ratio is calculated by dividing average improvement due to the model by error in the model. If the F values is greater than 1 then regression model explains the data well (good fit) and the

significance value highlights the unlikeliness of this F-value to occur by chance. The results of overall model fit (table 4.2.12) show that in all cases model fits the data well and highly significant ANOVA results show that there are least chances that such relationships occur by chance. F values in ANOVA test for model1, model 2 and model 3 were observed as 41.028, 35.731 and 25.136 respectively. Table 4.2.12 summarizes the F values and significance values of analysis of variance (ANOVA) test.

Table 4.2.12: Overall Model Fit (ANOVA[a])

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.306	1	27.306	41.028	.000[b]
	Residual	285.518	429	.666		
	Total	312.824	430			
2	Regression	44.758	2	22.379	35.731	.000[c]
	Residual	268.066	428	.626		
	Total	312.824	430			
3	Regression	46.952	3	15.651	25.136	.000[d]
	Residual	265.872	427	.623		
	Total	312.824	430			

a. Dependent Variable: EXPL b. Predictors: (Constant), INT c. Predictors: (Constant), INT, FORM d. Predictors: (Constant), INT, FORM, JR

4.2.6.4.3 Regression Analysis – Regression parameters (individual contribution of variables in explaining the outcome variable, Exploitation (EXPL)

Table 4.2.13 shows the regression model parameters (b values). The regression parameters in the table provide us the contribution of each variable in explaining the outcome variable by holding all other variables constant.

The numerical value gives us strength of relationship between independent and outcome variable whereas the positive or negative sign reflects the direction of relationship between variables.

Every b-value has associated standard error showing the extension of these values (b values) across different samples. Basically these errors decided whether the b-values are significantly different zero or not. For this significance testing of b-values SPSS uses t-test. T-test shows whether the predictors (independent variables) explain the outcome variable or not.

Table 4.2.13: individual contribution of variables (Coefficients)in explaining the outcome variable, Exploitation (EXPL)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			Tolerance
1	(Constant)	3.804	.202		18.790	.000	
	INT	.353	.055	.295	6.405	.000	1.000
2	(Constant)	3.382	.212		15.947	.000	
	INT	.121	.069	.102	1.754	.080	.597
	FORM	.336	.064	.306	5.279	.000	.597
3	(Constant)	3.201	.232		13.773	.000	
	INT	.095	.070	.080	1.356	.176	.574
	FORM	.345	.064	.314	5.423	.000	.594
	JR	.175	.040	.136	4.377	.016	.958

On the basis of our sample data of 431 respondents from knowledge intensive industries of Pakistan, Cross Functional Integration (INT), on the average contributes 35.3% in explaining the variation in the Realized Absorptive Capacity (Exploitation component) when entered in the regression equation without other independent variables .The contribution of Cross Functional Integration (INT) was significant at .001 level of significance (t= 6.405, P<.001). Contribution of Cross Functional Integration (INT) in explaining Exploitation (EXPL) on introduction of Formalization (FORM) becomes 21.2 % and this contribution is was observed non significant at .001 level of significance (t = 1.754 , p>.05). The unique contribution of 33.6 % in explaining the Exploitation (EXPL) in this equation is attributed to Formalization (FORM). The contribution of Formalization (FORM) is significant at .001 level of significance (t = 5.279, p<.001). The contribution of Cross Functional Integration (INT) on introduction of Formalization (FORM) and Job Rotation (JR) becomes 9.5 % and this contribution was observed

non significant (t = .176, p>.1).Unique contribution of 34.5 % in explaining the Exploitation (EXPL) in this equation is attributed to Formalization (FORM). The contribution of Formalization (FORM) is significant at .001 level of significance (t = 5.423, p<.001). The unique contribution of Job Rotation (JR) in explaining the Exploitation (EXPL) in this equation was observed as7.5 %. The contribution made by Job Rotation (JR) is significant (t=1.877, p< .05).

4.2.6.4.4 Regression Analysis - Diagnostics of Regression Model

Both the statistics were produced by using SPSS software for checking the assumption of multi collinearity of regression models of this study. It was observed that the values of both statistics were well within acceptable range (VIF<10 and T>.2). Table 8 (Anx - A) shows the results of both statistics.

Variance Inflation Factor (VIF) and Tolerance (T) for the Exploitation as dependent variable were calculated. Variance inflation factor (VIF) and Tolerance (T) values for Cross Functional Integration (INT) were observed as 1.741 and .574 respectively which are well in acceptance range of both statistics. Formalization (FORM) was having Variance inflation factor (VIF=1.684) which is well below the problematic point (VIF=10) where as the Tolerance (T) against Formalization (FORM) was observed as T=.594 which is well above the minimum acceptable limit (T =.2) Similarly the variance inflation factor (VIF) and Tolerance (T) for Job Rotation were observed within range (VIF = 1.044, T= .958).

The assumption of normality refers to the distribution of residual terms of dependent variable in multiple regression analysis. The assumption of normality of residuals of dependent variable was checked by subjecting the residual terms to histogram with normal curve and normal probability plot (P-P plot). Figure 3 (Anx - B) shows the results of both tests (histogram and p-p plot). The bell shaped distribution of the residual and tight closeness of the expected and observed cumulative probabilities show that that the normality assumption of regression model is met. The normality assumption was verified by producing the results of one sample Kolmogorov – Smirnov test of normality. Figure 4 (Anx - B) shows the results. Highly non significant results show that the residual terms of the dependent variable are not significantly different from normal distribution. Hence the normality assumption is met.

Homoscedosticity and Linearity. These assumptions are tested by producing graph between regression standardized predicted values (ZPRED) and regression standardized residuals (ZRES). If the values scatter around zero then the assumption of linearity and homoscedasticity is said to be met. Figure 3 (Anx - B) shows the results of homoscedasticity and linearity assumptions. Scattered data around zero shows that the assumption of homoscedasticity and linearity is met.

4.2.7 Discussion

In this study the hypotheses relating to impact of organizational mechanisms on the Potential Absorptive Capacity (Transformation and Exploitation components) were tested. Hypothesis 3 states that Cross Functional Integration (INT) positively impacts the Transformation (TFM) component of Absorptive Capacity. The main effect of organizational mechanism relating to Cross Functional Integration (INT) on Transformation (TFM) was tested. Table 4.2.9 shows that the impact of Cross Functional Integration (INT) was positive and statistically significant (b= .402, p<.001). Thus hypothesis 3 is supported. Hypothesis 4 (H4) states that there is positive impact of Cross Functional Integration (INT) on Exploitation (EXPL) component of Absorptive Capacity. Result of regression analysis (table 4.2.13) shows that Cross Functional Integration (INT) has positive impact on Exploitation (EXPL) component of Absorptive Capacity and the impact is statistically significant (b= .353, p< .001). This leads us to support research hypothesis that Cross Functional Integration (INT) positively impacts Exploitation (EXPL).

Hypothesis 7 (H: 7) of the study states that there is positive contribution of Formalization (FORM) in explaining the Transformation (TFM) component of Absorptive Capacity. The Formalization was entered in the regression equation along with Cross Functional Integration (INT) to see the impact of Formalization (FORM) in the presence of Cross Functional Integration (INT). results of table 4.2.9 shows that there is positive contribution of Formalization (FORM) in explaining the Transformation (TFM) component of Absorptive Capacity and more over this contribution is statistically significant(b= .209, p < .005). Thus hypothesis 7 (H: 7) is supported.

Hypothesis8 (H: 8) of the study states that there is positive contribution of Formalization (FORM) in explaining the Exploitation (EXPL) component of Absorptive Capacity. The

Formalization was entered in the regression equation along with Cross Functional Integration (INT) to see the impact of Formalization (FORM) in the presence of Cross Functional Integration (INT). Result (table 4.2.13) shows that there is positive contribution of Formalization (FORM) in explaining the Exploitation (EXPL) of Absorptive Capacity. The contribution of Formalization (FORM) in explaining the Exploitation (EXPL) is significant at .001 level of significance (b= .336, p<.001). Highly significant result shows that hypothesis 8 (H: 8) is supported.

Hypothesis 11 (H: 11) states that Job Rotation (JR) positively impacts Transformation (TFM) component of Absorptive Capacity. Table 4.2.9 shows the result of regression analysis relating to Job Rotation (JR) and Transformation (TFM) component of Absorptive Capacity. Regression analysis shows that Job Rotation (JR) positively impacts Transformation (TFM) component of Absorptive Capacity but the contribution is highly non significant (b=.034, p< .430). From highly non significant result of regression analysis, hypothesis 11 (H: 11) is not supported. Hypothesis 12 (H: 12) states that Job Rotation (JR) positively impacts Exploitation (EXPL) component of Absorptive Capacity. Table 4.2.13 shows the result of regression analysis relating to Job Rotation (JR) and Exploitation (EXPL) component of Absorptive Capacity. Regression analysis shows that Job Rotation (JR) positively impacts Exploitation (EXPL) component of Absorptive Capacity. The contribution is statistically significant at 0.05 level of significance rather this is significant at .1 level of significance. (b= .175 p < .05). Thus hypothesis 12 (H: 12) is supported.

4.3 Study-3.

Impact of human behavior mechanisms (Affective Commitment, Tacit Knowledge Sharing and Instrumental Ties) potential Absorptive Capacity (Acquisition and Assimilation components)

4.3.1. Introduction

This study explores how the human behavior mechanisms (Affective Commitment, Tacit Knowledge Sharing and Instrumental Ties) on two components of potential Absorptive Capacity i.e. Acquisition and Assimilation. The study is based on sample data from knowledge intensive companies of Pakistan and thus to be quantitative in nature.

4.3.2 Sample and Procedure.

Target population for this was knowledge intensive companies of Pakistan. Data was collected through questionnaires and stratified random sampling technique was adopted for this work. The stratified sampling technique adopted for data collection for this study was based on geographical locations. Data was collected from three strata of knowledge intensive industries of Pakistan as most of the industries are concentrated on three strata. The unit of analysis for this study was senior supervisors, managers, general managers and specialists such as plant managers' special task handling employees. Rationale for collecting the data from specific segments of knowledge intensive companies was that the maximum knowledge process activities are handled by supervisors, managers and specialists of the knowledge intensive industry. Diverse range of employees participated in the study. The employees with different educational background and having wide span of experience on a continuum and with different age groups participated in the study. The respondents from diverse background and experience were selected so that the sample results could be generalized to entire population. The major portion of survey questionnaires was distributed to respondents through mail and personal contacts and a few through e-mails. First reminder after distributing the questionnaires was given to the respondents at a time span of 15 days. Majority of the respondents returned the questionnaires duty filled after 10-15 days of first reminder. The remaining respondents were reminded again on telephone and e-mail. A certain percentage of respondents returned the filled questionnaires after 3-4 repeated reminders yet some percentage of respondents did not respond at all. Of 555 distributed questionnaires 432 were returned by respondents. Out of 432 responded questionnaires 31 were not worth enough to be included for analysis because most of questionnaires were partially filled or returned with a lot of missing data. However after evaluating responded questionnaires, 401 were considered for conducting the statistical processes. This makes response rate as 70.2%. SPSS software was used to factor analyze the instruments of study variables both independent and dependent variables. After checking the validity and reliability of measures of variables the data was analyzed in SPSS software for testing the conceptual model of study and testing the hypotheses related to different variable of study.

4.3.3. Characteristics of Sample.

The data was collected from respondents of knowledge intensive companies with diverse characteristics. Table 4.3.1 gives the description of characteristics of the sample of this study.

Data was collected from both the genders (males and females) for this study and consisted on 328 males (81.8 %) and 73 females (18.2 %) participated in this study. The data for this study was collected from respondents having a wide range of age. Minimum age of respondents was 20 years whereas the respondents with maximum 70 years of age participated in the study. 234 (58.4%) of respondents ranged age group of 20-30 years. 116 (28.9 %) respondents came from 31-40 years of age 34 (8.5 %) and 10 (2.5 %) participated from 41-50 years and 51-60 years of age respectively. The far end of continuum of age 60-70 years was of low percentage 7 (1.7%) see table 4.3.1. Participants of study came from different educational backgrounds wide range of education ranged from undergraduates study to the doctoral degree holders and specialists having highly professional certifications. However, the respondents from undergraduates doctoral degree holders and specialists were less in number as compared to graduates and masters 67 (16.7%), 23 (5.7 %) and 23 (5.7 %) correspond to undergraduates, specialists of field and doctoral degree holders respectively. Majority of respondents were graduates (178) consisting on 44.4 % of the total population and 114 (28.4 %) respondents were master's degree holders.

Data collected for this study came from employees holding different managerial positions in the knowledge intensive companies. The data was collected from senior supervisor, managers, general managers and employees holding special position such as technical coordinators, marketing managers and plant managers. 133 managers and 141 employees holding special positions in knowledge intensive companies participated in the study contributing 33.2 % and 35.2 % to the total sample. 86 (21.4 %) senior supervisors participated in the study and 41 (10.2 %) of the survey questionnaires were filled by general managers.

This study further categorized the respondents based on type of job they were holding. Permanent and temporary (contracted) employees were approached to fill the questionnaires.

This study focused on Absorptive Capacity frame work which is basically a unique knowledge process. The contracted employees might bias the results therefore to distribute random error data was collected from both type of employees. Before deciding to include both types of employees thorough interviews with experts from knowledge intensive companies were

conducted and discussed with the specialists of management domain. Majority of the data came from permanent employees because permanent employee's ratio is greater than contracted employees. 309 (77.1) permanent employees and 92 (22.9 %) employees holding jobs on contract bases participated in the study.

Along with other characteristics of respondents their length of service was also focused. Data for this study was collected from the respondents/employees of different service brackets. The diverse respondents having less than 5 years of service and respondents having service more than 30 years were included in the study. 118 (46.9 %) respondents participated in the study while 141 (35.2 %) respondents were having 5-10 years of service. 47 (11.7 %) and 14 (3.5 %) data in sample came from service brackets of 11-15 years and 16-20 years respectively. About 3 % data came from respondents having service above 20 years of service and beyond.

Table 4.3.1: Characteristics of Sample

		Frequency	Percent	Valid Percent	Cumulative Percent
GENDER	MALE	328	81.8	81.8	81.8
	FEMALE	73	18.2	18.2	100.0
	Total	401	100.0	100.0	
AGE OF RESPONDENT	20-30	234	58.4	58.4	58.4
	31-40	116	28.9	28.9	87.3
	41-50	34	8.5	8.5	95.8
	51-60	10	2.5	2.5	98.3
	61-70	7	1.7	1.7	100.0
	Total	401	100.0	100.0	
QUALIFICATION	UNDER GRADUATE	67	16.7	16.7	16.7
	GRADUATE	178	44.4	44.4	61.1
	MASTERS	114	28.4	28.4	89.5
	PHD	19	4.7	4.7	94.3
	OTHERS	23	5.7	5.7	100.0
	Total	401	100.0	100.0	
DESIGNATION	SUPERVISORS	86	21.4	21.4	21.4
	MANAGER	133	33.2	33.2	54.6

	GENERAL MANAGER	41	10.2	10.2	64.8
	OTHERS	141	35.2	35.2	100.0
	Total	401	100.0	100.0	
JOB TYPE	PERMANENT	309	77.1	77.1	77.1
	CONTRACT	92	22.9	22.9	100.0
	Total	401	100.0	100.0	
LENGTH OF SERVICE	Below 5	188	46.9	46.9	46.9
	5-10	141	35.2	35.2	82.0
	11-15	47	11.7	11.7	93.8
	16-20	14	3.5	3.5	97.3
	21-25	4	1.0	1.0	98.3
	26-30	1	.2	.2	98.5
	Above 30	6	1.5	1.5	100.0
	Total	401	100.0	100.0	
AGE OF ORGANIZATION	1-10	31	7.7	7.7	7.7
	11-20	148	36.9	36.9	44.6
	21-30	100	24.9	24.9	69.6
	31-40	35	8.7	8.7	78.3
	41-50	28	7.0	7.0	85.3
	Above 50	59	14.7	14.7	100.0
	Total	401	100.0	100.0	
NO OF EMPLOYEES	1-500	295	73.6	73.6	73.6
	501-1000	46	11.5	11.5	85.0
	1001-1500	13	3.2	3.2	88.3
	1501-2000	9	2.2	2.2	90.5
	2001-2500	4	1.0	1.0	91.5
	Above 2500	34	8.5	8.5	100.0
	Total	401	100.0	100.0	

Age of the organization might influence the results. The older companies invest more in knowledge process activities in general as compared to new companies. Majority of the data (148) came from companies having age of 11-20 years of bracket and contributing 36.9 % to the sample data collected from knowledge intensive companies of Pakistan. 24.9 % (100) of the data

came from companies having age of 21-30 years. 7.7 % and 8.7 % corresponded to companies having age of 1-10 years and 31- 40 years respectively. 7 % (28) data was contributed by companies having 41-50 years of age. 59 (14.7 %) of questionnaires were filled by the respondents coming from companies having age of 50 years and above. companies (42.9%) came from companies having 11-20 years of age. 20% and 21.3% of the data for this study was collected from the companies having 21-30 years of age and 31-40 years respectively. 7.7% (33) of data for this study was represented by companies having age bracket of 41-50 years and similarly 8.1% of the total data collected was attributed to companies having age bracket of 1-10 years.

The size of the company in the context of number of employees might have direct effect on knowledge process activities and Absorptive Capacity. Generally, the companies with greater resources and employees invest more as compared to companies having lesser number of employees. Data was collected from companies having different number of employees. Majority of the respondents (73.6 %) represented the data from companies having 1-500 employees. 11.5% (46) of data for study come from companies having 501-1000 employees. 3.2 % (13) of data come from companies having range of 1001-1500 employees. 3.2 % of sample data came from companies having employees between 1501 to 2500 in number. However, 8.5 % of the study data came from companies having employees above 2500.

4.3.4 Factor Analysis

Factor analysis was conducted on the data collected for this study by using principal component analysis (PCA) as extraction method and varimax methods was used as rotation method.

4.3.4.1 Kaiser- Meyer- Olkin (KMO) and Bartlett Test of Sphericity

Before conducting factor analysis, two statistics (sampling adequacy statistic-- Kaiser- Meyer-Olkin (KMO) and statistic of Bartlett's Test of Sphericity) need to be significant. Values of two statistics were checked i.e. sampling adequacy and Bartlett's test of spherecity and both statistics were found significant. Kaiser Meyer-Olkin (KMO) for whole sample in the study was observed as KMO = .782 where as Bartlett's test of sphericity was also observed significant at .001 level of significance which means a confidence internal (C I =99.9%).The test statistic for sampling

adequacy (KMO) for individual variables was also calculated and all values were observed well above the acceptable range.

Table 4.3.2 : Test of sampling adequacy and Bartlett's test of sphericity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.782
Bartlett's Test of Sphericity	Approx. Chi-Square	2984.806
	df	276
	Sig.	.000

The value of sampling adequacy (KMO) for individual variables ranged from .531 to .796. The values of Bartlett's test of Sphericity for individual variables were observed significant at a significance level of .001. Table 9 (Anx - A) shows the values of both statistics (KMO and Bartlett's test of sphericity) of all the variables. After both the statistics were found significant the factor analysis was conducted followed by reduction of items with low factor loadings.

4.3.4.2 Interpretation of Factor Analysis Results

Table 4.3.3 shows the results of factor analysis of variables of this study. All the items of the measures were subjected to load on their respective factors and it was found that maximum items loaded on their respective factors for which they were designed. The items loading low on their factor were dropped from the measure before conducting any analysis. The items ACQ4 and ACQ6 comparatively loaded low on the respective factor. The item ASM1 for Assimilation was loaded low on its factor. The items AFC4, AFC5 and AFC7 also loaded low on their respective factor. The items with low factor loadings are recommended to be dropped from the instrument.

However, the factor loadings with values falling on the margin are reviewed on the theoretical background of the study. Stevens (2002) suggests that for a sample size of 300, the factor loadings of items should be greater than 0.298. The measures were checked for their reliability by using reliability test (Chronbach's Alpha) after dropping the items with low factor loadings and it was found that reliabilities improved. The communalities (Table 10, Anx - A) of almost all the items were observed greater than .5.

The factor loading of the items of all the individual variables on the factors other than their own factors are shown (Table 11, Anx - A) in the rotated component matrix. Principal Component Analysis (PCA) was used as extraction method and varimax rotation method was used for rotation of components in this factor analysis.

Table 4.3.3 : Component Matrix of study variables

	Component				
	1	2	3	4	5
ACQ1	**.832**				
ACQ2	**.549**				
ACQ3	**.577**				
ACQ4	-.256				
ACQ5	**.599**				
ACQ6	-.106				
ASM1		.311			
ASM2		**.825**			
ASM3		**.839**			
AFC1			**.757**		
AFC2			**.462**		
AFC3			**.684**		
AFC4			.072		
AFC5			-.026		
AFC6			**.698**		
AFC7			.079		
TKS1				**.864**	
TKS2				**.743**	
TKS3				**.860**	
TKS4				**.773**	
INST1					**.792**
INST2					**.827**
INST3					**.822**
INST4					**.776**

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

4.3.4.3 Summary of results of Factor Analysis

Results of factor analysis (Table 4.3.3) show that most of the items loaded well on their respective factors as for which they were designed except a few items which loaded comparatively low. The items with low factor loadings were removed from the instruments and reliability of the instruments before and after removal of items from the instrument was carried out. The reliabilities of instruments enhanced after removal of low factor loading items.

Table 4.3.3 shows the results of factor analysis based on principal component analysis as extraction method and varimax as rotation method of factors for simplicity and easy interpretation of results. All items factored on their respective factors for which those were designed with high factor loading i.e. well above of cut off values of 0.298 (Stevens, 2002). Minimum factor loading of 0.01 (AFC5) was observed for Affective Commitment (AFC) and maximum of .760 (AFC1) was observed. Factor loadings for Tacit Knowledge Sharing (TKS) ranged from 0.578 to 0.848. TKS4 loaded comparatively low (.578) on the factor as compared to other factors (TKS1=.736, TKS2=.848 and TKS3= .704). As all the items of this instrument loaded high therefore, none of the items was dropped from the instrument. The reliability of the instrument was also observed high (.824) by including all the items. Similarly, all the items of Instrumental Ties (INST) loaded well on one factor for which they were designed and none of the items needed to be dropped from the instrument. Minimum factor loading was observed as .723 for INST1 which is well above the cut off point of acceptance. The instrument was subjected to check the reliability by including all the items and it was observed that instrument is highly reliable to e used for measuring Instrumental Ties. The value for Chronbach alpha for the instrument was observed as 0.819.

4.3.5 Results of study of relationships between Acquisition component(ACQ), Affective Commitment (AFC), Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS).

4.3.5.1 Descriptive Statistics

Mean responses of employees against all the variables were tabulated to see the overall response of employees against each variable. Table 4.3.4 shows the mean responses of dependent variable (DV) and independent variables of this study.

Mean response of Acquisition (ACQ) was observed as 4.63 with standard deviation of .87. Mean response of Affective Commitment (AFC) was observed as 4.94 with standard deviation of .87. Tacit Knowledge Sharing was responded with mean of 3.74 and standard deviation of .77.

Mean responses of the respondents with different demographics were also observed. Table 4.3.5 gives summary of descriptive statistics (mean responses) of employees with different demographics.

Table 4.3.4 : Descriptive Statistics of study variables

	N	Minimum	Maximum	Mean	Std. Deviation
ACQ	401	2.00	7.00	4.6309	.87393
ASM	401	2.50	7.00	4.9377	.70464
AFC	401	2.50	7.00	4.9140	.87451
TKS	401	1.00	5.00	3.7400	.77069
INST	401	1.00	5.00	3.7974	.76563

On the average males and females responded uniformly except a few variables. Mean response of 4.65 was observed for a male which was little higher as compared to females who responded Acquisition with mean of 4.55. Mean response of males for Affective Commitment (AFC) was observed was observed with almost similar response to females for Affective Commitment (AFC) who responded with mean value of 4.94 for Affective Commitment. Mean response of males and females was observed uniform with approximate mean value of 3.74. However, females comparatively responded low than males for Instrumental Ties. Mean response for males and females for Instrumental Ties was observed as 3.78 and 3.79 respectively.

The mean responses of study variables were also observed against the respondents with different age groups. Mean response for Acquisition was observed highest for the respondents having age groups 31-40 years of age. Whereas minimum mean response (mean=3.36) against Acquisition (ACQ) was observed for the respondents of age groups of 61-70 years. Mean response of respondents of age groups 20-30 years and 41-50 years was observed approximately same with means of 4.62 and 4.65 respectively. Mean response of respondents of age group of 51-60 years

was observed as 3.98. Mean response of 4.95 for Affective Commitment was observed for age groups of 20-03 years and 31-40 years both. Mean response for Affective Commitment of age group of 51-60 years was observed low comparatively low with mean of 4.10 whereas for age group of 41-50 years mean response for Affective Commitment was observed as 4.83 followed by mean response of 4.57 of age group of 61-70 years. Mean response of Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST) was observed as 3.69 and 3.77 respectively. Similarly, uniform mean response for Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST) was observed for age group of 31-40 years with approximate mean response of 3.82 for each variable. Mean response (mean=3.87) of Instrumental Ties(INST) of age group 41-50 years was observed a little higher as compared to the mean response(mean=3.84) of same age group for Tacit Knowledge Sharing(TKS). Same pattern was observed for age group of 51-60 years of age with mean responses of 3.75 and 3.53 for Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS) respectively. Mean response of Instrumental Ties(INST) for age group of 61-70 years was observed as 4.00 which was again higher than mean response(3.79) of same age group for Tacit Knowledge Sharing (TKS).

Mean response of graduates and master degree holders was observed as 4.63 and 4.68 respectively for Acquisition. Whereas, mean response of undergraduates was observed as 4.57for Acquisition (ACQ) and doctoral degree holders responded Acquisition with mean of 4.72 and for specialists it was observed as 4.47. Mean response of under graduates, graduates and specialists for Affective Commitment (AFC) was observed approximately as 4.99. Master degree holders responded the Affective Commitment (AFC) with the mean of 4.85. Mean response of doctoral degree holders was observed minimum among all categories who responded with mean of 4.42. Mean response (3.91) of Tacit Knowledge Sharing (TKS) for undergraduates was observed little lower than mean response (4.10) of Instrumental Ties (INST). Similarly, mean response of graduates for Instrumental Ties (INST) was observed higher than mean response of graduates for Tacit Knowledge Sharing (TKS) with mean responses of 3.74 and 3.68 respectively. Similarly, master degree holders responded high for Instrumental Ties with means of 3.82 as compared to mean response (3.73) of master degree holders for Tacit Knowledge Sharing (TKS). However, the mean responses of doctoral degree holders and specialists for Instrumental Ties (INST) were observed low with means of 3.83 and 3.52 respectively as compared to responses for Tacit

Knowledge Sharing (TKS) means of which were observed as 3.92 and 3.59 for master degree holders and specialists respectively.

Table 4.3.5: Descriptive Statistics (Mean responses) of demographics

		ACQ	ASM	AFC	TKS	INST
GENDER	MALE	4.65	4.96	4.91	3.74	3.78
	FEMALE	4.55	4.85	4.97	3.73	3.89
AGE OF RESPONDENT	20-30	4.62	4.94	4.95	3.69	3.77
	31-40	4.78	5.08	4.95	3.82	3.81
	41-50	4.85	5.21	4.83	3.84	3.87
	51-60	3.98	3.50	4.10	3.53	3.75
	61-70	3.36	3.64	4.57	3.79	4.00
QUALIFICATION	UNDER GRADUATE	4.57	4.70	4.93	3.91	4.01
	GRADUATE	4.63	5.09	4.99	3.68	3.74
	MASTERS	4.68	4.93	4.85	3.73	3.82
	PHD	4.72	4.71	4.42	3.92	3.83
	OTHERS	4.47	4.63	4.99	3.59	3.52
DESIGNATION	SUPERVISORS	4.73	5.15	4.94	3.78	3.84
	MANAGER	4.62	4.86	4.86	3.82	3.85
	GENERAL MANAGER	4.70	4.80	5.05	3.79	3.83
	OTHERS	4.56	4.92	4.91	3.63	3.71
JOB TYPE	PERMANENT	4.69	4.93	4.91	3.82	3.88
	CONTRACT	4.42	4.96	4.92	3.49	3.53
LENGTH OF SERVICE	Below 5	4.58	4.94	4.93	3.61	3.73
	5-10	4.71	4.95	4.90	3.80	3.78
	11-15	4.81	4.83	4.83	3.94	3.95
	16-20	4.66	5.04	4.89	3.88	3.86
	21-25	4.50	5.38	4.88	3.06	3.31
	26-30	5.00	4.00	5.50	3.00	4.00
	Above 30	4.33	5.17	5.42	4.50	4.50

Mean response (4.70) of general managers for Acquisition (ACQ) was observed highest among all managerial positions. Mean response of supervisors for Acquisition (ACQ) was observed as 4.73 and for managers it was observed as 4.62 where as the specialists' responded Acquisition (ACQ) with mean of 4.56. The Affective Commitment (ACQ) was responded high with mean of 5.05 by general managers as compared to other managerial positions.

Mean responses 4.94, 4.86 and 4.91 for Acquisition (ACQ) were observed for supervisors, managers and employees holding special positions in the knowledge intensive companies respectively. Mean responses of all managerial positions for Instrumental Ties (INST) were observed high as compared to the Tacit Knowledge Sharing (TKS). Mean responses for Instrumental Ties (INST) ranged from 3.71 to 3.85. Mean responses of all managerial positions for Tacit Knowledge Sharing (TKS) ranged from 3.63 to 3.82. Managers holding special managerial positions responded lowest (3.71) for Instrumental Ties (INST) and managers responded with highest mean of 3.85 for Instrumental Ties (INST). Lowest mean response (3.63) for Tacit Knowledge Sharing (TKS) corresponded managers holding special positions and highest mean response (3.82) corresponded to managers.

Mean response for employees having different job categories were also observed. The job categories included permanent jobs and jobs on contract bases. The mean response of employees with permanent jobs for Acquisition (ACQ) was observed high as compared to employees with jobs on contract bases. Their mean responses were observed as 4.69 and 4.42 respectively. Observed mean response (4.92) of employees having job on contract bases for Affective Commitment (AFC) was comparable to mean response (4.91) of permanent employees. Mean responses of permanent employees for Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST) were observed high as compared to mean responses of contracted employees in the knowledge intensive companies. Mean responses of permanent and contracted employees for Tacit Knowledge Sharing (TKS) were observed as 3.82 and 3.49 respectively, whereas for Instrumental Ties their responses were observed as 3.88 and 3.53 for permanent and contracted employees respectively.

4.3.5.2 Correlation Matrix of Study variables

Correlation matrix of study variables was produced by using SPSS to see the strength of association between potential Absorptive Capacity (Acquisition component) and independent variables (Affective Commitment, Tacit Knowledge Sharing and Instrumental Ties).

Correlation between variables provides the information about strength of association between them and roughly the direction of association between variables.

For this study both types of variables i.e. independent and dependent were continuous variables. Based on directional hypotheses of this study, Pearson product moment correlation was applied for assessing the association between. As the hypotheses were directional, therefore, one tailed test was applied. Table 4.3.6 shows the results of correlations coefficients between independent and dependent variables.

The potential Absorptive Capacity (ACQ component) was observed positively correlated to Affective Commitment (AFC). The correlation coefficient (r) between Acquisition (ACQ) and Affective Commitment (AFC) was observed as .288. The association between them was significant at .01 level of significance. The correlation coefficient of the relationship between Acquisition (ACQ) and Tacit Knowledge Sharing (TKS) was observed as r =.182 which was observed significant at .01 level of significance. The correlation coefficient of the relationship between Acquisition (ACQ) and Instrumental Ties (INST) was observed as r = .156. The relationship was significant at (.01) level of significance. The direction of relationship between dependent variable (ACQ) and all the independent variables was observed positive. This means that if the value of independent variable increases the value of dependent variable will also increase and if value of one variable goes down the corresponding value in the other variable will also decrease. The association between Acquisition (ACQ) and Affective Commitment was observed higher than the association between Acquisition (ACQ) and Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST), whereas the correlation coefficient between variables Acquisition (ACQ) and Tacit Knowledge Sharing was observed higher than the correlation coefficient between Acquisition (ACQ) and Instrumental Ties (INST). Moreover, all the associations were observed significant at (.01) level of significance.

Table 4.3.6 Correlations matrix of study variables (ACQ ,AFC,TKS and INST)

		ACQ	AFC	TKS	INST
ACQ	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	401			
AFC	Pearson Correlation	.288**	1		
	Sig. (1-tailed)	.000			
	N	401	401		
TKS	Pearson Correlation	.182**	.163**	1	
	Sig. (1-tailed)	.000	.001		
	N	401	401	401	
INST	Pearson Correlation	.156**	.195**	.611**	1
	Sig. (1-tailed)	.001	.000	.000	
	N	401	401	401	401

**. Correlation is significant at the 0.01 level (1-tailed).

4.3.5.3 Scatter Plot Matrix of Study Variables

Scatter plot matrix was drawn of study variables. Figure 4.3.1 shows the results of scatter plot. Generally, the Affective Commitment (AFC) shows the linear relationship with Absorptive Capacity (ACQ component).the cylindrical position of scatter plot between Acquisition and Affective Commitment shows the linear relationship between them and with less scattered data. The scatter plot between Tacit Knowledge Sharing and Acquisition (ACQ) was also observed linear but the pattern of data is slightly different from the pattern of data between Acquisition (ACQ) and Affective Commitment (AFC). This means that the relationship is linear but the data is little bit scattered showing comparatively less strong association. The pattern of data between the relationship of Instrumental Ties (INST) and Acquisition (ACQ) component of potential Absorptive Capacity was also observed linear but the data is more scattered showing the

association between variables less linear as compared to pattern of association of Acquisition(ACQ) with other two variables (AFC and TKS). The scattered data of the association of Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS) shows good linear relationship between them and similarly, the linear relationship was observed between the Instrumental Ties (INST) and Affective Commitment (AFC).

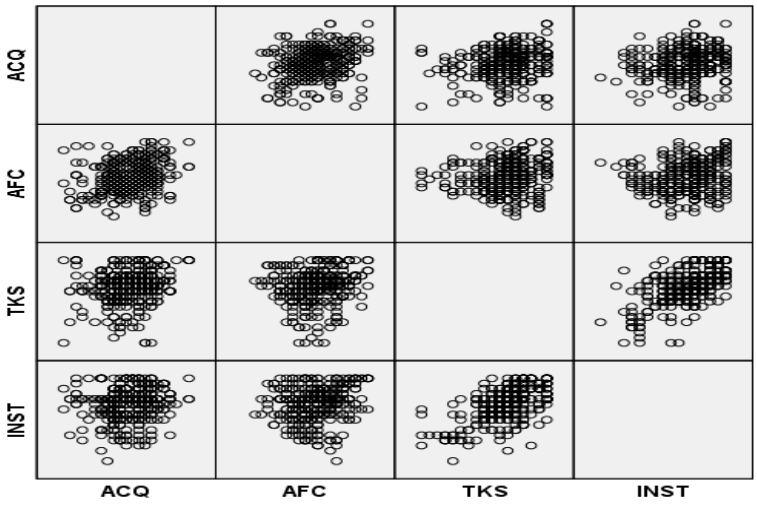

Figure 4.3.1 : Scatter plot of study variables

The scatter plot gives general idea that Instrumental Ties (INST) has strong linear relationship with Affective Commitment and Tacit Knowledge Sharing and in turn Affective Commitment and Tacit Knowledge Sharing are having strong linear relationship with dependent variable (ACQ). This gives a general idea that the impact of Instrumental Ties is transmitted to Acquisition (ACQ) through other variables that is Tacit Knowledge Sharing and Affective Commitment. This means that Tacit Knowledge Sharing and Instrumental Ties act as mediators in the relationship of Instrumental Ties and Acquisition (ACQ).

4.3.5.4 Regression Analysis

Regression analysis was carried out of the study model. Multiple regression analysis was conducted in order to test different hypotheses of study. The mediation testing was tested by using multiple regression analysis. The testing of mediation was carried out in three steps as per

procedure designed by Barren and Kenny (1986). In first and second steps the mediator and dependent variable are regressed on independent variable separately. In third step the dependent variable is regressed on both the variables (mediator and independent variable). If the contribution of independent variable in explaining the dependent variable is reduced in third step as compared to the contribution in second step then there is strong evidence that mediation is present.

4.3.5.4.1 Multiple regression analysis for mediation testing of Affective Commitment (AFC) in the relationship of Potential Absorptive Capacity (Acquisition component) and Instrumental Ties (INST). Table 4.3.7 shows the results of multiple regression analysis for testing mediation of Affective Commitment (AFC) in the relationship of Potential Absorptive Capacity (ACQ component) and Instrumental Ties (INST).

First the Affective Commitment (AFC) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explain the variation in Affective Commitment (AFC) significantly. The individual contribution in explaining the effective commitment by Instrumental Ties (INST) was observed as .223and this contribution was significant at .001 level of significance ($t=3.974$, $p<.001$). This means that for every unit variation in Instrumental Ties (INST) there is .223 units variation in Affective Commitment. The positive sign shows that variation is positive which means that there is increment in the Affective Commitment (AFC) with the increment in Instrumental Ties (INST).

In the second step Acquisition (ACQ) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explains the variation in Acquisition (ACQ) significantly. The individual contribution in explaining the Acquisition (ACQ) by Instrumental Ties (INST) was observed as .178 and this contribution was significant at .005 level of significance ($t=3.151$, $p<.005$). This means that for every unit variation in Instrumental Ties (INST) there is .178 units variation in Acquisition (ACQ). The contribution of Instrumental Ties in explaining Acquisition (ACQ) is positive which means that there is increment in the Acquisition (ACQ) with the increment in Instrumental Ties (INST).

In the third step Acquisition (ACQ) was regressed on Instrumental Ties (INST) and Affective Commitment (AFC) together. There is positive contribution of Instrumental Ties (INST) in explaining the variation in Acquisition (ACQ).

Table 4.3.7: Multiple regression analysis and mediation testing of Affective Commitment in the relationship of Acquisition and Instrumental Ties.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA	
		B	Std. Error	Beta			F	Sig
Step 1: AFC regressed on INST								
1	(Constant)	4.068	.217		18.724	.000	15.794	.000
	INST	.223	.056	.195	3.974	.000		
Step 2: ACQ regressed on INST								
1	(Constant)	3.956	.219		18.091	.000	9.927	.002
	INST	.178	.056	.156	3.151	.002		
Step 3 : ACQ regressed on INST and AFC								
1	(Constant)	2.867	.289		9.910	.000	20.483	.000
	INST	.118	.056	.104	2.127	.034		
	AFC	.268	.049	.268	5.505	.000		

The individual contribution in explaining the Acquisition (ACQ) by Instrumental Ties (INST) was observed as .118 and this contribution was significant at .05 level of significance ($t=2.127$, $p<.05$). This means that for every unit variation in Instrumental Ties (INST) there is .118 units variation in Acquisition (ACQ). The contribution of Instrumental Ties in explaining Acquisition (ACQ) is positive which means that there is increment in the Acquisition (ACQ) with the increment in Instrumental Ties (INST).

There is positive contribution of Affective Commitment (AFC) in explaining the variation in Acquisition (ACQ). The individual contribution in explaining the Acquisition (ACQ) by Affective Commitment was observed as .268 and this contribution was significant at .001 level

of significance (t=5.505, p<.001). This means that for every unit variation in Affective Commitment there is .268 units variation in Acquisition (ACQ). The contribution of Affective Commitment in explaining Acquisition (ACQ) is positive which means that there is increment in the Acquisition (ACQ) with the increment in Affective Commitment (AFC).

4.3.5.4.2 Multiple regression analysis for mediation testing of Tacit Knowledge Sharing (TKS) in the relationship of Potential Absorptive Capacity (Acquisition component) and Instrumental Ties (INST).

In first step the Tacit Knowledge Sharing was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explain the variation in Tacit Knowledge Sharing (TKS) significantly. The individual contribution in explaining the Tacit Knowledge Sharing (TKS) by Instrumental Ties (INST) was observed as .611 and this contribution was significant at .001 level of significance (t=15.424, p<.001). This means that for every unit variation in Instrumental Ties (INST) there is .615 units' variation in Tacit Knowledge Sharing. The positive sign shows that variation is positive which means that there is increment in the value of Tacit Knowledge Sharing (TKS) with the increment in Instrumental Ties (INST).

In the second step Acquisition (ACQ) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explains the variation in Acquisition (ACQ) significantly. The individual contribution in explaining the Acquisition (ACQ) by Instrumental Ties (INST) was observed as .178 and this contribution was significant at .005 level of significance (t=3.151, p<.005). This means that for every unit variation in Instrumental Ties (INST) there is .178 units variation in Acquisition (ACQ). The contribution of Instrumental Ties in explaining Acquisition (ACQ) is positive which means that there is increment in the Acquisition (ACQ) with the increment in Instrumental Ties (INST).

In the third step Acquisition (ACQ) was regressed on Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS) together. There is positive contribution of Instrumental Ties (INST) in explaining the variation in Acquisition (ACQ). The individual contribution in explaining the Acquisition (ACQ) by Instrumental Ties (INST) was observed as .082 and this contribution was observed non significant. (t=1.152, p>.1). The non significant result shows that in this regression model Instrumental Ties (INST) is not a good predictor of Acquisition (ACQ).

Table 4.3.8 : Multiple regression analysis for mediation testing of Tacit Knowledge Sharing in the relationship of Acquisition and Instrumental Ties

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA	
		B	Std. Error	Beta			F	Sig
Step1: TKS regressed on INST								
1	(Constant)	1.404	.155		9.086	.000	237.905	.000
	INST	.615	.040	.611	15.424	.000		
Step2: ACQ regressed on INST								
1	(Constant)	3.956	.219		18.091	.000	9.927	.002
	INST	.178	.056	.156	3.151	.002		
Step 3 : ACQ regressed on INST and TKS								
1	(Constant)	3.736	.239		15.631	.000	7.465	.001
	INST	.082	.071	.072	1.152	.250		
	TKS	.156	.071	.138	2.215	.027		

There is positive contribution of Tacit Knowledge Sharing (TKS) in explaining the variation in Acquisition (ACQ). The individual contribution in explaining the Acquisition (ACQ) by Tacit Knowledge Sharing (TKS) was observed as .156 and this contribution was significant at .05 level of significance ($t=2.215$, $p<.05$). This means that for every unit variation in Tacit Knowledge Sharing (TKS) there is .156 units variation in Acquisition (ACQ). The contribution of Tacit Knowledge Sharing in explaining Acquisition (ACQ) was observed positive which means that there is increment in the Acquisition (ACQ) with the increment in Tacit Knowledge Sharing. Table 4.3.8 shows the results of multiple regression analysis and testing of mediation effect of Tacit Knowledge Sharing.

4.3.5.4.3 Sobel's test for significance testing of Mediation

Table 4.3.9 shows the results of sobel's test for significance testing mediation of affective commitment and tacit knowledge sharing as suggested by Barron and Kenny (1986).

Table 4.3.9: Results of indirect effects of Instrumental Ties on Acquisition through Affective Commitment and Tacit Knowledge Sharing by using Sobel's test.			
Indirect effect of Instrumental Ties on Acquisition through Affective Commitment			
Inputs		**Sobel's test Statistic**	**Significance value (p value)**
a	.223	3.21926849	0.00064259
b	.268		
S_a	.056		
S_b	.049		
Indirect effect of Instrumental Ties on Acquisition through Tacit Knowledge Sharing			
Inputs		**Sobel's test Statistic**	**Significance value (p value)**
a	.615	2.17508535	0.01481186
b	.156		
S_a	.040		
S_b	.071		

4.3.5.4.4 Diagnostics of Regression Model

Table 12 (Anx - A) shows the values of VIF and tolerances (T) of all variables and all these values are well within the acceptable range. The values of VIF in multiple regression analysis with Acquisition (ACQ) as dependent variable were observed as 1.04 (INST and AFC as independent variables) and 1.596 (INST and TKS as independent variables) and values of tolerances for the same relationships were observed as .962 and .626 respectively.

The assumption of normality of residual terms of dependent variable was tested by histogram of regression standardized residuals with normal probability. Figure 5 (Anx - B) shows the graphs . The bell shaped curve of the distribution shows that assumption of normality of residuals of dependent variable is met. The normality assumption was further validated by subjecting the standardized residual scores to one sample Kolmogorov- Smirnov test of normality and it was

found that residual terms have normal distribution and hence the assumption of normality is met. Figure 7 (Annex - B) shows the results of Kolmogorov- Smirnov test.

Homoscedasticity and linearity assumption in multiple regression analysis means that independent variables are linearly related to dependent variable and for every level of independent variable there is homogeneous variance

This assumption was tested by drawing normal P-P plot of regression standardized residual (plotting graph between observed cumulative probability and expected cumulative probability) and scatter plot standardized predicted value (ZPRED) and regression standardized residual (ZRES).

The result of P-P plot of regression standardized residual (Figure 5, Annex - B) shows that observed and cumulative probabilities are tightly packed with each other showing that linearity assumption is met. Similarly scatter plot of regression standardized predicted and residual (Figure 5, Annex - B) shows that data is scattered around zero value highlighting that assumption of linearity and homoscedasticity is met.

4.3.6 Results of study of relationships between Potential Absorptive Capacity (Assimilation component), Affective Commitment (AFC), Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS).

4.3.6.1 Descriptive Statistics

Mean responses of employees for Assimilation component of potential Absorptive Capacity was observed as 4.94 (table 4.3.4). Mean response of male employees for Assimilation was observed as 4.96 which was higher than female employees whose mean response was observed as 4.85(table 4.3.5). High mean response of employees with age brackets of 31-40 years and 41-50 years was observed with mean values of 5.06 and 5.21 respectively. Employees of 20-30 years of age bracket responded the Assimilation with mean value of 4.94 and for 51-60 years of age bracket mean response was observed as 3.50. Employees with 51-60years of age responded with mean value of 3.64. The graduate employees responded with mean response of 5.09 and employees with master's degree responded with mean of 4.93 for Assimilation. Undergraduate employees and doctoral degree holder employees responded Assimilation with mean of

approximately 4.71. However, the employees with special qualification i.e., certificates etc responded with mean of 4.63 for Assimilation. Mean response of managerial position holders responded differently for Assimilation component of potential Absorptive Capacity. Supervisors responded high as compared to other managerial positions with mean response of 5.15. Managers and general managers responded with mean values of 4.86 and 4.80 respectively. The managers holding special positions in the knowledge intensive companies responded higher than managers and general managers with mean response of 4.92 for Assimilation. The mean response of contracted employees for Assimilation was observed higher than permanent employees. Mean responses of permanent and contracted employees was observed as 4.93 and 4.96 respectively.

4.3.6.2 Correlation Matrix of Study variables

Correlation matrix of study variables was produced by using SPSS to see the strength of association between potential Absorptive Capacity (Assimilation component) and independent variables (Affective Commitment, Tacit Knowledge Sharing and Instrumental Ties). Correlation between variables provides the information about strength of association between them and roughly the direction of association between variables. For this study both types of variables i.e. independent and dependent were continuous variables.

Based on directional hypotheses of this study, one tailed Pearson product moment correlation was applied for assessing the association between. Table 4.3.10 shows the results of correlations coefficients between independent and dependent variables. The potential Absorptive Capacity (Assimilation component) was observed positively correlated to Affective Commitment (AFC).

The correlation coefficient (r) between Assimilation (ASM) and Affective Commitment (AFC) was observed as .453. The association between them was observed significant at (.01) level of significance. The correlation coefficient of the relationship between Assimilation (ASM) and Tacit Knowledge Sharing (TKS) was observed as r =.098 which was observed significant at .05 level of significance. The correlation coefficient of the relationship between Assimilation (ASM) and Instrumental Ties (INST) was observed as r = .140 and the relationship was significant at .01 level of significance. The direction of relationship between dependent variable (ASM) and all the independent variables was observed positive. This means that if the value of independent

Table 4.3.10: Correlations matrix of study variables (ASM ,AFC,TKS and INST)

		ASM	AFC	TKS	INST
ASM	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	401			
AFC	Pearson Correlation	.453**	1		
	Sig. (1-tailed)	.000			
	N	401	401		
TKS	Pearson Correlation	.098*	.163**	1	
	Sig. (1-tailed)	.025	.001		
	N	401	401	401	
INST	Pearson Correlation	.140**	.195**	.611**	1
	Sig. (1-tailed)	.002	.000	.000	
	N	401	401	401	401

**. Significant at the 0.01 level. *. Significant at the 0.05 level.

variable increases the value of dependent variable will also increase and if value of one variable goes down the corresponding value in the other variable will also decrease. The association between Assimilation (ASM) and Affective Commitment was observed higher than the association between Assimilation (ASM) and Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST), whereas the correlation coefficient between variables Assimilation (ASM) and Tacit Knowledge Sharing (TKS) was observed low as compared to the correlation coefficient between Assimilation (ASM) and Instrumental Ties (INST).

4.3.6.3 Scatter Plot Matrix of Study Variables

Scatter plot matrix was drawn of study variables. Figure 4.3.2 shows the results of scatter plot. Generally, the Affective Commitment (AFC) shows the linear relationship with Absorptive Capacity (ASM component).the cylindrical position of scatter plot between Assimilation (ASM)

and Affective Commitment shows the linear relationship between them and with less scattered data. The scatter plot between Tacit Knowledge Sharing and Assimilation (ASM) was also observed linear but the pattern of data is slightly different from the pattern of data between Assimilation (ASM) and Affective Commitment (AFC). This means that the relationship is linear but the data is little bit scattered showing comparatively less strong association. The pattern of data between the relationship of Instrumental Ties (INST) and Assimilation (ASM) component of potential Absorptive Capacity was also observed linear but the data is more scattered showing the association between variables less linear as compared to pattern of association of Assimilation (ASM) with other two variables (AFC and TKS). The scattered data of the association of Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS) shows good linear relationship between them and similarly, the linear relationship is observed between the Instrumental Ties (INST) and Affective Commitment (AFC). The scatter plot gives general idea that Instrumental Ties (INST) has strong linear relationship with Affective Commitment and Tacit Knowledge Sharing. This gives a general idea that the impact of Instrumental Ties is transmitted to Assimilation (ASM) through other variables that is Tacit Knowledge Sharing and Affective Commitment. This scatter plot gives rough guess about Tacit Knowledge Sharing and Instrumental Ties as mediators in the relationship of Instrumental Ties and Assimilation (ASM).

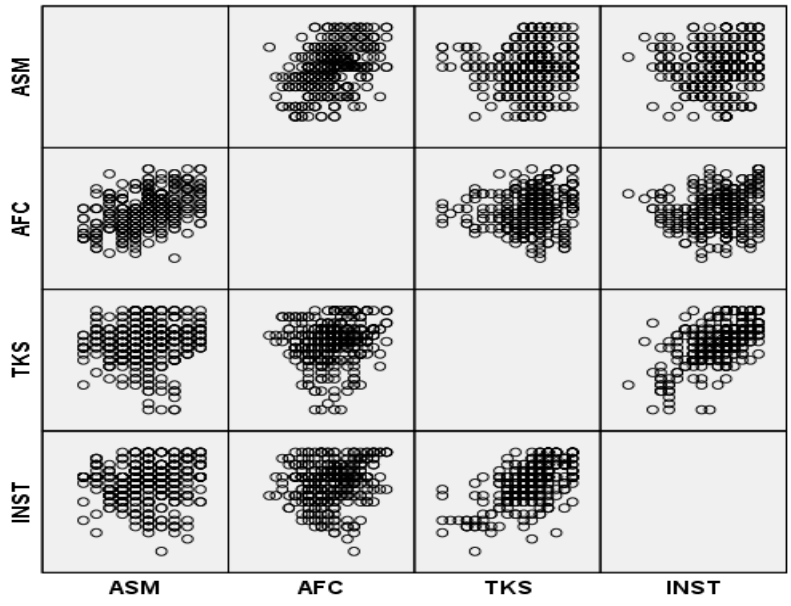

Figure 4.3.2 : Scatter plot matrix of study variables

4.3.6.4 Regression Analysis

Regression analysis was carried out of this with Assimilation (ASM) as dependent variable.

4.3.6.4.1 Multiple regression analysis for mediation testing of Affective Commitment (AFC) in the relationship of Assimilation (ASM) and Instrumental Ties (INST).

In the first step the Affective Commitment (AFC) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explain the variation in Affective Commitment (AFC) significantly. The individual contribution in explaining the effective commitment by Instrumental Ties (INST) was observed as .223 and this contribution was significant at .001 level of significance ($t=3.974$, $p<.001$). This means that for every unit of variation in Instrumental Ties (INST) there is .223 units variation in Affective Commitment. The positive sign shows that variation is positive which means that there is increment in the Affective Commitment (AFC) with the increment in Instrumental Ties (INST).

In the second step Assimilation (ASM) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explains the variation in Assimilation (ASM) significantly. The individual contribution in explaining the Assimilation (ASM) by Instrumental Ties (INST) was observed as .196 and this contribution was significant at .005 level of significance ($t=2.823$, $p<.005$). This means that for every unit variation in Instrumental Ties (INST) there is .196 units variation in Assimilation (ASM). The contribution of Instrumental Ties in explaining Assimilation (ASM) is positive which means that there is increment in the Assimilation (ASM) with the increment in Instrumental Ties (INST).

In the third step Assimilation (ASM) was regressed on Instrumental Ties (INST) and Affective Commitment (AFC) together. There is positive contribution of Instrumental Ties (INST) in explaining the variation in Assimilation (ASM). The individual contribution in explaining the Assimilation (ASM) by Instrumental Ties (INST) was observed as .075 and the contribution was observed as non significant ($t=1.179$, $p>.1$). The mediation testing is shown in Table 4.3.11.

There is positive contribution of Affective Commitment (AFC) in explaining the variation in Assimilation (ASM). The individual contribution in explaining the Assimilation (ASM) by Affective Commitment was observed as .544 and this contribution was significant at .001 level of significance (t=9.725, p<.001). This means that for every unit variation in Affective Commitment there is .544 units variation in Assimilation (ASM). The contribution of Affective Commitment (AFC) in explaining Assimilation (ASM) is positive which means that there is increment in the Assimilation (ASM) with the increment in Affective Commitment (AFC).

4.3.6.4.2 Results of multiple regression analysis for mediation testing of Affective Commitment (AFC) in the relationship of Assimilation (ASM) and Tacit Knowledge Sharing (TKS).

In first step the Tacit Knowledge Sharing (TKS) was regressed on Affective Commitment (AFC) and it was found that Tacit Knowledge Sharing (TKS) explains the variation in Affective Commitment (AFC) significantly.

Table 4.3.11: Multiple regression analysis for mediation testing of Affective Commitment in the relationship of Assimilation and Instrumental Ties.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA	
		B	Std. Error	Beta			F	Sig
Step1: AFC regressed on INST								
1	(Constant)	4.068	.217		18.724	.000	15.794	.000
	INST	.223	.056	.195	3.974	.000		
Step2: ASM regressed on INST								
1	(Constant)	4.192	.270		15.553	.000	7.971	.005
	INST	.196	.070	.140	2.823	.005		
Step 3 : ASM regressed on INST and AFC								
1	(Constant)	1.981	.332		5.957	.000	52.206	.000
	INST	.075	.064	.054	1.179	.239		
	AFC	.544	.056	.442	9.725	.000		

The individual contribution in explaining the effective commitment by Tacit Knowledge Sharing (TKS)was observed as .185 and this contribution was significant at .001 level of significance (t=3.292, p<.001). This means that for every unit variation in Tacit Knowledge Sharing (TKS) there is .185 units variation in Affective Commitment (AFC). The positive sign shows that variation is positive which means that there is increment in the value of Affective Commitment (AFC) with the increment in Tacit Knowledge Sharing (TKS).

Table 4.3.12: Multiple regression analysis for mediation testing of Affective Commitment in the relationship of Assimilation and Tacit Knowledge Sharing.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA	
		B	Std. Error	Beta			F	Sig
Step1: AFC regressed on TKS								
1	(Constant)	4.426	.265		16.685	.000	3.877	.005
	TKS	.137	.069	.098	1.969	.050		
Step2: ASM regressed on TKS								
1	(Constant)	4.426	.265		16.685	.000	3.877	.015
	TKS	.137	.069	.098	1.969	.050		
Step 3 : ASM regressed on TKS and AFC								
1	(Constant)	2.097	.334		6.271	.000	51.525	.000
	TKS	.035	.063	.025	.555	.579		
	AFC	.551	.056	.449	9.911	.000		

In the second step Assimilation (ASM) was regressed on Tacit Knowledge Sharing (TKS) and it was found that Tacit Knowledge Sharing (TKS) explains the variation in Assimilation (ASM) significantly. The individual contribution in explaining the Assimilation(ASM) by Tacit Knowledge Sharing (TKS) was observed as .137 and this contribution was significant at .05 level of significance (t=1.969, p<.05). This means that for every unit variation in Instrumental Ties (INST) there is .137 units variation in Assimilation (ASM). The contribution of Instrumental

Ties in explaining Assimilation (ASM) is positive which means that there is increment in the Assimilation (ASM) with the increment in Tacit Knowledge Sharing (TKS).

In the second step Assimilation (ASM) was regressed on Tacit Knowledge Sharing (TKS) and it was found that Tacit Knowledge Sharing (TKS) explains the variation in Assimilation (ASM) significantly.

The individual contribution in explaining the Assimilation(ASM) by Tacit Knowledge Sharing (TKS) was observed as .137 and this contribution was significant at .05 level of significance ($t=1.969$, $p<.05$). This means that for every unit variation in Instrumental Ties (INST) there is .137 units variation in Assimilation (ASM). The contribution of Instrumental Ties in explaining Assimilation (ASM) is positive which means that there is increment in the Assimilation (ASM) with the increment in Tacit Knowledge Sharing (TKS).

In the third step Assimilation (ASM) was regressed on Affective Commitment (AFC) and Tacit Knowledge Sharing (TKS) together. There is positive contribution of Affective Commitment (AFC) in explaining the variation in Assimilation (ASM). The individual contribution in explaining the Assimilation(ASM) by Affective Commitment (AFC)was observed as .551 and this contribution was observed significant at .001 level of significance ($t= 9.911$, $p<.001$). The significant result shows that Affective Commitment (AFC) to be a good predictor of Assimilation (ASM). See Table 4.3.12 for explanation of mediation testing.

There is positive contribution of Tacit Knowledge Sharing (TKS) in explaining the variation in Assimilation (ASM). The individual contribution in explaining the Assimilation(ASM) by Tacit Knowledge Sharing(TKS) was observed as .035 and this contribution was observed non significant ($t= .555$, $p > .5$). The non significant result shows that Tacit Knowledge Sharing (TKS) is not a good predictor in explaining Assimilation (ASM).

4.3.6.4.3 Sobel's test for significance testing of mediation

Table 4.3.13 shows the results of sobel's test for significance testing mediation of affective commitment and Tacit Knowledge Sharing in the relationship of Instrumental Ties and Absorptive Capacity (Assimilation component).

4.3.6.4.4 Diagnostics of Regression Model

Table 12 (Anx -A) shows the values of VIF and tolerances (T) of all variables and all these values are well within the acceptable range. The values of VIF in multiple regression analysis with Assimilation (ASM) as dependent variable were observed as 1.04 (INST and AFC as independent variables) and 1.02 (AFC and TKS as independent variables) and values of tolerances for the same relationships were observed as .962 and .974 respectively.

Table 4.3.13: Results of indirect effects of Instrumental Ties on Assimilation through Affective Commitment and Tacit Knowledge Sharing by using Sobel's test.

Indirect effect of Instrumental Ties on Assimilation through Affective Commitment

Inputs		**Sobel's test Statistic**	**Significance value (p value)**
a	.223	3.68458035	0.00011454
b	.544		
S_a	.056		
S_b	.056		

Indirect effect of Instrumental Ties on Assimilation through Tacit Knowledge Sharing

Inputs		**Sobel's test Statistic**	**Significance value (p value)**
a	.137	1.94627574	0.02581081
b	.551		
S_a	.069		
S_b	.056		

The assumption of normality of residual terms of dependent variable was tested by histogram of regression standardized residuals with normal probability. The bell shaped curve of the residuals of dependent variable (ASM) shows that normality assumption of multiple regression analysis is met. The normality assumption was further validated by subjecting the normal standardized

residuals of dependent variable (ASM) to normality test of Kolmogorov-Smirnov test of normality and itwas found that normality assumption of multiple regressions is met. See Figure 7 (Anx - B).

Homoscedasticity and linearity assumption in multiple regression analysis means that independent variables are linearly related to dependent variable and for every level of independent variable there is homogeneous variance. This assumption was tested by drawing normal P-P plot of regression standardized residuals (plotting graph between observed cumulative probability and expected cumulative probability) and scatter plot standardized predicted value (ZPRED) and regression standardized residual (ZRES). The result of P-P plot of regression standardized residual (Figure 5, Anx - B) show that observed and cumulative probabilities are tightly packed with each other showing that linearity assumption is met. Similarly scatter plot of regression standardized predicted and residual show that data is scattered around zero value highlighting that assumption of linearity and homoscedasticity is met.

4.3.7 Discussion

This study tests the hypotheses relating to links between human behavior mechanisms (Instrumental Ties, Affective Commitment and Tacit Knowledge Sharing) and Absorptive Capacity (Acquisition and Assimilation components). Hypothesis 17 (H: 17) proposes the positive impact of Instrumental Ties (INST) on Affective Commitment (AFC). Result (table 4.3.7) of regression analysis shows the positive impact of Instrumental Ties (INST) on Affective Commitment (AFC). Moreover, the result shows that the impact of Instrumental Ties (INST) on Affective Commitment is statistically significant at .001 level of significance ($b = .223$, $p < .001$). Hypothesis 13 (H: 13) relating to human behavior mechanisms (Instrumental Ties) states that there is positive impact of Instrumental Ties (INST) on Acquisition component of Absorptive Capacity. Result of regression analysis (table 4.3.7) shows that Instrumental Ties are having positive impact on Acquisition (ACQ) component of Absorptive Capacity. This impact is statistically significant at .001 level of significance ($b = .178$, $p < .005$). Hence, hypotheses 17 and 13 are supported. Hypothesis 19 states that there is positive impact of Affective Commitment (AFC) on Acquisition (ACQ) component of Absorptive Capacity. To test this hypothesis Acquisition (ACQ) was regressed on Instrumental Ties (INST) and Affective Commitment

(AFC) together. Table 4.3.7 shows the result of regression analysis. The positive contribution of Affective Commitment (AFC) in explaining the Acquisition (ACQ) is observed and this contribution is significant at .001 level of significance (b= .268, p< .001). Thus hypothesis 19 (H: 15) is supported. Hypothesis 28 states that the Affective Commitment (AFC) mediated in the relationship of Instrumental Ties (INST) and Acquisition (ACQ) component of Absorptive Capacity. The hypothesis testing results (table 4.3.7) shows that impact of Instrumental Ties (INST) on Acquisition component has reduced from (b= .178) as noted in the second step of regression analysis (table 4.3.7) to (b= .118) as noted in the third step in the regression analysis. Moreover, the significance level is also reduced from .001 level to .034 level. The Sobel's test (Table 4.3.9) and regression analysis result (table 4.3.7) shows the significant contribution of Affective Commitment (AFC) as a mediator in the relationship of Instrumental Ties and Acquisition component of Absorptive Capacity. Hence, hypothesis 28 is supported.

Hypothesis 18 (H: 18) states that Instrumental Ties impact positively on Tacit Knowledge Sharing (TKS). Instrumental Ties (INST) were regressed on Tacit Knowledge Sharing and positive impact of Instrumental Ties (INST) on Tacit Knowledge Sharing (TKS) was observed. Table 4.3.8 shows the result of regression analysis with Tacit Knowledge Sharing as outcome variable and Instrumental Ties (INST) as predictor. The result shows positive contribution of Instrumental Ties in explaining Tacit Knowledge Sharing (b= .615, p< .001) thus supporting hypothesis 18 (H: 18). Hypothesis 23 states the positive impact of Tacit Knowledge Sharing on Acquisition component of Absorptive Capacity. Tacit Knowledge Sharing was regressed on Acquisition (ACQ) together with Instrumental Ties in multiple regression analysis (Table 4.3.8). Significant contribution of Tacit Knowledge Sharing in explaining Acquisition component of Absorptive Capacity shows that hypothesis 23 (H: 23) is supported. Hypothesis 34 (H: 34) stated that Tacit Knowledge Sharing mediates in the relationship of Instrumental Ties and Acquisition component of Absorptive Capacity. Table 4.3.8 shows result of multiple regression analysis for mediation testing of Tacit Knowledge Sharing (TKS). In step 2 of regression analysis Instrumental Ties is shown to impact Acquisition (ACQ) significantly at (0.005) level of significance. However, the impact of Instrumental Ties reduced in both terms i.e., in numerical value and significance. The numerical value reduced from .178 to .082 and contribution changed from highly significant (p < .005) in step 2 to highly non significant (p >.2) in step 3, indicating

the presence of mediator (Tacit Knowledge Sharing) in the relationship of Instrumental Ties and Acquisition (ACQ). On the other hand, Tacit Knowledge Sharing in step 3 is shown to impact positively on Acquisition (ACQ) and this impact is statistically significant. The results of regression analysis (Table 4.3.8) and significance mediation testing of Sobel's test (Table 4.3.9) show the mediation of Tacit Knowledge Sharing in the relationship of Instrumental Ties and Acquisition (ACQ) component of Absorptive Capacity. Hence, hypothesis 34 (H: 34) is supported.

Hypothesis 14 (H: 14) states that Instrumental Ties impact positively on Assimilation (ASM) component of Absorptive Capacity. Instrumental Ties (INST) were regressed on Assimilation (ASM) and positive impact of Instrumental Ties (INST) on Assimilation (ASM) was observed. Table 4.3.11 shows the result of regression analysis with Assimilation (ASM) as outcome variable and Instrumental Ties (INST) as predictor. The result shows positive contribution of Instrumental Ties in explaining Assimilation (b= .196, p< .001) thus supporting hypothesis 14 (H: 14).

Hypothesis 20 (H: 20) proposes the positive impact of Affective Commitment (AFC) on Assimilation (ASM) component of Absorptive Capacity. The Affective Commitment (AFC) was regressed on Assimilation (ASM) together with Instrumental Ties (INST) Result (Table 4.3.11) of regression analysis shows the positive impact of Affective Commitment (AFC) on Assimilation (ASM). Moreover, the result shows that the impact of Affective Commitment (AFC) on Assimilation (ASM) is statistically significant at .001 level of significance (b= .544, p<.001). Thus supports the hypothesis 20 (H: 20).

Hypothesis 29 states that the Affective Commitment (AFC) mediated in the relationship of Instrumental Ties (INST) and Assimilation (ASM) component of Absorptive Capacity. the hypothesis testing results (table 4.3.10) shows that impact of Instrumental Ties (INST) on Assimilation (ASM) component has reduced from (b= .196) as noted in the second step of regression analysis (table 4.3.10) to (b= .075) as noted in the third step in the regression analysis. Moreover, the significance level is also reduced from .005 level to .239 level. The Sobel's test (Table 4.3.13) and regression analysis result (Table 4.3.11) shows the significant contribution of

Affective Commitment (AFC) as a mediator in the relationship of Instrumental Ties and Assimilation (ASM) component of Absorptive Capacity. Hence, hypothesis 29 is supported.

Hypothesis 27 (H: 27) states that Tacit Knowledge Sharing (TKS) impacts positively on Affective Commitment (AFC). Affective Commitment (AFC) was regressed on Tacit Knowledge Sharing (TKS) and positive impact of Tacit Knowledge Sharing (TKS) on Affective Commitment (AFC) was observed. Table 4.3.12 shows the result of regression analysis with Affective Commitment (AFC) as outcome variable and Tacit Knowledge Sharing (TKS) as predictor. The result shows positive contribution of Tacit Knowledge Sharing (TKS) in explaining Affective Commitment ($b = .137$, $p < .05$) thus supporting hypothesis 27 (H: 27).

Hypothesis 24 (H: 24) proposes the positive impact of Tacit Knowledge Sharing (TKS) on Assimilation (ASM) component of Absorptive Capacity. Tacit Knowledge Sharing (TKS) was regressed on Assimilation (ASM). Result (table 4.3.12) of regression analysis shows the positive impact of Affective Commitment (AFC) on Assimilation (ASM). Moreover, the result shows that the impact of Tacit Knowledge Sharing (TKS) on Assimilation (ASM) is statistically significant at .05 level of significance ($b = .137$, $p < .05$). Thus supports the hypothesis 24 (H: 24).

Hypothesis 32 states that the Affective Commitment (AFC) mediated in the relationship of Tacit Knowledge Sharing (TKS) and Assimilation (ASM) component of Absorptive Capacity. the hypothesis testing results (table 4.3.11) shows that impact of Tacit Knowledge Sharing (TKS) on Assimilation (ASM) component has reduced from ($b = .137$) as noted in the second step of regression analysis (table 4.3.12) to ($b = .035$) as noted in the third step in the regression analysis. Moreover, the significance level is also reduced (from .05 to .579). The Sobel's test (Table 4.3.13) and regression analysis result (4.3.12) shows the significant contribution of Affective Commitment (AFC) as a mediator in the relationship of Tacit Knowledge Sharing (TKS) and Assimilation (ASM) component of Absorptive Capacity. Hence, hypothesis 32 is supported.

4.4 Study-4.

Impact of human behavior mechanisms (Affective Commitment, Tacit Knowledge Sharing and Instrumental Ties) on Absorptive Capacity (Transformation and Exploitation components)

4.4.1. Introduction

This study explores how the human behavior mechanisms (Affective Commitment, Tacit Knowledge Sharing and Instrumental Ties) impact on two components of realized Absorptive Capacity (Transformation and Exploitation). The study is based on sample data from knowledge intensive companies of Pakistan and thus to be quantitative in nature.

4.4.2 Sample and Procedure.

Conceptual/target population for this was knowledge intensive companies of Pakistan. Data was collected through questionnaires and stratified random sampling technique was adopted to collect the data for this study. The stratified sampling technique adopted for data collection for this study was based on geographical locations. Data was collected from three strata of knowledge intensive pharmaceutical companies of Pakistan as most of the industries are concentrated on these three strata. The unit of analysis for this study was senior supervisors, managers, general managers and specialists such as plant managers' special task handling employees. Rationale for collecting the data from specific segments of knowledge intensive pharmaceutical companies was that the maximum knowledge process activities are handled by supervisors, managers and specialists of the knowledge intensive industry. Diverse range of employees participated in the study. The employees with different educational background and having wide span of experience on a continuum and with different age groups participated in the study. The respondents from diverse background and experience were selected to obtain the generalization of the study results. The major portion of survey questionnaires was distributed to respondents through mail and personal contacts and a few through e-mails. First reminder after distributing the questionnaires was given to the respondents 15 days after distribution of questionnaires. Majority of the respondents returned the questionnaires duty filled after 10-15 days of first reminder. Rests of the respondents were reminded again on telephone and e-mail. A certain percentage of respondents returned the filled questionnaires after 3-4 repeated reminders yet some percentage of respondents did not respond at all. Of 547 distributed questionnaires 407 were returned by respondents. Out of 407 responded questionnaires 28 were not worth enough to be included for analysis because most of questionnaires were partially filled or returned with a lot of missing data. However after evaluating responded questionnaires, 379 were considered for conducting the statistical processes. This makes response rate as 69.2%. SPSS software was used to factor analyze the instruments of study variables both independent and dependent variables.

After checking the validity and reliability of measures of variables the data was analyzed in SPSS software for testing conceptual model of study and testing hypotheses related to different variable of study.

4.4.3. Characteristics of Sample.

Data was collected from both the genders (males and females) for this study. The data consisted on 274 males (72.3%) and 105 females (27.7 %) participated in this study.

The data for this study was collected from respondents having a wide range of age. Minimum age of respondents was 20 years whereas the respondents with maximum 70 years of age participated in the study. 212 (55.9%) of respondents ranged age group of 20-30 years. 117 (30.9 %) respondents came from 31-40 years of age. 33 (8.7 %) and 10 (2.6 %) participated from 41-50 years and 51-60 years of age respectively. The far end of continuum of age 60-70 years was of low percentage 7 (1.8%). Participants of study came from different educational backgrounds. Wide range of education ranged from undergraduates study to the doctoral degree holders and specialists having highly professional certifications.

Table 4.4.1: Characteristics of Sample

		Frequency	Percent	Valid Percent	Cumulative Percent
GENDER	MALE	274	72.3	72.3	72.3
	FEMALE	105	27.7	27.7	100.0
	TOTAL	379	100.0	100.0	
AGE OF RESPONDENT	20-30	212	55.9	55.9	55.9
	31-40	117	30.9	30.9	86.8
	41-50	33	8.7	8.7	95.5
	51-60	10	2.6	2.6	98.2
	61-70	7	1.8	1.8	100.0
	Total	379	100.0	100.0	
QUALIFICATION	UNDER GRADUATE	42	11.1	11.1	11.1
	GRADUATE	162	42.7	42.7	53.8
	MASTERS	122	32.2	32.2	86.0
	PHD	18	4.7	4.7	90.8

	OTHERS	35	9.2	9.2	100.0
	Total	379	100.0	100.0	
DESIGNATION	SUPERVISORS	82	21.6	21.6	21.6
	MANAGER	136	35.9	35.9	57.5
	GENERAL MANAGER	41	10.8	10.8	68.3
	OTHERS	120	31.7	31.7	100.0
	Total	379	100.0	100.0	
JOB TYPE	PERMANENT	253	66.8	66.8	66.8
	CONTRACT	126	33.2	33.2	100.0
	Total	379	100.0	100.0	
LENGTH OF SERVICE	Below 5	154	40.6	40.6	40.6
	5-10	149	39.3	39.3	79.9
	11-15	49	12.9	12.9	92.9
	16-20	15	4.0	4.0	96.8
	21-25	5	1.3	1.3	98.2
	26-30	1	.3	.3	98.4
	Above 30	6	1.6	1.6	100.0
	Total	379	100.0	100.0	
AGE OF ORGANIZATION	1-10	31	8.2	8.2	8.2
	11-20	160	42.2	42.2	50.4
	21-30	85	22.4	22.4	72.8
	31-40	36	9.5	9.5	82.3
	41-50	37	9.8	9.8	92.1
	Above 50	30	7.9	7.9	100.0
	Total	379	100.0	100.0	
NO OF EMPLOYEES	1-500	294	77.6	77.6	77.6
	501-1000	42	11.1	11.1	88.7
	1001-1500	11	2.9	2.9	91.6
	1501-2000	9	2.4	2.4	93.9
	2001-2500	4	1.1	1.1	95.0
	Above 2500	19	5.0	5.0	100.0
	Total	379	100.0	100.0	

Respondents from undergraduates, doctoral degree holders and specialists were less in number as compared to graduates and masters degree holders. 42(11.1%), 35 (9.2 %) and 18 (4.7%) correspond to undergraduates, specialists of field and doctoral degree holders respectively. Majority of respondents were graduates162 (42.7%) and master degree holders 122 (32.2 %).

Collected data for this study came from employees holding different managerial positions in the knowledge intensive companies. The data was collected from senior supervisor, managers, general managers and employees holding special position such as technical coordinators, marketing managers and plant managers. 136 managers and 120 employees holding special positions in knowledge intensive companies participated in the study contributing 35.9 % and 31.7 % to the total sample. 82 supervisors and 41 general managers participated in this study making 21.6% and 10.8% contribution respectively to the study sample.

This study further categorized the respondents based on type of job they were holding. Permanent and the employees having job on contract bases were approached to fill the questionnaires. This study focused on Absorptive Capacity frame work which is basically a unique knowledge process. The contracted employees might bias the results therefore to distribute random error, the data was collected from both type of employees. Before deciding to include both types of employees thorough interviews with experts from knowledge intensive companies were conducted and discussed with the specialists of management domain. Majority of the data come from permanent employees because permanent employee's ratio is greater than contracted employees. 253 (66.8%) permanent employees and 126 (33.2 %) employees holding jobs on contract bases participated in the study.

Along with other characteristics of respondents, their length of service was also focused. Data for this study was collected from the respondents/employees of different service brackets. The diverse respondents having less than 5 years of service and respondents having service more than 30 years were included in the study. employees below 5 years of service who participated the study were 154(40.6 %) and 149 (39.3 %) questionnaires were filled by employees with 5-10 years of service bracket. 49(12.9%) employees with 11-15 years and 15 (4 %) employees with 16-20 years participated in this study. The employees with service more than 20 years together

contributed 3.2 % to the sample of study with lowest response from service bracket of 26-30 years of service.

Age of the organization might influence the results. The older companies invest more in knowledge process activities in general as compared to new companies. To compensate this difference the data for this study was collected from companies having different ages. Majority of the data came from companies having age of 11-20 years of bracket. 160(42.2 %) responses were received from this bracket. 31(8.2 %) and 85 (22.4 %) responses came from 1-10 years and 21-30 years old companies. 36 (9.5%), 37(9.8%) and 30 (7.9%) respondents came from 31-40 years, 41-50 years and above 50 years old companies respectively.

The size of the company in the context of number of employees might have direct effect on knowledge process activities and Absorptive Capacity. Generally, the companies with greater resources and employees invest more as compared to companies having lesser number of employees. Data was collected from companies having different number of employees. Majority of the respondents (77.6 %) represented the data from companies having 1-500 employees. 11.1% (42) of data for study come from companies having 501-1000 employees. 2.9 % (11) of data come from companies having range of 1001-1500 employees. 2.4% (9) of sample data came from companies having employees between 1501 to 2500 in number. 19(5 %) respondents came from companies having employees more than 2500 in number.

4.4.4 Factor Analysis

Factor analysis was conducted on the data collected for this study by using principal component analysis (PCA) as extraction method and varimax method was used as rotation method.

4.4.4.1 Kaiser- Meyer- Olkin (KMO) and Bartlett Test of Sphericity

Before conducting factor analysis, two statistics (sampling adequacy statistic-- Kaiser- Meyer-Olkin, KMO and statistic of Bartlett's Test of Sphericity) need to be significant.

Values of two statistics were checked i.e. sampling adequacy and Bartlett's test of spherecity and both statistics were found significant. Kaiser Meyer-Olkin (KMO) for whole sample in the study was observed as KMO = .812 where as Bartlett's test of sphericity was also observed significant

at .001 level of significance which means a confidence internal (C I =99.9%). The test statistic for sampling adequacy (KMO) for individual variables was also calculated and it all values were observed well above the acceptable range. KMO for Transformation (TFM) was observed highest among all variables of study (KMO=.803), where as, sampling adequacy of .588 was observed against Affective Commitment (AFC).

The statistic for sphericity i.e., Bartlett's test of sphericity was also found significant at .001 level of significance which means confidence internal of 99.9%. Table 13 (Anx - A) gives the summary of both statistics (KMO and Bartlett's test). After both the statistics were found significant the factor analysis was conducted followed by reduction of items with low factor loadings.

Table 4.4.2 : sampling adequacy(KMO) and Bartlett's test of sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.812
Bartlett's Test of Sphericity	3204.552	2984.806
	351	276
	.000	.000

4.4.4.2 Interpretation of Factor Analysis

Table 4.4.2 shows the results of factor analysis of study variables. All the items of Transformation (TFM) component of Absorptive Capacity loaded on one factor with factor loading well above the thresh hold limit except items TFM4 which comparatively loaded low (-.026) on its own factor.

Items of Exploitation component of realized Absorptive Capacity also loaded well with factor loadings falling well within acceptable range of factor loadings. However, EXPL5 loaded low (EXPL5=.282) and the item (EXPL2) loaded moderately well on its own factor (EXPL2=.323). The items with low factor loadings are recommended to be dropped from the instrument. However, the factor loadings with values falling on the margin are reviewed on the theoretical

background of the study. Sterns (2002) suggests that for a sample size of 300, the factor loadings of items should be greater then 0.298. The instruments for Transformation (TFM) and Exploitation (EXPL) were subjected for checking their reliabilities (Chronbach's alpha) and it was revealed that after dropping the items with low factor loadings (TFM4, EXPL2, EXPL5) the reliability of the Realized Absorptive Capacity improved from 0.501 to 0.71.

Table 4.4.3 : Component Matrix

	Components				
	1	2	3	4	5
TFM1	**.650**				
TFM2	**.741**				
TFM3	**.709**				
TFM4	-.026				
TFM5	**.705**				
TFM6	**.746**				
EXPL1		**.532**			
EXPL2		**.323**			
EXPL3		**.630**			
EXPL4		**.667**			
EXPL5		.282			
EXPL6		**.699**			
AFC1			**.777**		
AFC2			**.499**		
AFC3			**.675**		
AFC4			-.028		
AFC5			-.025		
AFC6			**.686**		
AFC7			.105		
TKS1				**.741**	
TKS2				**.845**	
TKS3				**.712**	
TKS4				**.603**	
INST1					**.730**
INST2					**.789**
INST3					**.796**
INST4					**.757**

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

All items of independent variables were factored on their respective factors for which those were designed and it was observed that maximum items loaded on their factors with high factor loadings i.e. well above of cut off values of 0.298 (Stevens, 2002).

However, factor loading of items (AFC4, AFC5, AFC7) of Affective Commitment (AFC) were observed well below the thresh hold point (.298) of factor loadings as suggested by Stevens (2002). All the items of Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST) loaded well above the cutoff point to their respective factors.

The factor loadings of items of Tacit Knowledge Sharing (TKS) ranged from .603 to .845 and factor loading of all the items Instrumental Ties (INST) also loaded well on its factor. Their factor loadings ranged from .730 to .796. The items with low factor loadings were dropped from the instruments for better reliability of the instruments. The communalities (Table 14, Anx - A) of the almost all the items were observed greater than .5 and factor loadings of all items on all factors are shown in Table 15 (Anx - A).

4.4.4.3 Summary of Factor Analysis

Factor analysis and reliabilities of measures allowed dropping some of the items before conducting analysis on study variables. Items with low factor loadings and low reliabilities (Chronbach alpha) were dropped from the measures. Table 4.4.3 gives summary of factor loadings of individual items on their respective measures. The low factor loading are recommended to be dropped from instruments. The arguments for dropping the individual items have been discussed in previous studies conducted in this work.

4.4.5. Results of study of relationship between Realized Absorptive Capacity (Transformation component), Affective Commitment (AFC), Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS)

4.4.5.1 Descriptive Statistics

Mean responses of employees against all the variables were tabulated to see the overall response of employees against each variable. Table 4.4.4 shows the mean responses of variables of this study.

Mean response of Transformation (TFM) was observed as 4.92 with standard deviation of .90. Mean response of Exploitation (EXPL) was observed as 5.22 with standard deviation of .91. Mean response of Affective Commitment (AFC) was observed as 4.90 with standard deviation of .87. Tacit Knowledge Sharing was responded with mean of 3.73 and standard deviation of .78. Mean response of employees of the sample data collected was observed as 3.78 for Instrumental Ties (INST) with standard deviation .77.

Table 4.4.4: Descriptive statistics of study variables

	N	Minimum	Maximum	Mean	Std. Deviation
TFM	379	1.80	7.00	4.9166	.90596
EXPL	379	2.50	7.00	5.2230	.91636
AFC	379	2.50	7.00	4.9011	.87765
INST	379	1.00	5.00	3.7883	.77783
TKS	379	1.00	5.00	3.7315	.78447
Valid N (listwise)	379				

Summary of mean response of demographics of employees of sample data from the knowledge intensive companies against all variables is shown in table 4.4.5. On the average males and females responded uniformly except a few variables. Mean response (4.93) for Transformation was observed for males which was little higher as compared to mean response (4.88) 0f females.

Response for the Exploitation (EXPL) was observed uniform for males and females both with mean value of 5.22. Mean response of male for Affective Commitment (AFC) was observed as 4.93 that was comparatively higher than females who responded with mean value of 4.83. Males responded low for Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST) as compared to female employees of knowledge intensive companies with mean values of 3.73 and 3.70 respectively. Mean responses of females for Tacit Knowledge Sharing and Instrumental Ties were observed as 3.94 and 3.80 respectively. Mean response of males (4.93) against Affective Commitment (AFC) was observed higher as compared to mean response of females (4.83).

The mean responses of study variables were also observed against the respondents with different age groups.

Mean response for Transformation (TFM) was observed highest (5.05) for the respondents having age groups 41-50 years of age.

Table 4.4.5: Descriptive Statistics (Mean responses) of demographics

		TFM	EXPL	AFC	TKS	INST
GENDER	MALE	4.93	5.22	4.93	3.73	3.70
	FEMALE	4.88	5.23	4.83	3.94	3.80
AGE OF RESPONDENT	20-30	4.97	5.18	4.92	3.74	3.66
	31-40	4.99	5.39	4.96	3.84	3.86
	41-50	5.05	5.18	4.85	3.86	3.80
	51-60	3.62	4.63	4.10	3.75	3.53
	61-70	3.40	3.86	4.57	4.00	3.79
QUALIFICATION	UNDER GRADUATE	4.77	5.21	4.85	4.05	3.92
	GRADUATE	4.99	5.16	4.96	3.72	3.65
	MASTERS	4.92	5.13	4.86	3.81	3.73
	PHD	4.86	5.65	4.64	3.92	4.00
	OTHERS	4.76	4.62	4.93	3.68	3.74
DESIGNATION	SUPERVISORS	5.10	5.34	4.95	3.84	3.77
	MANAGER	4.86	5.30	4.87	3.84	3.82
	GENERAL MANAGER	4.73	5.18	4.76	3.72	3.68
	OTHERS	4.92	5.07	4.95	3.72	3.62
JOB TYPE	PERMANENT	4.99	5.26	4.93	3.87	3.82
	CONTRACT	4.77	5.15	4.84	3.62	3.55
LENGTH OF SERVICE	Below 5	4.95	5.03	4.91	3.67	3.55
	5-10	4.90	5.29	4.89	3.80	3.78
	11-15	4.80	5.53	4.87	3.96	4.02
	16-20	4.61	5.42	4.77	3.82	3.85
	21-25	5.32	5.20	4.90	4.35	4.05
	26-30	4.80	4.75	5.50	4.00	3.00
	Above 30	5.77	5.50	5.42	4.50	4.50

Minimum mean response (3.40) against Transformation (TFM) was observed for the respondents of age groups of 61-70 years. Mean response of respondents of age groups 20-30 years and 31-40 years was observed approximately same with means of 4.97 and 4.99 respectively. Mean response of employees of age group of 51-60 years was observed as 3.62 for Transformation (TFM).

For Exploitation (EXPL) mean response of 20-30 and 41-50 years of age group was observed as 5.18 and for 31-40 years mean response was observed as 5.39.employees with age brackets of 51-60 years and 61-70 years responded with mean values of 4.63 and 3.86 respectively. Mean response of Affective Commitment (AFC) for age groups of 20-30 years and 31-40 years was observed as 4.92 and 4.96 respectively. Mean response of 41-50 years of age group was observed as 4.85. Mean responses of 4.10 and 4.57 against Affective Commitment (AFC) were observed for 51-60 years and 61-70 years of age groups respectively.

Mean response of age group of 20-30 years for Tacit Knowledge Sharing (TKS) and Instrumental Ties(INST) was observed as 3.74 and 3.66 a respectively . Uniform response for Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST) was observed for age group of 31-40 years with approximate mean response of 3.85. Mean response (3.86) of Instrumental Ties (INST) of age group 41-50 years was observed a higher as compared to the mean response (3.80) of same age group for Tacit Knowledge Sharing (TKS). Where as the mean response (3.53) of age group of 51-60 years of age for Instrumental Ties (INST) was observed lower than the response of employees (3.75) of same group for Tacit Knowledge Sharing (TKS). Mean response of employees of group 61-70 years for Tacit Knowledge Sharing was also observed higher than the response for Instrumental Ties of same group(61-70 years). Their mean responses were observed as 4.00 and 3.79 for Tacit Knowledge Sharing and Instrumental Ties respectively.

Mean response of graduates and master degree holders was observed as 4.99 and 4.92repectively for Transformation. Mean response of undergraduates was observed as 4.77. Respondents of doctoral degree holders' responded Transformation with mean of 4.86 and for specialists, the mean response was observed as 4.76. Mean response of under graduates, graduates and specialists for Affective Commitment (AFC) was observed as 4.85, 4.96 and 4.93 respectively. Mean response of doctoral degree holders and masters was observed as 4.64 and 4.86

respectively. Mean response (4.05) of Tacit Knowledge Sharing (TKS) for an undergraduate was observed higher than mean response (3.72) of Instrumental Ties (INST). Mean response of graduates for Instrumental Ties (INST) was observed lower than mean response of graduates for Tacit Knowledge Sharing (TKS) with mean responses of 3.65 and 3.72 respectively. Master degree holders responded low for Instrumental Ties with means of 3.73 as compared to mean response (3.81) of master degree holders for Tacit Knowledge Sharing (TKS). However, the mean responses of doctoral degree holders and specialists for Instrumental Ties (INST) were observed high with means of 4.00and 3.74 respectively as compared to their mean responses for Tacit Knowledge Sharing (TKS). Mean responses were observed as 3.92 and 3.68 for master degree holders and specialists respectively.

Mean responses of supervisors. Managers and general managers for Transformation (TFM) were observed as 5.10, 4.86 and 4.73 respectively. Mean response of employees holding special positions in the managerial hierarchy was observed as 4.92. Mean responses of supervisors, managers and general managers for Affective Commitment (AFC) were observed as 4.95, 4.87 and 4.76 respectively. Mean response of employees holding special managerial posts was observed as 4.95. Mean response of supervisors for Tacit Knowledge Sharing was observed as 3.84 and 3.77 respectively. Mean response of managers and general managers for Tacit Knowledge Sharing was observed as 3.84 and 3.72 respectively. Response for managers with special managerial positions was also observed as 3.72 against Tacit Knowledge Sharing (TKS). Mean response of supervisors was observed as 3.77 against Instrumental Ties (INST) and mean response of 3.82 for Instrumental Ties was observed for managers and mean response of general managers for Instrumental Ties (INST) was observed as 3.68. Managers with special managerial positions responded with the mean value of 3.62 against Instrumental Ties (INST).

Mean response for employees having different job categories were also observed. The job categories included permanent jobs and jobs on contract bases. The mean response of employees with permanent jobs for Transformation (TFM) was observed as 4.99 whereas, the response for employees having contracted jobs was observed as 4.77 for Transformation (TFM). Mean responses of permanent and contracted employees for effective commitment were observed as 4.93 and 4.84 respectively. Mean response of permanent employees for Tacit Knowledge Sharing and Instrumental Ties were observed as 3.87 and 3.82 respectively. Mean response of

employees on contract basis for Tacit Knowledge Sharing and Instrumental Ties were observed as 3.62 and 3.55 respectively.

Mean response of employees having less than 5 years of service responded with the mean value of 4.95 for Transformation(TFM), employees with 5-10 years of service responded with mean of 4.90 and employees with service 11-15 and 16-20 years responded Transformation (TFM) with mean values of 4.80 and 4.61 respectively. Employees with 21-25 years of service responded Transformation with mean value of 5.32 and employees with service of 26-30 years responded with mean value of 4.80. Employees with service of above 30 years responded Transformation with mean value of 5.77. Responses for Affective Commitment (AFC) below 5 years of service, 5-10 years of service, and 11-15 years of service and 16-20 years of service were observed as 4.91, 4.89, 4.87 and 4.77 respectively. The employees with 21-25 years and 26-30 years of service responded Affective Commitment (AFC) with mean values of 4.90 and 5.50 respectively.

The employees with service of above 30 years responded Affective Commitment (AFC) wit mean value of 5.42. For Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST) the employees with service below 5 years responded with mean values of 3.67 and 3.55 respectively. Employees with service 0f 5-10 years responded with mean values of 3.80 and 3.78 for Tacit Knowledge Sharing and Instrumental Ties respectively. Employees with 11-15 years responded with mean values of 3.96 and 4.02 for Tacit Knowledge Sharing and Instrumental Ties. Employees with 16-20 years responded with means of 3.82 and 3.85 for Tacit Knowledge Sharing and Instrumental Ties respectively and mean responses of employees with 21-25 years service and 26-30 years of service were observed as 4.35 and 4.00 for Tacit Knowledge Sharing and 4.05 and 3.00 for Instrumental Ties respectively. Employees with service above 30 years of age responded Tacit Knowledge Sharing and Instrumental Ties with mean value of 4.50.

4.4.5.2 Correlation Matrix of Study variables

Correlation matrix of study variables was produced by using SPSS to see the strength of association between potential Absorptive Capacity (Transformation component) Affective Commitment (AFC), Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST). Correlation between variables provides the information about strength of association between them and roughly the direction of association between variables. Based on directional hypotheses of this

study, Pearson product moment correlation was applied for assessing the association between variables and one tailed test was applied. Table 4.4.6 shows the results of correlations coefficients between variables (TFM, AFC, TKS and INST). The potential Absorptive Capacity (TFM component) was observed positively correlated to Affective Commitment (AFC). The correlation coefficient (r) between Transformation (TFM) and Affective Commitment (AFC) was observed as .402.

The association between them was significant at .01 level of significance. The correlation coefficient of the relationship between Transformation (TFM) and Tacit Knowledge Sharing (TKS) was observed as r=.152 which was observed significant at .01 level of significance. The correlation coefficient of the relationship between Transformation (TFM) and Instrumental Ties (INST) was observed as r = .132. The relationship was significant at .01 level of significance.

Table : 4.4.6: Correlations Matrix of study variables

		TFM	AFC	INST	TKS
TFM	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	379			
AFC	Pearson Correlation	.402**	1		
	Sig. (1-tailed)	.000			
	N	379	379		
INST	Pearson Correlation	.132**	.184**	1	
	Sig. (1-tailed)	.005	.000		
	N	379	379	379	
TKS	Pearson Correlation	.152**	.156**	.611**	1
	Sig. (1-tailed)	.001	.001	.000	
	N	379	379	379	379

The direction of relationship between variables was found positive which means that if the value of one variable increases the value of other variable will also increase and if value of one variable goes down the corresponding value in the other variable will also decrease. The

association between Transformation (TFM) and Affective Commitment (AFC) was observed higher than the association between Transformation (TFM) and Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST), whereas the correlation coefficient between Transformation (TFM) and Tacit Knowledge Sharing was observed higher than the correlation coefficient between Transformation (TFM) and Instrumental Ties (INST). Moreover, all the associations were observed significant at (.01) level of significance.

4.4.5.3 Scatter Plot Matrix of Study Variables

Scatter plot matrix was drawn of study variables. Figure 4.4.1 shows the results of scatter plot.

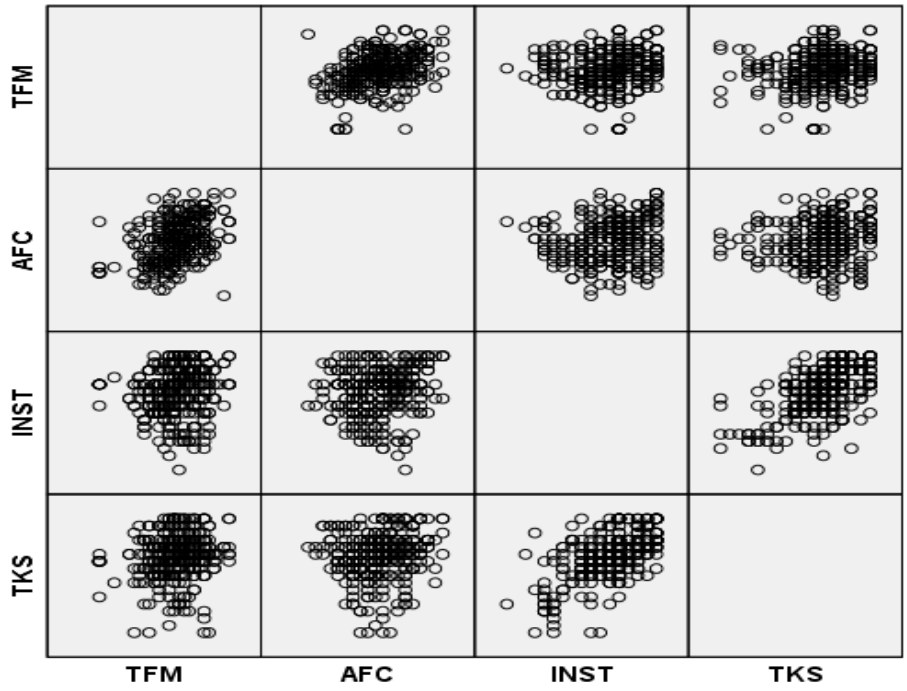

Figure 4.4.1 : Scatter plot of study variables

Generally, the Affective Commitment (AFC) shows the linear relationship with Absorptive Capacity (TFM component). Cylindrical position of scatter plot between Transformation (TFM) and Affective Commitment (AFC) shows the linear relationship between them and with less

scattered data. The scatter plot between Tacit Knowledge Sharing and Transformation (TFM) was also observed linear but the pattern of data is slightly different from the pattern of data between Transformation (TFM) and Affective Commitment (AFC). This means that the relationship is linear but the data is little bit scattered showing comparatively less strong association. The pattern of data between the relationship of Instrumental Ties (INST) and Transformation (TFM) component of potential Absorptive Capacity was also observed linear but the data is more scattered showing the association between variables less linear as compared to pattern of association of Transformation (TFM) with other two variables (AFC and TKS).

The scattered data of the association of Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS) shows good linear relationship between them and similarly, the linear relationship was observed between the Instrumental Ties (INST) and Affective Commitment (AFC). The scatter plot gives general idea that Instrumental Ties (INST) and Tacit Knowledge Sharing have strong linear relationship with Affective Commitment and Affective Commitment has strong linear relationship with Transformation (TFM). This gives a general idea that the impact of Instrumental Ties and Tacit Knowledge Sharing is transmitted to Transformation (TFM) through Affective Commitment (AFC).

4.4.5.4 Regression Analysis

Regression analysis was carried out of the study model with Transformation as dependent variable.

4.4.5.4.1 Multiple regression analysis and mediation testing of Affective Commitment (AFC) in the relationship of Instrumental Ties (INST) and Transformation (TFM).

In the first step, Affective Commitment (AFC) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explain the variation in Affective Commitment (AFC) significantly. The individual contribution in explaining the effective commitment by Instrumental Ties (INST) was observed as .207 and this contribution was significant at .001 level of significance ($t=3.631$, $p<.001$). This means that for every unit variation in Instrumental Ties (INST) there is .223 units variation in Affective Commitment. The positive sign shows that variation is positive which means that there is increment in the Affective Commitment (AFC)

with the increment in Instrumental Ties (INST). The highly significant ANOVA test of this regression equation shows that model fits the data well (F=13.185, p<.001).

In the second step Transformation (TFM) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explain the variation in Transformation (TFM) significantly. The individual contribution in explaining the Transformation (TFM) by Instrumental Ties (INST) was observed as .154 and this contribution was significant at .05 level of significance (t=2.593, p<.05). This means that for every unit variation in Instrumental Ties (INST) there is .154 units variation in Transformation (TFM). The contribution of Instrumental Ties in explaining Transformation (TFM) is positive which means that there is increment in the Transformation (TFM) with the increment in Instrumental Ties (INST). The significant ANOVA test (table 4.4.7) shows that model fits the data well (F= 6.723, p< .05)

In the third step Transformation (TFM) was regressed on Instrumental Ties (INST) and Affective Commitment (AFC) together. There is positive contribution of Instrumental Ties (INST) in explaining the variation in Transformation (TFM). The individual contribution in explaining the Transformation (TFM) by Instrumental Ties (INST) was observed as .071 and this contribution was not significant (t=1.263, p>.1). This means that for every unit variation in Instrumental Ties (INST) there is .071 units variation in Transformation (TFM) but this contribution is not significant.

There is positive contribution of Affective Commitment (AFC) in explaining the variation in Transformation (TFM). The individual contribution in explaining the Transformation (TFM) by Affective Commitment was observed as .403 and this contribution was significant at .001 level of significance (t=8.150, p<.001). This means that for every unit variation in Affective Commitment there is .403 units variation in Transformation (TFM). The contribution of Affective Commitment in explaining Transformation (TFM) was positive which means that there is increment in the Transformation (TFM) with the increment in Affective Commitment (AFC). The significant ANOVA test shows that model fits the data well (F=37.154, p<.001)

4.4.5.4.2 Multiple regression analysis and mediation testing of Affective Commitment (AFC) in the relationship of Tacit Knowledge Sharing (TKS) and Transformation (TFM).

In first step, Affective Commitment (AFC) was regressed on the Tacit Knowledge Sharing was regressed on Instrumental Ties (INST) and it was found that Tacit Knowledge Sharing (TKS) explains the variation in Affective Commitment (AFC) significantly.

Table 4.4.7: Multiple regression analysis for mediation testing Affective Commitment in the relationship of Transformation and Instrumental Ties.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA	
		B	Std. Error	Beta			F	Sig
Step1: AFC regressed on INST								
1	(Constant)	4.115	.221		18.630	.000	13.185	.000
	INST	.207	.057	.184	3.631	.000		
Step2: TFM regressed on INST								
1	(Constant)	4.333	.230		18.843	.000	6.723	.010
	INST	.154	.059	.132	2.593	.010		
Step 3 : TFM regressed on INST and TKS								
1	(Constant)	2.673	.294		9.087	.000	37.154	.000
	INST	.071	.056	.061	1.263	.207		
	AFC	.403	.049	.391	8.150	.000		

The individual contribution in explaining the effective commitment by Tacit Knowledge Sharing (TKS) was observed as .175 and this contribution was significant at .01 level of significance ($t=3.073$, $p<.01$). This means that for every unit variation in Tacit Knowledge Sharing (TKS) there is .175 units variation in Affective Commitment (AFC). The positive sign shows that variation is positive which means that there is increment in the value of Affective Commitment (AFC) with the increment in Tacit Knowledge Sharing (TKS). The ANOVA test shows that overall the model fits the data well ($F=9.443$, $p<.01$).

In the second step Transformation (TFM) was regressed on Tacit Knowledge Sharing (TKS) and it was found that Tacit Knowledge Sharing (TKS) explains the variation in Transformation (TFM) significantly. The individual contribution in explaining the Transformation (TFM) by

Tacit Knowledge Sharing (TKS) was observed as .176 and this contribution was significant at .05 level of significance (t=3.00, p<.01). This means that for every unit variation in Tacit Knowledge Sharing (TKS) there is .176 units variation in Transformation (TFM). The contribution of Tacit Knowledge Sharing (TKS) in explaining Transformation (TFM) is positive which means that there is increment in the Transformation (TFM) with the increment in Tacit Knowledge Sharing (TKS). Overall regression model is good fit of the data (F= 8.931, p<.01)

Table 4.4.8: Multiple regression analysis for mediation testing Affective Commitment in the relationship of Transformation and Tacit Knowledge Sharing.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA	
		B	Std. Error	Beta			F	Sig
Step1: AFC regressed on TKS								
1	(Constant)	4.248	.217		19.578	.000	9.443	.002
	TKS	.175	.057	.156	3.073	.002		
Step2: TFM regressed on TKS								
1	(Constant)	4.261	.224		19.010	.000	8.931	.003
	TKS	.176	.059	.152	2.988	.003		
Step 3 : TFM regressed on AFC and TKS								
1	(Constant)	2.562	.294		8.717	.000	38.410	.000
	TKS	.106	.055	.092	1.924	.055		
	AFC	.400	.049	.388	8.145	.000		

In the third step Transformation (TFM) was regressed on Affective Commitment (AFC) and Tacit Knowledge Sharing (TKS) together. There is positive contribution of Tacit Knowledge Sharing (TKS) in explaining the variation in Transformation (TFM). The individual contribution in explaining the Transformation (TFM) by Tacit Knowledge Sharing (TKS) was observed as .106 and this contribution was observed non significant. (t=1.924, p>.05). The non significant result shows that in this regression model Tacit Knowledge Sharing (TKS) is not a good predictor of Transformation (TFM).

There is positive contribution of Affective Commitment (AFC) in explaining the variation in Transformation (TFM). The individual contribution in explaining the Transformation (TFM) by Affective Commitment was observed as .400 and this contribution was significant at .001 level of significance (t=8.145, p<.001). This means that for every unit variation in Affective Commitment (AFC) there is .400 units variation in Transformation (TFM). The contribution of Affective Commitment (AFC) in explaining Transformation (TFM) was observed positive which means that there is increment in the Transformation (TFM) with the increment in Affective Commitment. Table 4.4.8 shows the results of multiple regression analysis.

4.4.5.4.3 Significance Testing of Mediators by using Sobel's test criteria

Sobel's test statistic for significance testing of mediation of affective commitment and tacit knowledge sharing in the relationship of instrumental ties and transformation is given in figure 4.4.9

4.4.5.4.4 Diagnostics of Regression Model

Table 16 (Anx – A) shows the values of VIF and tolerances (T) of all variables. Two statistics of multi collinearity (VIF and Tolerance) have values well within the acceptable range. The value of variance inflation factor (VIF) was observed as VIF = 1.035 and value for Tolerance (T) was observed as T= .966 in the relationship of Instrumental Ties (INST), Affective Commitment (AFC) with Transformation (TFM). Whereas variance inflation factor (VIF) and Tolerance were observed as VIF= 1.025 and T= .976 in the relationship of Instrumental Ties (INST), Tacit Knowledge Sharing (TKS) with Transformation (TFM).

The assumption of normality of residual terms of dependent variable was tested by residual statistics and histogram of regression standardized residuals with normal probability curve. See Figure 6 (Anx – B).The results of P-P plot and distribution shape of residuals of dependent variable with normal curve shows the normality condition is met. To further test the normality of residuals of Transformation (TFM) with different independent variables was also tested by Kolmogorov-Smirnov test. Figure 6 (Anx – B) shows the results of different regression equations with Transformation as dependent variable. Highly non significant results of regression equations in Kolmogorov-Smirnov test. Figure 7 (Anx - B) shows that the residuals of

Transformation (TFM) are normally distributed thus confirms the assumption of normality to be met.

Table 4.4.9 : Results of indirect effects of Instrumental Ties and Tacit Knowledge sharing on Transformation through Affective Commitment by using Sobel's test

Indirect effect of Instrumental Ties on Transformation through Affective Commitment

Inputs		**Sobel's test Statistic**	**Significance value (p value)**
a	.207	3.32212952	0.00044667
b	.403		
S_a	.057		
S_b	.049		

Indirect effect of Tacit Knowledge sharing on Transformation through Affective Commitment

Inputs		**Sobel's test Statistic**	**Significance value (p value)**
a	.175	2.87365759	0.00202874
b	.400		
S_a	.057		
S_b	.049		

Homoscedasticity and linearity assumption in multiple regression analysis means that independent variables are linearly related to dependent variable and for every level of independent variable there is homogeneous variance. This assumption was tested by drawing normal P-P plot of regression standardized residuals (plotting graph between observed cumulative probability and expected cumulative probability) and scatter plot between standardized predicted value (ZPRED) and regression standardized residual (ZRES). See Figure 5 (Anx – A).The result of p-p plot of regression standardized residual shows that observed and cumulative probabilities are tightly packed with each other showing that linearity assumption is met. Similarly scatter plot of regression standardized predicted and residual show that data is

scattered around zero value highlighting that assumption of linearity and homoscedasticity is met.

4.4.6 Results of study of relationship between Realized Absorptive Capacity (Exploitation component), Affective Commitment (AFC), Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS)

4.4.6.1 Descriptive Statistics

Mean responses of employees for Exploitation (EXPL) component of Realized Absorptive Capacity was observed as 5.22 (table 4.4.4). Mean response of male employees for Exploitation (EXPL) 5.22 and mean response of female employees of the sample data was observed as 5.23 for Exploitation (EXPL). Mean response of employees with age bracket of 20-30 years, 31-40 years, 41-50 years and 51-60 years was observed as 5.18, 5.39, 5.18 and 4.63 respectively. However, the employees with age bracket of 61-70 years responded Exploitation (EXPL) with mean value of 3.86. Undergraduate employees responded Exploitation (EXPL) with the mean value of 5.21 and the graduate employees responded with mean response of 5.16. The employees with master's degree responded with mean of 5.13 for Exploitation (EXPL). Employees having doctoral degree responded Exploitation (EXPL) with mean value of 5.65 and employees with special qualification responded Exploitation (EXPL) with mean value of 4.62. Mean response of managers with different managerial positions responded r Exploitation (EXPL) with small differences in from one another. Supervisors and managers responded Exploitation (EXPL) with mean values of 5.34 and 5.30 respectively. General Managers and employees holding special positions in managerial hierarchy responded with mean values of 5.18 and 5.07 respectively. Mean responses of permanent and contracted employees was observed as 5.26 and 5.15 respectively. Employees with service bracket of below 5 years and above 30 years responded with mean values of 5.03 and 5.50 respectively. Respondents with service of 5-10 years and 11-15 years responded with 5.29 and 5.53 respectively. Employees with service of 16-20 years and 21-25 years responded with mean values of 5.42 and 5.20. However, employees with service bracket of 26-30 years responded with mean value of 4.75.

4.4.6.2 Correlation Matrix of Study variables

Correlation matrix of study variables was produced by using SPSS to see the strength of association between Potential Absorptive Capacity (Exploitation component), Affective Commitment (AFC), Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST). Correlation between variables provides the information about strength of association between them and shows us roughly the direction of association between variables.

Table 4.4.10 : Correlations Matrix of study variables

		EXPL	AFC	INST	TKS
EXPL	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	379			
AFC	Pearson Correlation	.361**	1		
	Sig. (1-tailed)	.000			
	N	379	379		
INST	Pearson Correlation	.213**	.184**	1	
	Sig. (1-tailed)	.000	.000		
	N	379	379	379	
TKS	Pearson Correlation	.251**	.156**	.611**	1
	Sig. (1-tailed)	.000	.001	.000	
	N	379	379	379	379

Based on directional hypotheses of this study, one tailed Pearson product moment correlation was applied for assessing the association between variables. Table 4.4.10 shows the results of correlations coefficients between variables (EXPL, AFC, TKS and INST). The potential Absorptive Capacity (EXPL component) was observed positively correlated to Affective Commitment (AFC). The correlation coefficient (r) between Exploitation (EXPL) and Affective Commitment (AFC) was observed as .361. The association between them was significant at (.01) level of significance. The correlation coefficient of the relationship between Exploitation (EXPL) and Tacit Knowledge Sharing (TKS) was observed as r=.251 which was observed significant at

.01 level of significance. The correlation coefficient of the relationship between Exploitation (EXPL) and Instrumental Ties (INST) was observed as r = .213. The relationship was significant at .01 level of significance. The direction of relationship between variables was found positive which means that if the value of one variable increases the value of other variable will also increase and if value of one variable goes down the corresponding value in the other variable will also decrease. The association between Exploitation (EXPL) and Affective Commitment (AFC) was observed higher than the association between Exploitation (EXPL) and Tacit Knowledge Sharing (TKS) and Instrumental Ties (INST), whereas the correlation coefficient of the association between Exploitation (EXPL) and Tacit Knowledge Sharing was observed higher than the correlation coefficient of the association between Exploitation (EXPL) and Instrumental Ties (INST). Moreover, all the associations were observed significant at ($p < .01$) level of significance.

4.4.6.3 Scatter Plot Matrix of Study Variables (EXPL, AFC, TKS and INST)

Scatter plot matrix was drawn of study variables. Figure 4.4.2 shows the results of scatter plot.

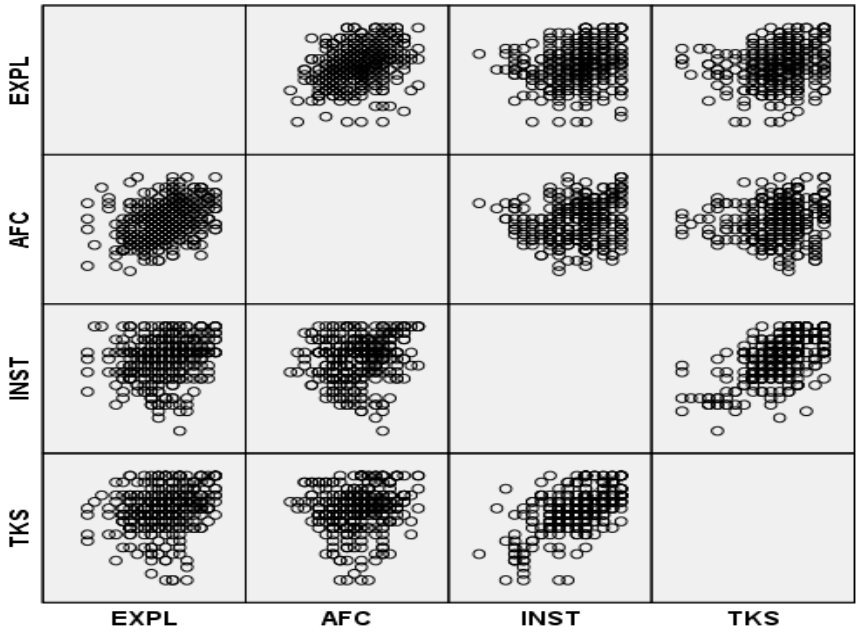

Figure 4.4.2 : Scatter plot matrix of study variables

Affective Commitment (AFC) shows the linear relationship with Exploitation (EXPL). Cylindrical position of scatter plot between Exploitation (EXPL) and Affective Commitment (AFC) shows the linear relationship between them and with less scattered data. The scatter plot between Tacit Knowledge Sharing and Exploitation (EXPL) was also observed linear but the pattern of data is slightly different from the pattern of data between Exploitation (EXPL) and Affective Commitment (AFC). This means that the relationship is linear but the data is little bit scattered showing comparatively less strong association.

The pattern of data between the relationship of Instrumental Ties (INST) and Exploitation (EXPL) component of potential Absorptive Capacity was also observed linear but the data is more scattered showing the association between variables less linear as compared to pattern of association of Exploitation (EXPL) with other two variables (AFC and TKS). The scattered plot of the association of Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS) shows good linear relationship between them. Linear relationship between Instrumental Ties (INST) and Tacit Knowledge Sharing was found and Tacit Knowledge Sharing was having strong linear relationship with Exploitation (EXPL). The scatter plot gives general idea about the indirect impact of Instrumental Ties on Realized Absorptive Capacity (Exploitation component) that is, through Tacit Knowledge Sharing and Affective Commitment (AFC).

4.4.6.4 Regression Analysis

Regression analysis was carried out of this study with Exploitation (EXPL) as dependent variable.

4.4.6.4.1 Results of multiple regression analysis for mediation testing of Tacit Knowledge Sharing (TKS) in the relationship of Instrumental Ties (INST) and Exploitation (EXPL)

In the first step Tacit Knowledge Sharing (TKS) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explain the variation in Tacit Knowledge Sharing (TKS) significantly.

The individual contribution in explaining the Tacit Knowledge Sharing (TKS) by Instrumental Ties (INST) was observed as .617and this contribution was significant at .001 level of significance ($t=15.002$, $p<.001$). This means that for every unit of variation in Instrumental Ties

(INST) there is .617 units variation in Tacit Knowledge Sharing (TKS). The positive sign shows that variation is positive which means that there is increment in the Tacit Knowledge Sharing (TKS) with the increment in Instrumental Ties (INST). Overall regression model is good fit of the data (F= 225.047, p<.001).In the second step Exploitation (EXPL) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explain the variation in Exploitation (EXPL) significantly.

Table 4.4.11: Multiple regression analysis for mediation testing of Tacit Knowledge Sharing in the relationship of Exploitation and Instrumental Ties

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA	
		B	Std. Error	Beta			F	Sig
Step1: TKS regressed on INST								
1	(Constant)	1.396	.159		8.780	.000	225.047	.000
	INST	.617	.041	.611	15.002	.000		
Step2: EXPL regressed on INST								
1	(Constant)	4.270	.229		18.629	.000	18.002	.000
	INST	.252	.059	.213	4.243	.000		
Step 3 : INST and TKS regressed on EXPL								
1	(Constant)	3.956	.249		15.899	.000	13.894	.000
	INST	.113	.074	.096	1.522	.129		
	TKS	.225	.073	.193	3.064	.002		

The individual contribution in explaining the Exploitation (EXPL) by Instrumental Ties (INST) was observed as .252 and this contribution was significant at .001 level of significance (t=4.243 , p<.001). This means that for every unit variation in Instrumental Ties (INST) there is .252 units of variation in Exploitation (EXPL). The contribution of Instrumental Ties in explaining Exploitation (EXPL) is positive which means that there is increment in the Exploitation (EXPL) with the increment in Instrumental Ties (INST). Table 4.4.10 shows the results of ANOVA test. Overall regression model is good fit of the data (F= 18.002, p<.001)

In the third step Exploitation (EXPL) was regressed on Instrumental Ties (INST) and Tacit Knowledge Sharing (TKS) together. There is positive contribution of Instrumental Ties (INST) in explaining the variation in Exploitation (EXPL). The individual contribution in explaining the Exploitation (EXPL) by Instrumental Ties (INST) was observed as .113 and the contribution was observed as non significant (t=1.522, p>.1). Table 4.4.11 gives results of mediation testing.

There is positive contribution of Tacit Knowledge Sharing (TKS) in explaining the variation in Exploitation (EXPL)). The individual contribution in explaining the Exploitation (EXPL) by Tacit Knowledge Sharing (TKS) was observed as .225 and this contribution was significant at .005 level of significance (t=3.064 , p<.005). This means that for every unit variation in Tacit Knowledge Sharing (TKS) there is .225 units variation in Exploitation (EXPL). The contribution of Tacit Knowledge Sharing (TKS) in explaining Exploitation (EXPL)) is positive which means that there is increment in the Exploitation (EXPL) with the increment in Tacit Knowledge Sharing (TKS). Overall regression model is good fit of the data (F= 13.894, p<.001)

4.4.6.4.2 Results of multiple regression analysis for mediation testing of Affective Commitment (AFC) in the relationship Instrumental Ties (INST) and Exploitation (EXPL)

In first step the Instrumental Ties (INST) was regressed on Affective Commitment (AFC) and it was found that Instrumental Ties (INST) explains the variation in Affective Commitment (AFC) significantly. The individual contribution in explaining the effective commitment by Instrumental Ties (INST) was observed as .207 and this contribution was significant at .001 level of significance (t=3.631, p<.001). This means that for every unit variation in Instrumental Ties (INST) there is .207 units variation in Affective Commitment (AFC). The positive sign shows that variation is positive which means that there is increment in the value of Affective Commitment (AFC) with the increment in Instrumental Ties (INST). Overall model fits the data well (F = 13.185, p< .001)

In the second step Exploitation (EXPL) was regressed on Instrumental Ties (INST) and it was found that Instrumental Ties (INST) explains the variation in Exploitation (EXPL) significantly. The individual contribution in explaining the Exploitation (EXPL) by Instrumental Ties (INST) was observed as .252 and this contribution was significant at .001 level of significance (t = 4.243 , p < .001). This means that for every unit variation in Instrumental Ties (INST) there is .252

units variation in Exploitation (EXPL). The contribution of Instrumental Ties in explaining Exploitation (EXPL) is positive which means that there is increment in the Exploitation (EXPL) with the increment in Instrumental Ties (INST). The significant ANOVA test shows that model is a good fit of the data ($F = 18.002$, $p < .001$)

In the third step Exploitation (EXPL) was regressed on Affective Commitment (AFC) and Instrumental Ties (INST) together. There is positive contribution of Affective Commitment (AFC) in explaining the variation in Exploitation (EXPL). The individual contribution in explaining the Exploitation (EXPL) by Affective Commitment (AFC)was observed as .347 and this contribution was observed significant at .001 level of significance ($t = 6.890$, $p < .001$). The significant result shows that Affective Commitment (AFC) to be a good predictor of Exploitation (EXPL). See table 4.4.12 for results of mediation testing.

Table 4.4.12 : Multiple regression analysis for mediation testing Affective Commitment in the relationship of Exploitation and Instrumental Ties

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA	
		B	Std. Error	Beta			F	Sig
Step1: AFC regressed on INST								
1	(Constant)	4.115	.221		18.630	.000	13.185	.000
	INST	.207	.057	.184	3.631	.000		
Step2: EXPL regressed on INST								
1	(Constant)	4.270	.229		18.629	.000	18.002	.000
	INST	.252	.059	.213	4.243	.000		
Step 3 : INST and AFC regressed on EXPL								
1	(Constant)	2.840	.300		9.476	.000	33.846	.000
	INST	.179	.057	.152	3.154	.002		
	AFC	.347	.050	.333	6.890	.000		

There is positive contribution of Instrumental Ties (INST) in explaining the variation in Exploitation (EXPL). The individual contribution in explaining the Exploitation (EXPL) by Instrumental Ties (INST) was observed as .179 and this contribution was observed significant

(t = 3.154, p < .005). Significant result shows that Instrumental Ties (INST) is a good predictor in explaining Absorptive Capacity, Exploitation (EXPL) component. The ANOVA result shows the goodness of fit of regression model. The model is good fit of the data (F = 33.846, p<.001)

4.4.5.4.3 Significance Testing of Mediators by using Sobel's test criteria

Sobel's test for significance testing of mediation effect of Affective Commitment and Tacit Knowledge Sharing in the relationship of Instrumental Ties and Exploitation component of Absorptive Capacity was carried out. Table 4.4.13 shows the results.

Table 4.4.13: Results of indirect effects of Instrumental Ties on Exploitation through Affective Commitment and Tacit Knowledge Sharing by using Sobel's test

Indirect effect of Instrumental Ties on Exploitation through Tacit Knowledge Sharing			
Inputs		**Sobel's test Statistic**	**Significance value (p value)**
a	.617	3.01951037	0.00126592
b	.225		
S_a	.041		
S_b	.073		
Indirect effect of Instrumental Ties on Exploitation through Affective Commitment			
Inputs		**Sobel's test Statistic**	**Significance value (p value)**
a	.207	3.21766421	0.00064620
b	.347		
S_a	.057		
S_b	.050		

4.4.6.4.4 Diagnostics of Regression Model

Table 16 (Anx – A) shows the values of VIF and tolerances (T) of all variables.

Two statistics of multi collinearity (VIF and Tolerance) have values well within the acceptable range. The value of variance inflation factor (VIF) was observed as VIF = 1.035 and value for Tolerance (T) was observed as T= .966 in the relationship of Instrumental Ties (INST), Affective Commitment (AFC) with Transformation (TFM). Whereas variance inflation factor (VIF) and Tolerance were observed as VIF= 1.025 and T= .976 in the relationship of Instrumental Ties (INST), Tacit Knowledge Sharing (TKS) with Transformation (TFM).

The assumption of normality of residual terms of dependent variable was tested by residual statistics and histogram of regression standardized residuals with normal probability curve. See Figure 6 (Anx - B). The results of P-P plot and distribution shape of residuals of dependent variable with normal curve shows the normality condition is met. To further test the normality of residuals of Transformation (TFM) with different independent variables was also tested by Kolmogorov-Smirnov test. Figure 7 (Anx - B) shows the results of different regression equations with Transformation as dependent variable. Highly non significant results of regression equations in Kolmogorov-Smirnov test show that the residuals of Transformation (TFM) are normally distributed thus confirms the assumption of normality to be valid.

Homoscedasticity and linearity assumption in multiple regression analysis means that independent variables are linearly related to dependent variable and for every level of independent variable there is homogeneous variance. This assumption was tested by drawing normal P-P plot of regression standardized residual (plotting graph between observed cumulative probability and expected cumulative probability) and scatter plot standardized predicted value (ZPRED) and regression standardized residual (ZRES). See Figure 6 (Anx - B). The result of P-P plot of regression standardized residual shows that observed and cumulative probabilities are tightly packed with each other showing that linearity assumption is met. Similarly scatter plot of regression standardized predicted and residual show that data is scattered around zero value highlighting that assumption of linearity and homoscedasticity is met.

4.4.7 Discussion

Hypothesis 15 (H : 15) relating to human behavior mechanisms (Instrumental Ties) states that there is positive impact of Instrumental Ties (INST) on Transformation (TFM) component of Absorptive Capacity. Result of regression analysis (Table 4.4.7) shows that Instrumental Ties are

having positive impact on Transformation (TFM) component of Absorptive Capacity. This impact is statistically significant at .001 level of significance (b= .207, p<.001). Hence, a hypothesis 15 is supported.

Hypothesis 21 states that there is positive impact of Affective Commitment (AFC) on Transformation (TFM) component of Absorptive Capacity. To test this hypothesis Transformation (TFM) was regressed on Instrumental Ties (INST) and Affective Commitment (AFC) together. Table 4.4.7 shows the result of regression analysis. The positive contribution of Affective Commitment (AFC) in explaining the Transformation (TFM) is observed and this contribution is significant at .001 level of significance (b= .403, p< .001). Thus hypothesis 21 (H: 21) is supported.

Hypothesis 30 states that the Affective Commitment (AFC) mediates in the relationship of Instrumental Ties (INST) and Transformation (TFM) component of Absorptive Capacity. The hypothesis testing results (Table 4.4.7) show that impact of Instrumental Ties (INST) on Acquisition component has reduced from (b= .154) as noted in the second step of regression analysis (Table 4.4.7) to (b= .071) as noted in the third step in the regression analysis. Moreover, the significance level is also reduced from .01 level to .207 level of significance. The Sobel's test (Table 4.4.9) and regression analysis result (4.4.7) show the significant contribution of Affective Commitment (AFC) as a mediator in the relationship of Instrumental Ties and Transformation (TFM) component of Absorptive Capacity. Hence, hypothesis 30 is supported.

Hypothesis 25 (H: 25) proposes the positive impact of Tacit Knowledge Sharing (TKS) on Transformation (TFM) component of Absorptive Capacity. Tacit Knowledge Sharing (TKS) was regressed on Transformation (TFM). Result (Table 4.4.8) of regression analysis shows the positive impact of Affective Commitment (AFC) on Transformation (TFM). Moreover, the result shows that the impact of Tacit Knowledge Sharing (TKS) on Transformation (TFM) is statistically significant at .005 level of significance (b= .176, p<.005). Thus supports the hypothesis 25 (H: 25).

Hypothesis 33 states that the Affective Commitment (AFC) mediates in the relationship of Tacit Knowledge Sharing (TKS) and Transformation (TFM) component of Absorptive Capacity. the hypothesis testing result (Table 4.4.8) shows that impact of Tacit Knowledge Sharing (TKS) on

Transformation (TFM) component has reduced from (b= .176) as noted in the second step of regression analysis (table 4.4.8) to (b= .106) as noted in the third step in the regression analysis. Moreover, the significance level is also reduced from .005 level of significance to .055 level of significance. The Sobel's test (Table 4.4.9) and regression analysis result (4.4.8) show the significant contribution of Affective Commitment (AFC) as a mediator in the relationship of Tacit Knowledge Sharing (TKS) and Transformation (TFM) component of Absorptive Capacity. Hence, hypothesis 33 is supported.

Hypothesis 16 (H: 16) states that Instrumental Ties (INST) has positive impact on Exploitation (EXPL) component of Absorptive Capacity. Result of regression analysis (Table 4.4.11) shows positive impact of Instrumental Ties (INST) on Exploitation (EXPL) component of Absorptive Capacity. This impact of Instrumental Ties (INST) is statistically significant at (.001) level of significance (b= .252, p<.001) which supports hypothesis 16(H: 16).

Hypothesis 26 (H: 26) proposes the positive impact of Tacit Knowledge Sharing (TKS) on Exploitation (EXPL) component of Absorptive Capacity. Tacit Knowledge Sharing (TKS) was regressed on Exploitation (EXPL) together with Instrumental Ties (INST). Result (Table 4.4.11) of regression analysis shows the positive impact of Tacit Knowledge Sharing (TKS) on Exploitation (EXPL). Moreover, the result shows that the impact of Tacit Knowledge Sharing (TKS) Exploitation (EXPL) is statistically significant at .005 level of significance (b= .225, p<.005). Thus hypothesis 26 (H: 26) is supported.

Hypothesis 35 (H: 35) states that Tacit Knowledge Sharing (TKS) mediates in the relationship of Instrumental Ties (INST) and Exploitation (EXPL) component of Absorptive Capacity. The hypothesis testing result (Table 4.4.11) shows that the impact of Instrumental Ties (INST) on Exploitation (EXPL) component has reduced from (b= .252) as noted in the second step of regression analysis (table 4.4.10) to (b= .113) as noted in the third step in the regression analysis. Moreover, the significance level is also reduced from (.001) level of significance to (.129) level of significance. The Sobel's test (Table 4.4.13) and regression analysis result (4.4.11) show the significant contribution of Tacit Knowledge Sharing (TKS) as a mediator in the relationship of Instrumental Ties (INST) and Exploitation (EXPL) component of Absorptive Capacity. Hence,

hypothesis 35 (H: 35) stating meditational effect of Tacit Knowledge Sharing (TKS) in the relationship of Instrumental Ties (INST) and Exploitation (EXPL) is supported.

Hypothesis 22 (H: 22) proposes the positive impact of Affective Commitment (AFC) on Exploitation (EXPL) component of Absorptive Capacity. Result (Table 4.4.12) of regression analysis shows the positive impact of Affective Commitment (AFC) on Exploitation (EXPL). Moreover, the result shows that the impact of Affective Commitment (AFC) on Exploitation (EXPL) is statistically significant at .001 level of significance (b= .347, p<.001). Thus hypothesis 22 (H: 22) is supported.

Hypothesis 31 (H: 31) states that the relationship between Instrumental Ties (INST) and Exploitation (EXPL) is mediated by Affective Commitment (AFC). The hypothesis testing result (Table 4.4.12) shows that the impact of Instrumental Ties (INST) on Exploitation (EXPL) component has reduced from (b= .252) as noted in the second step of regression analysis (table 4.4.12) to (b= .179) as noted in the third step in the regression analysis. Moreover, Sobel's test (Table 4.4.13) indicates significance results and conclusively, hypothesis 31 (H: 31) stating that Affective Commitment (AFC) mediates the relationship of Instrumental Ties (INST) and Exploitation (EXPL) is supported.

4.5 Results of Study 5: Identification of critical success factors attributing to development of absorptive capacity.

4.5.1 Characteristic of sample

21 employees, 9 middle managers and 5 senior managers were interviewed in total. Mostly, the interviews were conducted at the interviewees' work place while 11 interviews out of total were conducted either at public place or at their residence due to personal connections with authors. The interviews of 30-40 minutes duration were conducted for further data collection purposes To further explore the patterns of themes two focus group interviews were conducted with 7 and 10 participants in focus group 1 and focus group2 respectively. This provided a strong research input. The feedback obtained from employees was open and positive.

4.5.2 Establishment of Codes

The factors attributing to development of absorptive capacity were explored by adopting six steps thematic analysis approach as suggested by Braun and Clarke (2006).The views of the

respondents about the factors attributing to development of absorptive capacity roles of middle managers were based on frequency of responses. The data was collected in four rounds. Majority of the codes about critical success factors were recorded during first and second round of interviews. In fourth round of interview majority of the codes were repeated by the respondents and thus saturation about the views of respondents was achieved in four rounds. About 82 percent of the codes were established about the success factors in round 1 and 10 percent new codes were tapped in second round and remaining codes came from next two rounds (See Fig 4.5.1).

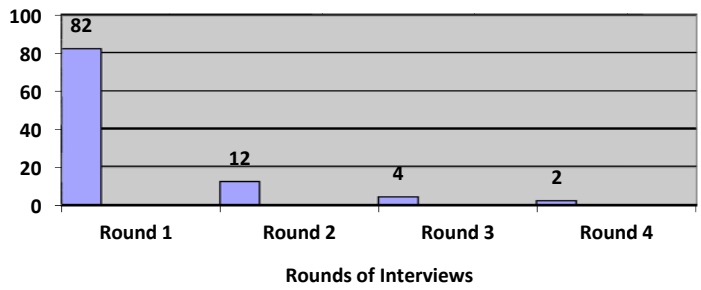

Figure 4.5.1: Establishment of codes

4.5.3 Success factors

The adopted research process (thematic analysis) provided an in-depth understanding of absorptive capacity process in context to critical success factors in pharmaceutical companies based in Pakistan. Different success factors were highlighted respondents with three dominant themes related to management, employees and process.

Following the patterns of responses during interviews three themes of factors for the development of absorptive capacity were concluded as shown in table 4.5.1. The themes and factors were finalized based on at least 80 percent of responses on specific factor by majority of the respondents. Themes and factors are stated below.

4.5.3.1 Management Related Success Factors

The respondents coined their views highlighting the responsibilities of management related to infrastructure and supporting activities for absorptive capacity process. Training on existing

technology and upgraded versions as well as new technology was highlighted as basic step to enhancement of absorptive capacity. For effective knowledge transfer to the employees and identification of actual knowledge required for company the management especially top management was identified to hold responsibility for development of professional network with outside environment. It was highlighted by respondents that employees putting efforts in processing knowledge and contributing to achievement of goals of company more should be compensated more as compare to employees performing stereotype jobs. Newly acquired knowledge demands well established procedures so that knowledge may be assimilated across the departments in the company effectively. Majority of the respondents highlighted this prime responsibility to be performed by management being focal department of all processes. Communication with all stake holders was also highlighted.

4.5.3.2 Employee Related Success Factors

Employee involvement in knowledge process activities at all levels was perceived by the respondents for development of absorptive capacity in pharmaceutical companies. The respondents highlighted the motivation of employees as a strong input for processing new knowledge. As the new knowledge acquired by the companies requires commitment and that is achieved through motivation and at the same time flexibility to employees in processing knowledge activities was also perceived by employees. The skill level of employees regarding Absorptive capacity process was highlighted as contributing factor in its development.

4.5.3.3 Process Related Success Factors

Absorptive capacity development process was responded as a function of interdepartmental coordination by respondents. As the absorptive capacity process requires dedicated efforts, the value added activities may be segregated from non value added activities. Too many conferences in context to processing the knowledge were perceived as playing negative effect on absorptive capacity. The respondents also perceived that tacit knowledge may be developed and a mechanism may be formulated to sharing of tacit knowledge among employees and different departments. Majority of the respondents perceived had a view point that absorptive capacity process may be evaluated periodically.

Table 4.5.1 : Themes and sub themes related to critical success factors	
Themes	**Critical success factors**
Management related	– Arrangement of training relevant to newly acquired knowledge – Effective communication – Performance based incentive system instead of position. – Professional links outside the companies. – Development of procedures for knowledge process activities. – Upgraded technology (machinery etc).
Employee related	– Employees' involvement – Employee motivation – Initiative to Employees – Skill level of employees
Process related	– Interdepartmental coordination – Segregation of value added activities from non value added activities – Avoid too many conferences – Development of Tacit Knowledge sharing mechanism – Periodic evaluation of processes in the light of newly acquired knowledge

4.6 Results of study 6: Processing knowledge (Transformation Process) in pharmaceutical companies

4.6.1 Characteristics of Respondents

In individual interviews data was collected from both genders with different age groups and type of qualifications. Out of total 35 respondents 24 were male and 11 were females. With regard to the age groups, 5 respondents came from age group of 20-30 years and maximum participation

(15) came from the age group of 31-40 years followed by the participation by the age group of 41-50 years (10). 5 respondents came from the age bracket (above 50 years).

Maximum participation came from subject specialists (13). Equal number of respondents (8) with Graduates and Masters Qualification participated in the study followed by 6respondents with under graduate qualification.

16 males and 2 females participated in the focus group interviews. The respondents belonged to different age groups. 11 respondents came from the age group of 31-40 years followed by the 4 respondents from 41-50 years. Two respondents came from the each group (20-30 years and above 50 years). Subject specialists with 8 in number and 5 under graduates participated in the interviews. However, masters and graduates with 2 and 3 in number represented the sample the focus groups. Table 4.6.1 shows the characteristics of sample.

Table 4.6.1 : Characteristics of sample

Gender		Age				Qualification			
Male	Female	20-30	31-40	41-50	Above 50	Under graduate	graduate	Masters	Subject specialists
24	11	5	15	10	5	6	8	8	13
Focus group Interviews (N= 11 for focus group 1 and N = 7 for focus group 2)									
9	2	1	7	2	1	3	2	1	5
7	0	1	4	2	1	2	1	1	3

4.6.2 Observed Transformation process

The process of transformation of the technology to the end product was analyzed based on the competence level of employees from both the departments (R&D and manufacturing).It was revealed during case study and interviews with respondents that the transformation process is largely a function of interdependency of two dominating departments in pharmaceutical companies (R& D and manufacturing). The new knowledge is transformed into routines based

on user feedback and on receiving any side effects from the end users through their normal channels. The pharmaceutical companies have three inputs to execute their transformation process (user feedback, side effects and import of active ingredients). For Transformation process in pharmaceutical companies of Pakistan, see Figure 6 (Anx-B).

4.6.3 Evaluation of transformation process based on competence level of donors and recipients

It was revealed that with high competence of recipients and donors, the high level of transformation was also observed. High transformation was also observed even with moderate competence level of donor but with high competence level of recipients. However, moderate level of transformation was observed in case of medium competence level of recipients with high and medium level of donors.

Table 4.6.2: Transformation of technology based on competence level of recipients and donors

	Competence level of recipients			
		HIGH	MODERATE	LOW
Competence level of donors	HIGH	Very High transformation	Moderate transformation	Low transformation
	MODERATE	Very High transformation	Moderate transformation	Low transformation
	LOW	Moderate transformation	Low transformation	Very Low transformation

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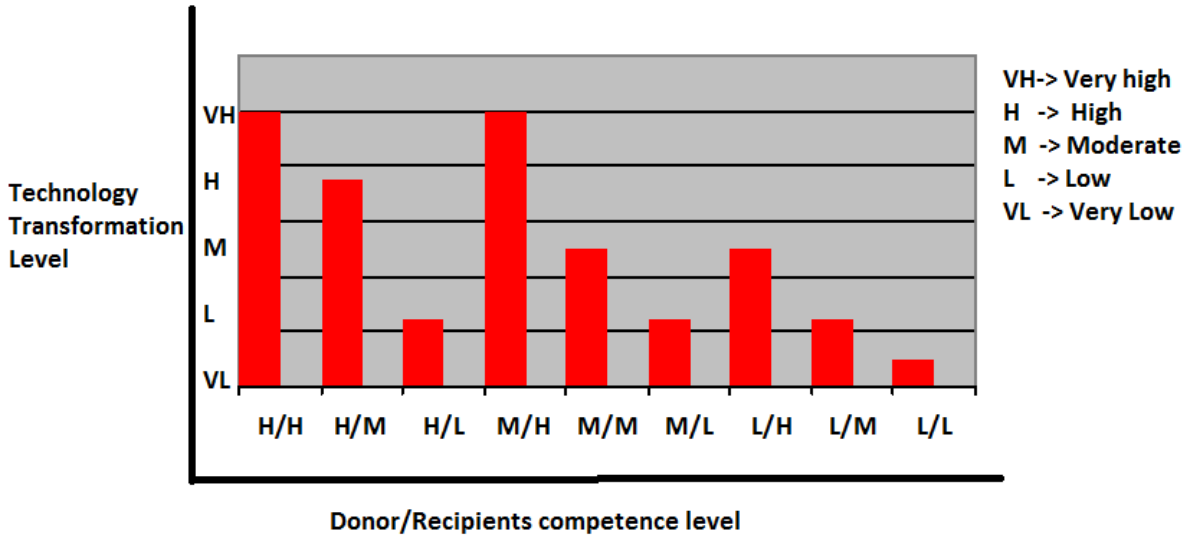

Figure 4.6.1: Technology transformation level based on competence level of donors/recipients

Moderate level of transformation was observed in case of low competence level of donors but with high competence level of recipients. Low transformation was observed in case of low competence level in donors and moderate competence level in recipients. Confusion in transformation was observed in case the competence level of recipients is low and donors' competence level is either medium or high. No transformation is carried out incase both donors and recipients are at low level of the competence. Table 4.6.2 and figure 4.6.1 show the donor - recipient transformation process based on their competence level.

4.7 Results of study 7: Roles of middle managers in development of absorptive capacity-identification of role conflict

4.7.1 Characteristics of sample

This study was conducted in four phases. The respondents in four phases consisted on both the genders with different qualification levels and different age groups. Pharmaceutical companies in Pakistan are male dominant therefore; proportionally more males were part of this study than females. At the same time, qualification and age groups were taken into consideration and specialists with more than 40 years covered major portion of data of this study. Table 4.7.1

describes different characteristics of sample collected in four phases of study. The data was described and analyzed using Thematic Analysis approach**.**

Table 4.7.1: characteristics of samples					
		Phases of study			
Characteristics of respondents		Phase 1 N= 41	Phase 2 N=52	Phase 3 N=44	Phase 4 N=24
Gender	Male	35	48	38	22
	Female	6	4	6	2
Qualification	Specialists	18	30	23	16
	Graduates	13	15	16	4
	undergraduates	10	7	5	4
Age	20-30 Ys	4	10	2	1
	31-40 Ys	12	12	5	3
	Above 40 Ys	25	30	37	20

4.7.2 Establishment of Codes

In phase 1 of this study, the roles of middle managers were explored by adopting six steps thematic analysis approach from Braun and Clark (2006) and Braun and Clark (2013). The views of the employees, middle managers and decision makers about the roles of middle managers were based on frequency of responses. Majority of the codes about middle managers' roles were recorded during first round of interviews. About 80 percent of the codes were established about the views of decision makers and in second round 12 percent codes regarding views of decision makers were established followed by remaining 8 percent in third round of interviews. The codes for roles of middle managers in the view point of middle managers themselves were also observed high in first round of study but percentage was low as compared to decision makers. In first round about 70 percent of codes were established and in second round 20 percent codes of views were established and in third round 10 percent of the codes were recorded. The majority of codes about perception of employees regarding roles of middle managers were also established

in first round of interviews like middle managers and decision makers. 78 percent codes were established in first round of interviews of employees followed by 15 and 7 percent in second and third round of interviews of employees. (See figure 4.7.1).

Figure 4.7.1: Percentage of codes established in three rounds of interviews

4.7.3 Common Roles of Middle Managers

The codes generated during the interviews were converted to the sub-themes and themes resultantly attributing to roles of middle managers in pharmaceutical companies of Pakistan. The roles indentified by at least 85 percent of each segment were included in the common roles. Figure 4.7.2 shows the aggregate of percentage of all the segments of respondents.

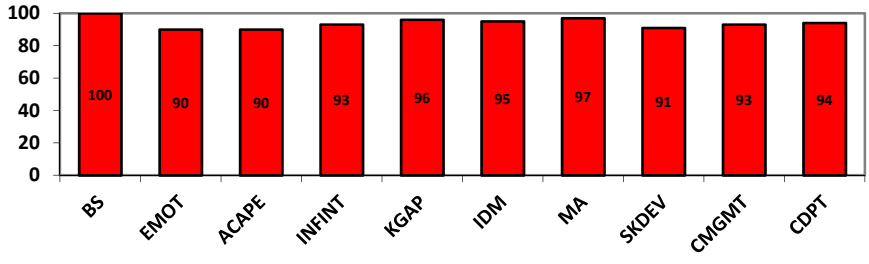

Figure 4.7.2: Common roles of middle managers perceived by respondents

Two resultant themes emerged from the codes; 1) Roles directly related to knowledge activities and 2) Roles indirectly related to knowledge activities, which are described as under:

4.7.3.1 Roles directly related to knowledge activities.

The role of boundary spanners (BS) was perceived by hundred per cent respondents. Boundary spanner role was perceived with different wordings but with convergent views. For example, employees viewed that middle managers being directly related to knowledge processes should take control of knowledge flow from upside down and downside up and from inside-out and outside-in of the organization.

Table 4.7.2: Common roles of middle managers perceived by DM,MM and EM

Main Category	**Specific Roles**
Directly related to Knowledge Activities	Boundary spanners (BS) Employee motivation to process knowledge activities (EMOT) Absorptive capacity process Evaluation (segregation of tacit and explicit knowledge flow processes) (ACAPE) Information Integration (INFINT) Identification of knowledge gaps in routine activities for new product and process development (KGAP)
Indirectly related to Knowledge Activities	Input to decision makers (IDM) Management of activities directly or indirectly attributing to Absorptive Capacity process (MA) Employee Skill development through cross training (SKDEV) Conflict Management related to knowledge activities(CMGMT) Coordination across departments (CDPT)

Middle managers viewed this role as the manager of knowledge related to all activities in absorptive capacity process thus hold position to manage the flow of knowledge among these activities. Decision makers viewed in terms or responsibilities of transferring knowledge from employees and decision makers to knowledge process activities directly thus holding a position where all activities of absorptive capacity converge. Employee motivation to process knowledge

activities (EMOT) was also perceived with high percentage by all respondents. However, this role was highly perceived by decision makers followed by employees. Middle managers though perceived this role relatively lower than employees and decision makers but still percentage was high with an aggregate percentage of 90 per cent.

Absorptive capacity process Evaluation (segregation of tacit and explicit knowledge flow processes, ACAPE) was invariably perceived high by decision makers and middle managers and relatively low by employees being the custodians of tacit knowledge but still rated high to evaluate explicit portion of knowledge. The evaluation of process was perceived with 90 per cent agreement among all employees accumulatively. Information Integration (INFINT) and Identification of knowledge gaps in routine activities for new product and process development (KGAP) were perceived very high with aggregate percentage of 93 and 96 per cent respectively by all three segments of sample population.

4.7.3.2 Roles indirectly related to knowledge activities

The roles, Input to decision makers (IDM) and Management of activities directly or indirectly attributing to Absorptive Capacity process (MA) by middle managers were perceived very high (95 and 97 per cent respectively) by all the segments of study population. However, Employee Skill development through cross training (SKDEV) was perceived comparatively low on the average by three categories as compared rest of the roles. Middle managers had the lowest scores regarding these roles followed by employees with next higher category and decision makers perceived this role of middle managers with very high percentage. On the average this role was perceived by 91 per cent of all the respondents.

The role of Conflict Management related to knowledge activities (CMGMT) and Coordination across departments (CDPT) were also perceived very high (93 and 94 per cent) by entire sample population. Table 4.7.2 shows the common roles of middle managers perceived by respondents.

The common roles were agreed upon by at least 85 percent of the entire population under study. Majority of the roles were perceived by more than 90 percent of each category.

4.7.4 Conflicting Roles of Middle Managers. The roles identified by all segments of target population but not mutually agreed to, by all were divided in three categories discussed as:

4.7.4.1 Operational Roles-perceived by decision makers (DM)

Process capability enhancement (PCE) was not agreed by Middle Managers; however, employees had full agreement with the decision makers in this role. Technological infrastructure Evaluation (TIE) was moderately agreed to, by middle managers and employees had very high views about this role.

Table 4.7.3: Conflicts among DM,MM and EMPL about roles of middle managers

	Perceived Reference Roles	**Extent of Agreement**		
		DM	**MM**	**EMP**
Operational Roles	Process capability enhancement (PCE)	-	L	**VH**
	Technological infrastructure Evaluation- (TIE)	-	M	**VH**
	Process modifications as per new requirements (PMOD)	-	M	H
	Process optimization (POPT)	-	M	**VH**
	Benchmarking (BM)	-	**VH**	L
Related to Control	Control on employees (ECON)	M	-	L
	Employees' discipline (EDIS)	L	-	L
	Performance Evaluation (PE)	M	-	M
	Mentors (MNT)	M	-	H
Related to Internal processes	Data management (DMG)	**VH**	M	-
	Tacit Knowledge and experience sharing(TKES)	**VH**	H	-
	On the job trainer (OJT)	**VH**	L	-
	Acquisition of latest techniques related to processes development (ATPD)	**VH**	M	-

Process modifications as per new requirements (PMOD) and Process optimization (POPT) were also moderately agreed to, by employees with high (H) and very high (VH) shades of agreement respectively. Conversely, middle managers fully agreed (VH) with the decision makers in role of Benchmarking (BM) while, employees had low (L) agreement with them.

4.7.4.2 Roles Related to Control – Perceived by Middle managers (MM)

Control on employees (ECON) was moderately agreed to, by decision makers and low by employees whereas, Employees' discipline (EDIS) was not agreed to (L), both by decision makers and employees. Role of Performance evaluation (PE) was also moderately agreed to, by both (employees and decision makers).Role as Mentors (MNT) was agreed to, with moderate and high shades of agreement.

4.7.4.3 Roles Related to Internal processes- Perceived by Employees (EMPL)

Decision makers fully agreed (VH) with all the roles of middle managers perceived by employees. However, middle managers agreed to the roles with lower shades. Data management (DMG) and Acquisition of latest techniques related to processes development (ATPD) were agreed to, by middle managers with moderate shade (M).Tacit Knowledge and experience sharing (TKES) was agreed with high shade, yet the middle managers did not agree with employees regarding the role "On the job trainer (OJT)". Table 4.7.3 shows the extent of agreement with roles of middle managers and is elaborated in the form of web diagram (see Figure 7, Anx, B).

4.8 Chapter Summary

This chapter has presented the results of studies conducted in this thesis work. The studies conducted included quantitative and qualitative approaches. First four studies consisted on quantitative and the next three referred to be qualitative portion. In study 1 and study 2 organizational mechanisms related to formalization, cross functional integration and job rotation were studied in relation to absorptive capacity and its components. The impact of organizational mechanisms was studied on absorptive capacity. In study 3 and study 4, the impact of human resource mechanisms related to instrumental ties, tacit knowledge sharing and affective commitment was Studies on absorptive capacity. In study 5 critical success factors were identified and study 6 focused on transformation process. In the last study roles of middle managers and their conflicts were identified. Results of studies 1 and 2 showed that organizational mechanisms related to formalization cross functional integration and job rotation had positive impact on absorptive capacity components (acquisition, assimilation, transformation and exploitation). However, job rotation was found to have weak relationship with absorptive capacity. In studies 3 and 4 it was found that affective commitment had a mediating affect in the relationships of on absorptive capacity components and instrumental ties. Tacit knowledge sharing was also observed as mediator in the relationship of instrumental ties and absorptive capacity components. Qualitative portion highlighted that identified critical factors, transformation process and middle managers' roles played important role in development of absorptive capacity. The resultant framework of absorptive capacity is shown in Figure 8(Anx-B)

CHAPTER-5

DISCUSSION AND ANALYSIS

5.0 Introduction

Over the past two decades scholars of research world in knowledge management domain have emphasized the importance Absorptive Capacity for the companies to grow in this competitive era. The companies with knowledge intensive strategy in the company seek new knowledge all the times. The dealing of this new knowledge inside the company requires Absorptive Capacity to be compatible with new processes. The Absorptive Capacity is directly dependent on the different mechanisms of organization. The purpose of this research was to find the contribution of two mechanisms found in the organization, organizational and human behavior mechanisms for the development of Absorptive Capacity. In this context, this study aimed to examine two broad research questions first, how do organizational mechanisms impact Absorptive Capacity and its components and second; research question aimed to examine how do human behavior mechanisms impact Absorptive Capacity and its components. I find in this study that tests of different hypotheses support the point of view that organizational mechanisms directly impact the Absorptive Capacity in its enhancement and human behavior mechanisms directly or indirectly impact Absorptive Capacity. Results indicate that organizational mechanisms and human behavior mechanisms in knowledge intensive companies do have distinct and significant role in development of Absorptive Capacity overall. This study tested different hypotheses regarding different antecedents related to organizational mechanisms and human behavior mechanisms in order to examine their impact on individual components of Absorptive Capacity. Total 35 hypotheses were tested in this study and majority of the results of hypotheses supported the theoretical grounds. Next two sections pertain to discussion and analysis of hypotheses relating to organizational and human behavior mechanisms.

5.1 Discussion and analysis about relationships between Organizational Mechanisms and Absorptive Capacity components.

In hypothesis 1, this study suggested that Cross Functional Integration will directly impact Potential Absorptive Capacity component Acquisition. Cross Functional Integration being strong

source of new knowledge exchange forces the employees to share their work experiences and professional skills with each other. This platform provides healthy environment for acquiring new knowledge and its Assimilation especially in knowledge intensive environment. The significant contribution of Cross Functional Integration in explaining the Acquisition component for enhancement of Absorptive Capacity indicate that Absorptive Capacity is dependent on employees helping behaviors to their team members to acquire new knowledge from external boundaries of organization. Hypothesis 2 suggested a positive impact of Cross Functional Integration on Assimilation component of Absorptive Capacity. As the knowledge acquired from outside the boundaries of organization to build its knowledge base requires a streamlined process of Absorptive Capacity. The knowledge after all is handled by employees and helping attitude of employees attributing to Cross Functional Integration. Mutual handling of knowledge especially the new knowledge from outside the boundaries of organization need to be skilled grouping of employees within organization to accumulate this new knowledge. Results of regression analysis support this hypothesis. Significance contribution in enhancing the potential Absorptive Capacity (Assimilation component) highlights the importance of Cross Functional Integration in building Absorptive Capacity in knowledge intensive environment. Speed, direction and intensity of new external knowledge are critical to Absorptive Capacity enhancement of any organization while dealing with novel domain (Zahra and George, 2002). The Cross Functional Integration may help in enhancing the Assimilation process of new knowledge through right direction and speed. Overall, Cross Functional Integration has positive impact on Potential Absorptive Capacity, however, the impact of Cross Functional Integration (INT) was observed higher on Assimilation than its impact on Acquisition component of potential Absorptive Capacity. This indicates that knowledge process (Absorptive Capacity) is strengthened through Assimilation as compared to Acquisition in regard to Cross Functional Integration (INT) as one of the antecedents. The knowledge intensive companies mainly focus on external knowledge because they need research and development for new product development and enhancement in existing designs. They rely on the new knowledge from other firms but the new knowledge acquired needs new pattern of knowledge process as existing knowledge pattern may be different from companies generating this R & D knowledge. The scattered knowledge and skills need to accumulate to one direction for effective Acquisition and Assimilation of new

knowledge forming part of Potential Absorptive Capacity. The results of regression analysis also support this theoretical view.

Hypothesis 3 was examined for the impact of Cross Functional Integration on Transformation component of Absorptive Capacity. Transformation being a part of knowledge process activity focusing on refinement of routines and practices with in organization. Mutual efforts in the form of Cross Functional Integration align the processes for increment in the knowledge base of firm and in turn for building Absorptive Capacity. Knowledge intensive companies are dependent on the external knowledge because of availability of latest knowledge outside their boundaries and its routine processes are required to be identified and realigned with new incoming knowledge. Employees in knowledge intensive companies share their experience and augment the knowledge activities. Regression analysis results show positive contribution of Cross Functional Integration in enhancement of Transformation process of Absorptive Capacity. Hypothesis 4 stating to have positive impact of Cross Functional Integration (INT) on Exploitation component of Realized Absorptive Capacity was examined through regression analysis. Exploitation is knowledge process where the new and old knowledge is merged to create new processes and competences of employees. It was argued in hypothesis that mutual sharing of experience and skills in the form of Cross Functional Integration helps the employees to interact with other employees within the organization and in turn impacts knowledge process activity directly. Knowledge process activities (Absorptive Capacity) require continuous interaction of employees with existing knowledge processes in knowledge intensive environment to upgrade old knowledge and create new knowledge (Exploitation component). Results of hypothesis 4 highlight the significance of Cross Functional Integration in the upgrading of knowledge base and enhance Absorptive Capacity of the organization.

Overall organizational mechanisms related to Cross Functional Integration have positive impact on Absorptive Capacity and its individual components. Handling of new knowledge especially in knowledge intensive environment is dependent on the process of integration for which there is need to change the knowledge structures on receiving new knowledge.

This study stated hypotheses regarding organizational mechanisms related to Formalization to have positive impact on Absorptive Capacity and its components. The hypotheses 5 through 8 regarding organizational mechanisms related to Formalization were aimed to test their impact on Acquisition, Assimilation, and Transformation and Exploitation components of Absorptive

Capacity. These hypotheses were based on the argument that Formalization leads the employees to perform the specific activities required for specific knowledge process. The knowledge intensive companies acquire new knowledge mostly from external boundaries in addition to relying on their own R & D efforts. Therefore, they have comparatively established procedures to deal with knowledge as far as Acquisition, Assimilation and application of new knowledge from external sources is concerned. These companies may require changing their knowledge structures and realigning them as per requirement of new knowledge. The Formalization was framed to have positive impact on Absorptive Capacity. Regression results show significant contribution of organizational mechanisms related to Formalization in building Absorptive Capacity. Most significant contribution of Formalization in building Absorptive Capacity was observed for Exploitation component. The most significant impact of Formalization on Exploitation component may be due to the reason that at Exploitation stage the old knowledge is upgraded and new knowledge is adapted by changing knowledge processes. To align old knowledge process with new requirement need to have specific Transformation process. A well comprehensive written document may augment this adaptation process. The hypothesis 8 shows strong positive relationship between Formalization and Exploitation. This is well aligned with theoretical argument of this relationship. Hypotheses 5 and 7 also support the argument made in chapter 2. The hypotheses were also based on the argument that knowledge intensive companies which acquire most of their knowledge from outside their boundaries may enhance their Absorptive Capacity (Acquisition and Transformation components) by well formulated written procedures to handle this knowledge. Formalization was observed to have positive and significant impact on these two components. However, the Formalization was also observed to have positive impact on Assimilation component of Absorptive Capacity but this contribution of Formalization in explaining the Assimilation was observed marginally significant. The impact was observed significant at border line 0.05 level of significance. The significance level may increase by increasing the sample size. However, for this study this hypothesis was taken as partially supported as a border line case. The other theoretical reasons are many which attribute to this marginally significant relationship between Formalization and Assimilation. One of the reasons may be that the new knowledge is assimilated in informal way or free environment instead of binding imposed by the written procedures. The written procedures may be helpful in Assimilation of highly contextualized environment and new knowledge is related to existing

knowledge with the company. In knowledge intensive environment the knowledge types keep on changing very fast therefore, employees may be allowed to capture this new knowledge at their own pace and style for company instead of written down procedures. This argument may rule out the argument of increasing sample size to enhance relationship of Formalization and Assimilation.

The organizational mechanisms related to Formalization provide us information that Acquisition, Transformation and Exploitation components of Absorptive Capacity are procedure related. This means that the written operating procedures to handle new knowledge from the outside boundaries of organization have positive impact on Absorptive Capacity except Assimilation for which Formalization has non- significant impact. Therefore, employees in knowledge intensive environment may be exposed openly to new knowledge acquired from outside boundaries of organization to assimilate this knowledge or some other mechanisms in the organization may be explored.

Hypotheses regarding organizational mechanisms related to Job Rotation were also examined. Job Rotation being a procedure to switch the employees between different jobs contributes to Absorptive Capacity through diverse experience. The rationale for the establishment of hypotheses regarding Job Rotation was based on the argument that employees by switching to different jobs gain more experience and contribute to develop Absorptive Capacity. The exposure to different jobs leads the employees to accumulate more diverse knowledge as compared to employees having fixed jobs in their environment. Hypotheses 9 through 12 regarding organizational mechanisms related to Job Rotation stating to have positive impact of Job Rotation on Absorptive Capacity were examined. Job Rotation was found to have positive relation with Acquisition component of Absorptive Capacity with significant contribution whereas, the impact on Assimilation on was positive but with less significance. Hypothesis 10 was partially supported. The Acquisition process for new knowledge in knowledge intensive companies need specialists of field with diverse knowledge base. The new external knowledge should be directional and requirement specific so that target to acquire appropriate knowledge may be achieved. Employees with switching jobs carry more experience and they may identify and extract the new external knowledge critical to their operations and such knowledge is appropriate for organization (Zahra and George, 2002).Based on this argument, hypothesis 10 was examined and impact of Job Rotation on Assimilation was found positive but with low

significance. This may be due to the reason that in knowledge intensive companies the knowledge flow is inward from outside boundaries of companies. Moreover, the frequency of knowledge flow is high due to scientific advancement and fast growing changes in medicines of every field. In this environment the Job Rotation may restrict the employees to gain in depth knowledge about specific technology and product which is most important for applying it to its operations. On the other hand Job Rotation may lead the employees to gain diverse knowledge but in general form and will be deprived off the in depth and quality knowledge due to non availability of time and fast growing requirement of contextualized knowledge. The Job Rotation may have strong and positive effect on development of Assimilation component if the contextualized knowledge. Job Rotation may impact Assimilation differently depending upon the type of knowledge to be acquired and assimilated in the company especially in knowledge intensive environment. Hypotheses 11 and 12 were concerning to organizational mechanisms related to Job Rotation with the argument to have positive impact on Absorptive Capacity components namely as Transformation and Exploitation.Hypothesis11 did not support. Hypothesis 11 was tested by using regression analysis. It was observed that organizational mechanisms related to Job Rotation and Transformation was weakly related to each other and even the relationship was observed highly non significant ($p > .4$). Weak and highly non significant result may be due the reason that Transformation need specific skills and direction as at this knowledge process phase new routines and practices are developed. Employees need to emphasize this phase of knowledge process and require concentrated efforts to develop new routines and practices for processing of new external knowledge. In knowledge intensive companies the knowledge is acquired from external sources periodically and routine practices are realigned with this new knowledge and employees switching to different jobs may not develop such routines for processing the new knowledge. Specific employees for specific knowledge process may serve this purpose. Relationship of Job Rotation with Exploitation was observed weak and marginally significant ($p =.06$). The weak and marginally significant result shows the contribution of Job Rotation towards Exploitation of knowledge obtained from outside the boundaries to its operations. Job Rotation may contribute with high significance by exploring more reasons attributing to this low significance contribution. One of the reasons may be that inflow of new knowledge is greater in knowledge intensive environment and time and intellectual resources may not handle this change because of switching to different jobs. By the

time already acquired knowledge is processed, the requirement of new knowledge is generated and it is acquired to fulfill this new requirement. In this situation the employees having frequent Job Rotations become out of sequence. Employees dealing with new knowledge at one time may be performing another job once the same kind of knowledge needs to acquire. Another dimension of this weak relationship may be that employees with rotation to different job as a compulsion lose interest in particular job and their performance reduces when employed on the same job again. The contribution of Job Rotation on Exploitation component of Realized Absorptive Capacity may be enhanced by restricting the rotation to specific and similar jobs or slightly different but within the same domain and context so that the reversion to same job again becomes easy. The argument that switching to different jobs impacts Exploitation component positively is partially supported but may impact significantly by taking other factors into consideration such as increasing sample size.

Overall the organizational mechanisms related to Formalization, Cross Functional Integration and Job Rotation impact Absorptive Capacity components with different contributions and significance levels. Organizational mechanisms related to certain aspects such as Job Rotation, need to be investigated further and be studied exploring different options for their contribution to build Absorptive Capacity in combination with other variables. Job Rotation in this study is shown to have weak relationship with Absorptive Capacity overall and its individual components. It is perhaps due to the reason that frequency of inflow of new knowledge is more than capacity of organization to assimilate it. Employees being engaged in routine knowledge activities are unable to work across jobs and therefore, contributing with constant figure to absorb new knowledge. Secondly, the employees in knowledge intensive companies have specific and specialized tasks and may not like to work across different tasks. Overall Organizational mechanisms are shown to have key contribution to develop Absorptive Capacity and it needs to be addressed by managers at all levels of management.

5.2 Discussion and analysis about relationships between Human Behavior Mechanisms and Absorptive Capacity components.

One of the research questions of this study was how do human behavior mechanisms impact the Absorptive Capacity in the organization in knowledge intensive environment. The results this study aimed to answer this research question through hypotheses testing about the relationship of human behavior mechanisms and Absorptive Capacity. The hypotheses generated in chapter 2

were tested empirically in four different studies in chapter 4. Overall the results of regression analysis supported majority of hypotheses which were generated on the basis of existing literature and thorough interviews with experts of fields in addition to observing employees behavior in the knowledge intensive environment.

This section discusses and analyzes the relationship of human behavior mechanisms related to Instrumental Ties, Affective Commitment and Tacit Knowledge Sharing. Hypotheses 13 through 35 were related to impact of human behavior mechanisms related to Instrumental Ties, Affective Commitment and Tacit Knowledge Sharing on components of Absorptive Capacity. Hypotheses 17, 13 and 18 stated positive relationship of Instrumental Ties with Affective Commitment, Acquisition component of Absorptive Capacity and Tacit Knowledge Sharing respectively. Hypotheses were based on the argument that behavior of employees may impact Absorptive Capacity directly or indirectly. The employees with particular behavior impact Acquisition process in a particular way and one behavior impacts other behavior in employees in different way. The significant relationship of Instrumental Ties with Affective Commitment and Tacit Knowledge Sharing (H17 and H18) shows that mutual understanding of employees with each other promotes the behaviors such emotional attachment with the organization and sharing their experiences with other employees in organization. In knowledge intensive companies the employees dealing with knowledge process activities are closely interlinked and know the solution of problem in routine activities. This bonding (Instrumental Ties) helps them to have affection with organization for which they are working and being close to each other they share their personal experiences and the knowledge related to knowledge process activities which is tacit in nature and can not be learned through formal means and procedures. It is argued that more strengthen the bonding working relationships among employees, more commitment to organization is found because organization provides such atmosphere to establish behaviors in employees. Significant contribution of Instrumental Ties in obtaining the knowledge from external boundaries shows the behavior of employees facilitating their network for knowledge Acquisition. This shows importance of directional support of employees among each other in the form of provision of resources both physical and intellectual in knowledge intensive environment.

Hypothesis 19 stated that employees with high emotional attachment (Affective Commitment) with organization in knowledge intensive environment lead to commit themselves to acquire

knowledge with high intensity from outside boundaries. The augment was based on behavior attitudes of employees in the organization. Highly significant relationship between Affective Commitment and Acquisition component of Absorptive Capacity in knowledge intensive companies (knowledge intensive environment) highlight the importance of behavior of employees while dealing with specialized knowledge. Hypothesis 23 suggested a positive impact of another behavioral aspect of employees (Tacit Knowledge Sharing) on Acquisition component of Absorptive Capacity. The hypothesis was based on importance of Tacit Knowledge Sharing for knowledge process activities. Research related to tacit knowledge highlights that tacit knowledge can not be easily communicated and shared knowledge among employees with interactions may make it convenient to transfer (Nonaka, 1994). Original work on Absorptive Capacity by Cohen and Levinthal (1990) also highlights the importance of Tacit Knowledge Sharing among employees for enhancement of absorptive especially the Acquisition component. The employees in knowledge intensive companies process new knowledge in consultation with each other and requirement of new knowledge to be acquired from outside the boundaries is generated. This relationship gives healthy input to decision makers at every stage about the behavioral aspects of employees. Hypothesis 28 was argued to have mediation effect of Affective Commitment in the relationship of Instrumental Ties and Acquisition component of Absorptive Capacity. Hypothesis 34 stated the mediation effect of Tacit Knowledge Sharing in the relationship of Instrumental Ties and Acquisition component of Absorptive Capacity. The argument was based on the transmission media between closeness of employees (Instrumental Ties) and their actions about knowledge process activity (Acquisition of new knowledge). As argued in chapter 2 about hypotheses 28 and 34 that employee's attitudes (Instrumental Ties) towards other employees is transmitted to impact Acquisition component of Absorptive Capacity through Affective Commitment and Tacit Knowledge Sharing. The significant mediation effect of Affective Commitment and Tacit Knowledge Sharing highlights that employee in knowledge intensive environment impact Absorptive Capacity, Acquisition component through their behaviors (Affective Commitment and Tacit Knowledge Sharing) with other employees. The behavioral mechanisms related to Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment were stated to have positive impact on Assimilation component of Absorptive Capacity. Hypotheses 14, 20 and 24 argued to have these relationships. The significant contribution of Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment in

explaining Assimilation component of Absorptive Capacity highlights the knowledge processes regarding new knowledge and its Assimilation is dependent upon behavior of employees. Hypothesis 27 stating to have positive impact of Tacit Knowledge Sharing on Affective Commitment was also supported which means that by sharing practical experiences with each other in the organization become emotionally attached with organization. Hypotheses 29 and 32 argued the Affective Commitment to have mediation effect in the relationship of Instrumental Ties and Assimilation and the relationship between Tacit Knowledge Sharing and Assimilation. In both cases, the significant mediation effect of Affective Commitment was found. Significant results of mediation effect of Affective Commitment highlight the importance of central role played by the behavior of employees in the process of knowledge activities for Assimilation of acquired knowledge.

Human behavior mechanisms related to Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment were stated to have positive effect on Transformation component of Absorptive Capacity. Hypotheses 15, 21 and 25 explain the relationship between variables. It was observed that all mechanisms were having positive impact on Transformation component of Absorptive Capacity thus contributing to Absorptive Capacity in positive way like other components of Absorptive Capacity. Similarly these mechanisms were stated to have positive impact on Exploitation component of Absorptive Capacity and were stated in hypotheses16, 26 and 22. The results of regression analysis also showed positive and significant contribution to explain Exploitation component of Absorptive Capacity. Results show significant contribution of human behavior mechanisms on Transformation and Exploitation components of Absorptive Capacity. Hypothesis 23 stated the mediation effect of Affective Commitment in the relationship of Instrumental Ties and Transformation component and hypothesis 33 stated the mediation effect of Affective Commitment in the relationship of Tacit Knowledge Sharing and Transformation component of Absorptive Capacity. Like other mediation effects, mediation effects of Affective Commitment in both relationships were also observed significant thus highlighting the importance of intermediate relations of human behavior mechanisms. The mediation effect (hypothesis 35) of Tacit Knowledge Sharing in the relationship of Instrumental Ties and Exploitation was significant. The mediation effect of Affective Commitment in the relationship of Instrumental Ties and Exploitation (hypothesis 31) was observed significant. This

means that Affective Commitment has indirect effect on the Exploitation component of Absorptive Capacity.

Human behavior mechanisms related to Instrumental Ties, Tacit Knowledge Sharing and Affective Commitment are shown to have positive contribution in explaining and building Absorptive Capacity in knowledge intensive environment. The knowledge intensive companies being receptors to the new knowledge in most cases rely on employees to process this new knowledge obtained from outside the boundaries of companies. Their behavior directly or indirectly impacts these knowledge process activities. Results of different studies highlight that employees providing physical and intellectual support (Instrumental Ties) to other employees directly and directly impact the Absorptive Capacity process in knowledge intensive companies. Instrumental Ties impact Absorptive Capacity components with different significant levels and intensities. Similarly, behavior of employees related to sharing of knowledge hidden in their minds and level of emotional attachment to their organization also impact Absorptive Capacity directly and indirectly. The results also highlight that mere exposure of new knowledge to routine processes of organization is not sufficient to enhance Absorptive Capacity but through specific behaviors of employees dealing with this knowledge. Results of studies also show that level of Affective Commitment to organization mediates in the relationship of other behaviors and Acquisition, Assimilation and Transformation components of Absorptive Capacity. However, the Affective Commitment of employees as a mediator was proved non significant in the relationship of Instrumental Ties and Exploitation component of Absorptive Capacity. This means that Affective Commitment and Instrumental Ties directly impact Exploitation component of Absorptive Capacity. Significant mediators reflect that knowledge process activity (Absorptive Capacity) is not simple process but it depends upon basic knowledge process elements i.e., employees of organization. The impact of employee's behavior on Absorptive Capacity is both direct and indirect. The indirect effect of behavior of employees on knowledge processes makes the knowledge processes fragile and more attention is required to execute theses processes.

5.3 Discussion about critical success factors, absorptive capacity process and Middle Manager's roles in development of absorptive capacity

The qualitative portion of the research work focused on the exploration of insights of internal mechanisms at micro level with the argument that Absorptive Capacity is not only the function

of human and organizational mechanisms but also the internal processes and micro level factors as well as roles of individual employees such as middle managers in whole process. The first qualitative explored the factors critical to develop Absorptive Capacity in pharmaceutical companies and found three themes of these critical success factors. Management related factors highlight the importance of top mangers though they are not directly involved in processing the knowledge but are required to be engaged continuously in absorptive capacity process one way or the other. This also highlights that mangers especially at the higher level are not responsible for resource provisioning but their involvement in knowledge process is equally important. However, prime responsibility lies with the employees being vital entity in processing new knowledge and at the same time they need support and necessary resources to process new knowledge and enhance Absorptive Capacity of the organization. The factors related to the process of absorptive capacity highlight the integrated approach of all the activities attributing the development of absorptive capacity. Overall, all these factors are inter meshed with each other and their interdependency indicated that absorptive capacity is not simply a unidirectional flow of activities but a complex network with relative importance of each factor at different levels. These critical factors need to be addressed with appropriate execution plans.

Absorptive capacity as a process is a function of donors and recipients (Cohen and Levinthal, 1990) intra firm as well as inter firm perspective. The mutual exchange of knowledge between donors and recipients results into creation of new knowledge as highlighted by Nonaka (1994) in his work of knowledge Creation Company. However, the importance of competence level of recipients is more critical as compared to the competence level of donors. The results of this study highlight that recipient in context to inter firm or intra firm be given due importance as the new knowledge absorption is going to take place at recipients' end. The resource provision at the recipients end may be extended in an appropriate way and activities may be aligned to expedite the process.

Middle managers play an important role in development of absorptive capacity as all the knowledge activities are routed through them as hub of all activities. In the original study of absorptive capacity, their role as boundary spanners has been emphasized (Cohen and Levinthal, 1990). They highlight middle managers (boundary spanners) as the entities obtaining information all the departments and sub department and generate requirements for them. The roles played by them are not simple and in pharmaceutical environment these roles even become more

complicated because of fast flow of information across departments. The common roles of middle managers agreed to, by the entire company highlight the smooth functioning of the major process of absorptive capacity. However, conflicting roles as perceived by different levels inside the company may deviate the goals badly affect absorptive capacity process. The pharmaceutical companies need to resolve the conflicts related to roles of middle managers as role ambiguity may lead to confusion.

Overall, absorptive capacity is dependent on intra organization factors and roles and processes inside the organization and may be emphasized in addition to focusing on core processes and mechanisms.

5.4 Chapter Summary

This chapter has explained the results of study and analysis of those results in the context of knowledge process activities named as Absorptive Capacity in this study. The Absorptive Capacity dealing the specialized knowledge obtained from the external boundaries of the organization plays an important role in enhancing knowledge base of company. It deals with Acquisition of new external knowledge form outside, its Assimilation and using it routine activities for enhancement of knowledge base of company. This chapter has analyzed the impact and significance of antecedents directly and indirectly impacting Absorptive Capacity. To be more precise the organizational mechanisms related to Formalization, Cross Functional Integration, Job Rotation and human behavior mechanisms related to Affective Commitment, Tacit Knowledge Sharing and Instrumental Ties have been discussed. This chapter has discussed the results of regression analysis highlighting the impact of antecedents related to organizational mechanisms and antecedents related to human behavior mechanisms. The results show that in organizational mechanisms related to Formalization and Cross Functional Integration directly impact Absorptive Capacity. Most of the multiple regression results were found significant, however, the results in different regression equations were found with varying numerical values highlighting the intensity of impact on different components of Absorptive Capacity. The relationship of organizational mechanisms related to Job Rotation with different components of Absorptive Capacity was found less significant in most of regression equations. Non significant results of association between Job Rotation and different components of Absorptive Capacity showed Job Rotation as less frequently followed practice in knowledge intensive environment.

This might be due to the reason that in knowledge intensive environment the inflow of knowledge is more frequent and on the other end the employees are deputed to fixed jobs and managers feel uncomfortable to switch employees from one job to another. The employees mostly perform critical and specialized jobs and it is not possible for them to switch to different jobs frequently.

Human behavior mechanisms have also been analyzed for their impact on different components of Absorptive Capacity. Most of the regression equations were found to have positive impact of human behavior mechanisms on Absorptive Capacity components. Some of human behavior mechanisms such as Affective Commitment were found to have mediation effect in the relationship of other human behavior mechanisms and Absorptive Capacity component. Instrumental Ties in most of the regression equations showed indirect significant impact of Absorptive Capacity components. The impact of human behavior mechanisms on Absorptive Capacity components showed the importance of employee's behavior in the process of newly targeted knowledge for organization. Direct and indirect impact of behavior of employees on components of Absorptive Capacity showed the importance of basic elements of specialized knowledge acquired for knowledge base of organization.

Overall the discussion and analysis of results showed that Absorptive Capacity in not only dependent on the routine and well established activities of organization i.e., organizational mechanisms but at the same time the human behavior mechanisms are equally important in the enhancement of Absorptive Capacity. It has been argued that human behavior mechanisms are even more important than organizational mechanisms as these (organizational mechanisms) are directly dependent on behavior of employees in the organization. Resultantly, Absorptive Capacity has been shown to be dependent upon both mechanisms and may be enhanced by emphasizing these mechanisms in balance in the context of knowledge intensive environment.

CHAPTER 6

CRITICAL REVIEW OF WORK

New developments in the present scenario have forced the companies to develop their knowledge bases to keep pace with the advancements. Companies have limited resources and skills to develop required component of knowledge inside their boundaries as there are fast changes in the design and up gradation of technologies both in products, services and knowledge bases. It is neither feasible nor advisable to adopt such models of producing all the knowledge inside the boundaries of the companies. Generally, companies focus on key processes and develop portion of knowledge inside the boundaries and rest is obtained from external sources. Even in the portion of own generated knowledge; there is continuous input from external sources for its up gradation. Conclusively, companies have to rely on external knowledge as a routine matter for processing every kind of knowledge. Alternatively, companies focus themselves to develop their absorptive capacity to manage the external new knowledge and upgrade the existing knowledge effectively. The new knowledge is easily assimilated if it is similar to the existing knowledge without any fundamental changes in the processes contrast to dissimilar knowledge that requires change both in infrastructure and absorptive capacity. This leads the decision makers to make tradeoff between utilization of resources available to them and outcomes of their companies in the form of knowledge infrastructures.

Companies strive to develop their absorptive capacity with their aim of cost effectiveness for which they need to develop effective knowledge infrastructures and align their processes with minimum distortions as there are number of parallel activities taking place in the companies. This study has incorporated the organizational and human behavior mechanisms in knowledge intensive environment; moreover, knowledge process, critical success factors and role of boundary spanners have also been identified. Thus, this study has deeply evaluated the intra organizational mechanisms related to employees for the development of absorptive capacity.

Generally, the knowledge processes are carried out in a smooth way in the companies following a predefined pattern (formalized way) with well connected communication patterns among employees. On introduction of new knowledge, employees and managers may deviate from this formalized procedure while addressing problems for assimilation of this new knowledge as

processing this new knowledge and documenting it in parallel may become difficult for them. On next acquisition of upgraded knowledge, this may affect absorptive capacity as employees involved in first acquisition process might have left the company; therefore, formalized record of previous acquisition becomes unavailable.

Absorptive capacity is a process that affects every department of knowledge intensive company positively or negatively based on participation in knowledge process. If the department is fully involved in absorptive capacity process, it eliminates all the possible negative affects and if it ignores new knowledge, the negative fallout may become permanent feature of the company. Dependency of any department on new knowledge determines the requirement of level of involvement in absorptive capacity process. However, every department in the company becomes secondary user even if the new knowledge is totally irrelevant to it. Absorptive capacity process requires all departments to be aware of new knowledge every time it is acquired inside the company. Management may devise a mechanism to ensure access of all employees and all departments to this new knowledge, however, access to irrelevant employees and departments may add cost and lead to wastage of resources.

In general, the access of new knowledge to all departments, employees and all stakeholders may ensure cross functional integration that significantly contributes in the development of absorptive capacity. Research literature on attitude and performance of employees argues that employees with initiative and access with flexibility to knowledge domains perform effectively in transformation process. They share commonalities and differences about the new knowledge and its evaluation and implementation in specific scenario thus generating new ideas to absorb knowledge effectively.

In routine, departments in knowledge intensive environment work in isolation for execution of tasks assigned to them by management and they might miss most important information relevant to them either due to their commitment or felt irrelevant by them without evaluation. This gap is filled by the middle manager in knowledge intensive companies in Pakistan who identify the requirements of all stake holders of new knowledge inside the organization. Middle managers, due to their pivotal position in the company, evaluate the knowledge gaps in key departments to acquire new knowledge for them. They may be effectively placed to manage knowledge

activities and disseminate this new knowledge to all concerned departments. Middle managers have to perform other important tasks such as resource management, addressing employee problems, problem solving in routine activities. Generally, they are specialists of one core domain and may become handicap in evaluating the processes and the acquisition knowledge not falling in their core domain. Moreover, they may focus on the activities attributing to control factors of employees and thus may become less productive for the company. They may come in conflict with the employees and decision makers about their roles in the company. Decision makers need to address role conflict issue of middle managers for effective development of absorptive capacity.

Knowledge intensive pharmaceutical companies in Pakistan focus on their core products and processes related to these products and employ their resources to perform absorptive capacity process cost effectively. Employees are trained on these special processes but they may leave after gaining experience and getting enriched offers from other companies. Knowledge culture of the company is new for new induction (employees) and they may take sufficient time to couple themselves with new settings. Companies may go for multitasking of existing employees and switch them to different tasks as an alternate to fill the gap. Results of this study highlight the weak and non significant contribution in the development of absorptive capacity framework which may refer to less professional dynamism in employees and unwillingness to perform multitasks. Decision makers may invest on their employees to motivate them to perform multi tasks for development of absorptive capacity.

Absorptive capacity is a sequential process based on interconnected activities ensuring effective assimilation of new knowledge in the companies. However, it may not be considered a simple flow of knowledge as new knowledge may contain tacit components that require more concentrated efforts to absorb it in the routine processes. Tacit knowledge may not be assimilated effectively till the time it is not shared and sharing of tacit knowledge depends on the extent of willingness of employees to share. Research literature argues that tacit knowledge may be absorbed through on the job training, direct involvement in knowledge activities, practical demonstration and sharing practical experiences. Employees may become afraid of losing their position and monopoly if they share unique tacit knowledge with the other employees; moreover,

they may think it (sharing of tacit knowledge) an extra burden as it involves dedication and time which they may avoid to give others.

Employees interact with one another in the company and establish different groups based on their common traits and they do communicate with other groups on need basis. Employees do share their practical experiences and tacit knowledge with the employees very close to them and sometimes sharing of personal experience with each other becomes a group activity which becomes a source of generation of new idea. Knowledge sharing through these instrumental ties may only be an individual or group activity that may not benefit the company in true sense. Decision makers need to establish a formal or informal platform for tacit and explicit knowledge sharing through on job training, seminars, discussion and problem solving sessions for absorptive capacity development of their company.

Absorptive capacity process revolves around employees who are real custodians of knowledge and processes in the companies as well as prime entities to receive newly acquired knowledge from external boundaries. Human behavior theories argue that employees are the vital as well as fragile components of the companies. The employees drive knowledge processes but are driven by the management. Development of absorptive capacity is dependent on the employees but the quality comes only through motivated and committed employees. The crafting of employees according to knowledge process is dependent on decision makers.

CHAPTER – 7

CONCLUSION AND RECOMMENDATIONS

7.0 Introduction

This chapter presents the conclusion of this thesis work carried out in different phases keeping in view the objectives and research questions of study. Answering to the main research question of study this study has adopted the mix method approach to answer the sub research questions and achieve research objectives. This work has conducted different sub studies and each study gives answer to different research questions through testing of hypotheses generated in literature review chapter and through interviews conducted in qualitative study. The impact of organizational mechanisms and human behavior mechanisms were observed on absorptive capacity in quantitative studies of this work. Impact of Knowledge process, critical success factors and roles of middle managers were investigated in qualitative portion of study. The results showed that organizational and human behavior mechanisms directly or indirectly contribute to develop absorptive capacity framework in knowledge intensive environment. Qualitative study showed that companies operating in knowledge intensive environment have the opportunity to exploit knowledge all the times as the inflow of knowledge is very fast and companies have to catch this flow all the times. Conclusively transformation process and middle managers' roles were observed as strong sources for the development of absorptive capacity.

7.1 Conclusions

This study intended to develop absorptive capacity framework in knowledge intensive environment in the alignment of main research question of study. This study was conducted to ascertain the impact of organizational and human behavior mechanisms on absorptive capacity along with finding insights of knowledge culture in the companies. This study conducted to answer sub questions for which mix method approach was adopted and selected the micro level variables with the intension to find the development of absorptive capacity itself. In research literature the absorptive capacity has been studied at macro level and generally its impact on other constructs has been studied. Volberda et al (2010) have taken into account the detailed discussion about this construct. They have criticized it as black box because actual concepts and

key aspects of the organization have not been discussed in the context of absorptive capacity. Theoretical development about this construct has been discussed with in organization starting from the original model suggested by Cohen and Levinthal (1990) and refinement of model such as Zahra and George (2002). They have suggested that intra organizational mechanisms be studied in the context of absorptive capacity. Despite recommendations and gaps identified, micro level variables have not been included in the studies in extant literature. Original model on absorptive capacity highlight the individual mechanisms consisting both on systems and employees have viewed as building blocks for the development of absorptive capacity of organization. This study therefore has considered intra organizational mechanisms both related to procedures and human behaviors. This study has considered formalization, cross functional integration and job rotation variables related to organizational mechanisms and affective commitment, tacit knowledge sharing and instrumental ties related to human behavior mechanisms in order to develop absorptive capacity framework in knowledge intensive environment.

The Absorptive Capacity has been discussed in the context of diverse knowledge frameworks ranging from organizational to joint ventures and inter-firm collaborations. In the same context impact of intra organizational mechanism related to formalization, cross functional integration and job rotation was tested on absorptive capacity. Formalization being procedural mechanism is directly related to acquisition component of absorptive capacity. This was viewed as the source of new knowledge acquisition because knowledge processed in systematic way may lead the employees to come across the gaps and needs about the new knowledge. It was hypothesized that formalization will have positive impact on recognition and acquisition of new knowledge form outside the boundaries of firms. Knowledge is assimilated by following formalized systems and it is transformed and exploited effectively by documentation. The hypotheses generated from existing literature related to formalization showed to have positive impact on absorptive capacity components. Results showed to have positive impact of formalization on absorptive capacity in knowledge intensive environment.

Cross functional integration was claimed to have positive impact on absorptive capacity components in knowledge intensive environment. In knowledge intensive environment the knowledge is acquired and processed with high speed and knowledge processing in isolation

may reduce the efficiency of the employees in processing this knowledge. The employees involving in knowledge process activities in pharmaceutical companies may contribute to recognize and assimilate any new knowledge required for their operations because of mutual discussion and interactions. On this theme cross functional was hypothesized to have positive impact on components of absorptive capacity. Empirical findings of the relationship between cross functional integration and absorptive capacity components supported these hypotheses related to cross functional integration and absorptive capacity components.

Job rotation was the third variable understudy in this work related to organizational mechanisms. Job rotation was hypothesized to have positive impact on absorptive capacity components. It was based on the argument that employees by rotation to different jobs gain more experience and become more knowledge able about different dimensions of their field. Employees with interaction to different jobs are able to identify the specific requirement of knowledge. Job rotation may lead them to assimilate complicated knowledge and similarly transformation of knowledge becomes easy. Combining old knowledge with newly assimilated knowledge for generation of new knowledge memory requires diverse experience and it has been argued in research literature that job rotation gives this diverse experience to employees in the organization. It was hypothesized that job rotation had positive impact on absorptive capacity components. Empirical results showed either weak or non-significant results in relation to absorptive capacity and job rotation thus not supporting hypotheses strongly. It may be due to that the management may not afford to employ their human resource to multiple dimensions as new knowledge is acquired frequently in knowledge intensive environment. The employees may become less efficient in dealing with this new knowledge. The other reason may be that management in knowledge intensive environment cannot afford to switch skilled (specialists) employees as they are designated to specific jobs. Rotation to different jobs would mean that employees to quit their specialties. There is need to explore more about this important variable in relation to absorptive capacity.

Overall majority of the hypotheses relating to organizational mechanisms with components of absorptive capacity were supported in knowledge intensive environment.

Absorptive capacity components were also studied in relation to human behavior mechanisms. As suggested by many studies including original study on absorptive capacity that there is more work needed to done on this construct in the context of micro level variables related to employees. This study have taken into account three aspects of human behavior mechanisms named as affective commitment, tacit knowledge sharing and instrumental ties. Research literature highlighted the importance of human behavior aspects in relation to absorptive capacity. It has been argued in research literature that employees with high affective commitment perform better as compared to employees working as a routine matter. The relationship of employees with each other and showing a helping attitude towards problem solving may contribute to develop absorptive capacity in the organization as suggested in many studies in research literature. Original work on absorptive capacity showed much importance on knowledge sharing and subsequent studies showed particularly tacit knowledge sharing in knowledge process activities of organization. The extant literature on the acquisition and assimilation of new knowledge which is tacit in nature show and that the process of knowledge is possible only when it is shared. This study has therefore considered tacit knowledge sharing as one of the variables to study in the context of human behavior mechanisms for the development of absorptive capacity in knowledge intensive environment.

Research literature shows that instrumental ties of employees impact positively for the development of absorptive capacity. The employees with close cooperation in knowledge process activities with each other by working in teams and augmenting with each other enhances absorptive capacity. Knowledge is processed effectively as highlighted by many studies in research. At the same time research literature shows that without loyalty to organization these knowledge processes may not be performed. This study hypothesized the affective commitment as mediator in the relationship of instrumental ties and absorptive capacity components. Hypotheses related to tacit knowledge sharing as mediator in the relationship of instrumental ties and absorptive capacity components were also framed in the light of review of research literature. Empirical tests of multiple regression analysis showed that affective commitment had a mediation effect in the relationship of instrumental ties and absorptive capacity components. Similarly, empirical results also showed that instrumental ties transmitted their effect on absorptive capacity components through tacit knowledge sharing.

Critical success factors related to employees, management and process also showed positive contribution in the development of absorptive capacity. The identified factors were found to attribute in processing knowledge activities among different departments. Results showed that knowledge intensive pharmaceutical companies on the average had knowledge process capabilities for effective development of absorptive capacity. Employees focused on provision of resources and incentive system for employees from management as critical success factors. Other related critical success factors included technology and infrastructure system in the companies. Cultural gap between employees and management showed that mostly the employees are aligned with management in relation to knowledge process activities. However, employees and management had certain commonalities and conflicts which need to be addressed by decision makers. Transformation of knowledge through joint efforts of R&D and manufacturing was also found effective in the development of absorptive capacity framework in pharmaceutical companies.

7.2 Contributions

This thesis work has many contributions the body of knowledge attributing to both theory and practices. The contributions are as follows:-

a. Despite huge literature on Absorptive Capacity in extant literature this construct is still in development phase. This has been studied in different perspectives and considered macro level antecedents of organization and insights in relation to intra organizational and human behavior mechanisms are still be explores as highlighted by Volberda et al (2010). This study thus contributes to the theoretical insights to this emerging construct in relation to organizational mechanisms of organization and behavior of employees in processing the knowledge activities for the development of absorptive capacity at micro level.

b. This study provides a healthy input to managers directly involved in making execution of knowledge processes from employees at different levels. The absorptive capacity deals with the capabilities of employees and organization related to targeted knowledge critical to its operations which are different from traditional processes to deal with knowledge. In this way absorptive capacity requires specific processes in the organization. This study

highlights the organizational mechanisms which have positive impact on knowledge process activities in knowledge intensive environment. The inflow of knowledge in knowledge intensive environment is fast and managerial hierarchy needs to take decision at the same pace. The empirical results of this study highlight specific mechanisms which are critical to different components of absorptive capacity thus giving an evidenced input to decision makers.

c. Employees in absorptive capacity context may behave differently from traditional knowledge process activities because in knowledge intensive environment targeted knowledge is dealt. Employees being basic building blocks in developing absorptive capacity (Cohen and Levinthal, 1990) are important in processing knowledge activities especially in generation and development of organizational memory. This leads to conclude that employees' behavior is critical to absorptive capacity. Managers at all levels should know the link between their behavior and absorptive capacity components. The empirical results of this study suggest employment pattern required for absorptive capacity to managers and decision makers. This leads mangers to decide right person for right job in relation to absorptive capacity development in knowledge intensive environment.

d. This study gives detailed analysis of organizational and human behavior mechanisms along with knowledge transformation process and provides evidence based input to decision makers in pharmaceutical companies to reshape their knowledge management strategies.

e. This study unfolded the micro level antecedents for development of absorptive capacity framework thus contributing to theory of absorptive capacity in the context of intra firm antecedents.

7.3 Limitations

This study has incorporated knowledge intensive companies only as a study population and collected data from pharmaceutical companies of Pakistan. Traditional companies, less developed companies and pure R & D companies having different knowledge structures may

behave differently if study with same antecedents is conducted in these companies. The study conducted only in intra firm context and incorporated only limited antecedents related to human and organizational mechanisms. This study has only explored transformation process in pharmaceutical companies which may differ in different companies which are less knowledge intensive in nature.

7.4 Recommendations and future work

This study has been conducted in pharmaceutical companies and explored intra company factors for the development of absorptive capacity framework. Based on the gaps felt during conduct of work, following is recommended for future work:-

a. Micro level antecedents related to stake holders other than employees may be explored in future work.

b. This study focused on transformation process only, future studies may be conducted on other processes (acquisition, assimilation and exploitation).

c. This study collected data from pharmaceutical companies of Pakistan; the mirror studies may be conducted by collecting data from other knowledge intensive companies such as chemical, telecommunication and biotech industries.

d. The mirror studied may be conducted in less knowledge intensive and non R&D companies to evaluate and refine the absorptive capacity theory.

ANX—A

Table 1: Summary of KMO and Bartlett's Test of individual variables				
Variables of Test	KMO	Bartlett's test of sphericity		
		Approx chi square	df	Sig
All	.837	3490.765	231	.000
ACQ	.590	203.097	10	.000
ASM	.529	113.924	3	.000
FORM	.872	1080.009	15	.000
INT	.856	954.116	15	.000
INST	.580	155.727	1	.000

Table 2 : Communalities of variables		
	Initial	**Extraction**
ACQ1	1.000	.602
ACQ2	1.000	.569
ACQ3	1.000	.688
ACQ4	1.000	.458
ACQ5	1.000	.493
ACQ6	1.000	.716
ASM1	1.000	.654
AS2	1.000	.653
ASM3	1.000	.631
FORM1	1.000	.508
FORM2	1.000	.667

FORM3	1.000	.672
FORM4	1.000	.735
FORM5	1.000	.653
FORM6	1.000	.504
INT1	1.000	.562
INT2	1.000	.670
INT3	1.000	.583
INT4	1.000	.575
INT5	1.000	.672
INT6	1.000	.601
JR1	1.000	.772
JR2	1.000	.748

Table 3 : Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
ACQ1	.157	.099	.076	-.178	**.716**	-.033
ACQ2	.164	.003	.166	.133	.099	.698
ACQ3	.249	.052	.247	-.204	**.721**	-.023
ACQ4	-.084	.211	.023	.245	.082	.136
ACQ5	-.029	.119	.659	.162	**.572**	.102
ACQ6	.047	.050	.005	-.044	.167	.825
ASM1	.002	-.008	-.205	.182	.716	.256

AS2	.089	.165	**.784**	.036	-.014	-.031
ASM3	.098	.039	**.739**	.121	-.186	.157
FORM1	**.615**	.302	.147	.065	.102	-.055
FORM2	**.762**	.198	.200	.017	.015	-.074
FORM3	**.779**	.249	.020	-.045	.030	.017
FORM4	**.827**	.160	-.012	.012	-.024	.157
FORM5	**.724**	.265	.062	.008	.017	.235
FORM6	**.629**	.314	.038	.008	.052	.079
INT1	.276	**.674**	.036	.085	.033	.147
INT2	.156	**.779**	.094	-.006	.061	.163
INT3	.271	**.647**	.171	.179	.139	-.102
INT4	.315	**.664**	-.045	.159	-.080	-.030
INT5	.268	**.745**	.198	.035	.066	-.018
INT6	.308	**.639**	.234	-.097	.153	-.102
JR1	.115	.052	.111	**.849**	.122	-.092
JR2	-.069	.146	.031	**.827**	.047	.187

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

Table 4: Diagnostics of regression models for testing assumptions						
Model	Unstandardized Coefficients		Standardized Coefficients	**Durbin Watson statistic**	**Co linearity Statistics**	
	B	Std. Error	Beta		**Tolerance**	**VIF**
ACQ as dependent variable						
1 (Constant)	3.307	.178				
1 INT	.353	.049	.336		1.000	1.00
(Constant)	3.095	.190				
2 INT	.239	.062	.227		.609	1.641
FORM	.167	.057	.173	1.924	.609	1.641
(Constant)	2.880	.206				
3 INT	.204	.063	.194		.582	1.717
3 FORM	.178	.056	.185		.606	1.650
JR	.092	.035	.122		.950	1.052
ASM as dependent variable						
1 (Constant)	3.459	.260				
INT	.415	.071	.275		1.000	1.000
2 (Constant)	3.286	.281				
INT	.321	.091	.213		.609	1.641
FORM	.136	.084	.099	2.05	.609	1.641
3 (Constant)	3.071	.305				
INT	.287	.093	.190		.582	1.717
FORM	.148	.084	.107		.606	1.650
JR	.092	.052	.085		.950	1.052

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Table 5: Summary of KMO and Bartlett's Test of individual variables				
Variables of Test	KMO	Bartlett's test of sphericity		
		chi square	df	Sig
All	.897	3590.765	231	.000
TFM	.670	213.231	10	.000
EXPL	.529	123.127	3	.000
FORM	.872	1080.009	15	.000
INT	.856	954.116	15	.000
JR	.580	155.727	1	.000

Table 6 : Communalities

	Initial	Extraction
TFM1	1.000	.508
TFM2	1.000	.531
TFM3	1.000	.544
TFM4	1.000	.739
TFM5	1.000	.565
TFM6	1.000	.636
EXPL1	1.000	.555
EXPL2	1.000	.510
EXPL3	1.000	.595
EXPL4	1.000	.638
EXPL5	1.000	.683
EXPL6	1.000	.631
FORM1	1.000	.506
FORM2	1.000	.668
FORM3	1.000	.663
FORM4	1.000	.737
FORM5	1.000	.655
FORM6	1.000	.667
INT1	1.000	.583
INT2	1.000	.620
INT3	1.000	.616
INT4	1.000	.517
INT5	1.000	.720
INT6	1.000	.604
JR1	1.000	.787
JR2	1.000	.786

Extraction Method: Principal Component Analysis.

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Table 7 : Rotated Component Matrix[a]

	Component						
	1	2	3	4	5	6	7
TFM1	.006	.189	**.680**	.038	.095	.006	-.019
TFM2	.076	.086	**.699**	.001	.121	-.017	.121
TFM3	.132	.100	**.687**	.039	.037	.193	-.069
TFM4	-.135	-.030	**-.088**	-.026	.218	.069	-.812
TFM5	.249	-.109	**.683**	.023	.001	.104	.118
TFM6	.071	.161	**.743**	-.012	-.187	.134	-.003
EXPL1	.107	.206	.297	.152	.544	**.293**	.191
EXPL2	-.142	.145	-.153	-.132	.632	**.115**	-.122
EXPL3	.102	.192	.383	.057	.379	**.334**	.377
EXPL4	-.034	.265	.240	-.146	.056	**.687**	-.108
EXPL5	-.011	-.022	.109	-.126	.737	**-.278**	-.186
EXPL6	.165	-.143	.135	.194	-.036	**.723**	.053
FORM1	.400	**.552**	.141	.059	.051	.109	-.061
FORM2	.254	**.740**	.218	-.004	.009	.047	-.070
FORM3	.316	**.731**	.126	-.056	.050	.063	-.059
FORM4	.183	**.821**	.078	.013	.070	-.051	.125
FORM5	.279	**.737**	.055	.034	.128	-.009	.111
FORM6	.321	**.569**	.021	.018	.161	.115	.448
INT1	**.635**	.292	-.005	.047	-.163	.135	.217
INT2	**.751**	.170	.035	.017	-.009	.029	.155
INT3	**.694**	.215	.213	.175	-.076	.058	-.055
INT4	**.621**	.300	-.007	.118	-.015	.090	.135
INT5	**.794**	.212	.188	.055	.067	-.010	-.031
INT6	**.713**	.227	.198	-.059	.029	-.034	.013
JR1	.067	.106	.098	**.864**	-.074	.002	-.100
JR2	.120	-.081	-.030	**.856**	-.061	.071	.150

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 7 iterations.

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Table 8: Diagnostics of regression models for assumtions							
Model		Unstandardized Coefficients		Standardized Coefficients	**Durbin Watson statistic**	**Co linearity Statistics**	
		B	Std. Error	Beta		**Tolerance**	**VIF**
TFM as dependent variable							
1	(Constant)	3.483	.213		1.924		
	INT	.402	.058	.317		1.000	1.000
2	(Constant)	3.221	.228				
	INT	.258	.074	.204		.597	1.674
	FORM	.209	.068	.179		.597	1.674
3	(Constant)	3.138	.251				
	INT	.247	.076	.195		.574	1.741
	FORM	.213	.069	.182		.594	1.684
	JR	.034	.043	.037		.958	1.044
EXPL as dependent variable							
1	(Constant)	3.804	.202		1.905		
	INT	.353	.055	.295		1.000	1.000
2	(Constant)	3.382	.212				
	INT	.121	.069	.102		.597	1.674
	FORM	.336	.064	.306		.597	1.674
3	(Constant)	3.201	.232				
	INT	.095	.070	.080		.574	1.741
	FORM	.345	.064	.314		.594	1.684
	JR	.075	.040	.086		.958	1.044

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Table 9: Summary of KMO AND Bartlett's Test of individual variables				
Variables of Test	KMO	Bartlett's test of sphericity		
		Approx chi square	df	Sig
All	.782	2984.806	276	.000
ACQ	.596	100.792	6	.000
ASM	.531	118.514	3	.000
AFC	.587	382.866	21	.000
TKS	.787	599.738	6	.000
INST	.796	533.908	6	.000

TABLE 10: Communalities of items of variables		
	Initial	Extraction
ACQ1	1.000	.782
ACQ2	1.000	.551
ACQ3	1.000	.624
ACQ4	1.000	.428
ACQ5	1.000	.568
ACQ6	1.000	.796
ASM1	1.000	.582
ASM2	1.000	.626
ASM3	1.000	.588
AFC1	1.000	.576
AFC2	1.000	.462
AFC3	1.000	.397
AFC4	1.000	.554
AFC5	1.000	.698
AFC6	1.000	.643
AFC7	1.000	.681
TKS1	1.000	.735
TKS2	1.000	.771

TKS3	1.000	.699
TKS4	1.000	.590
INST1	1.000	.575
INST2	1.000	.651
INST3	1.000	.677
INST4	1.000	.653

Extraction Method: Principal Component Analysis.

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Table 12: Diagnostics of regression models for assumtions

Model		Unstandardized Coefficients		Standardized Coefficients	t	**Durbin watson statistic**	**Collinearity Statistics**	
		B	Std. Error	Beta			**Tolerance**	**VIF**
ACQ as Dependent variable								
1	(Constant)	2.867	.289		9.910	1.931		
	INST	.118	.056	.104	2.127		.962	1.040
	AFC	.268	.049	.268	5.505		.962	1.040
1	(Constant)	3.736	.239		15.631	1.860		
	INST	.082	.071	.072	1.152		.626	1.596
	TKS	.156	.071	.138	2.215		.626	1.596
ASM as Dependent variable								
1	(Constant)	1.981	.332		5.957	**1.765**		
	INST	.075	.064	.054	1.179		**.962**	**1.040**
	AFC	.544	.056	.442	9.725		**.962**	**1.040**
1	(Constant)	2.097	.334		6.271	**1.746**		
	AFC	.551	.056	.449	9.911		**.974**	**1.027**
	TKS	.035	.063	.025	.555		**.974**	**1.027**

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Table 13: Summary of KMO AND Bartlett's Test of individual variables				
Variables of Test	KMO	Bartlett's test of sphericity		
		Approx chi square	df	Sig
All	.812	3204.552	351	.000
TFM	.803	462.571	15	.000
EXPL	.702	427.109	15	.000
AFC	.588	347.847	21	.000
TKS	.791	601.865	6	.000
INST	.800	529.831	6	.000

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Table 14: communalities of variables		
	Initial	Extraction
TFM1	1.000	.470
TFM2	1.000	.517
TFM3	1.000	.600
TFM4	1.000	.275
TFM5	1.000	.529
TFM6	1.000	.669
EXPL1	1.000	.493
EXPL2	1.000	.623
EXPL3	1.000	.516
EXPL4	1.000	.438
EXPL5	1.000	.562
EXPL6	1.000	.542

AFC1	1.000	.639
AFC2	1.000	.496
AFC3	1.000	.462
AFC4	1.000	.730
AFC5	1.000	.668
AFC6	1.000	.675
AFC7	1.000	.709
TKS1	1.000	.740
TKS2	1.000	.732
TKS3	1.000	.694
TKS4	1.000	.615
INST1	1.000	.605
INST2	1.000	.669
INST3	1.000	.665
INST4	1.000	.612

Extraction Method: Principal Component Analysis.

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Table 15 : Rotated Component Matrix[a]

	Component						
	1	2	3	4	5	6	7
TFM1	.046	.639	.173	-.026	.117	.123	-.023
TFM2	.003	.688	.112	.114	.083	.095	.050
TFM3	.006	.718	.139	.121	.175	-.099	-.100
TFM4	-.017	-.143	.191	-.226	-.154	.297	-.233
TFM5	.063	.687	-.064	.033	.164	-.038	.139
TFM6	.132	.781	-.023	-.170	.007	-.087	.066
EXPL1	.105	.305	.575	.186	.151	-.017	.015
EXPL2	.074	-.098	.752	-.100	-.115	.130	-.044
EXPL3	.056	.358	.529	.121	.244	.103	.141
EXPL4	.092	.236	.576	.055	.028	-.178	.082
EXPL5	.010	-.061	.716	.100	.007	.126	-.143
EXPL6	.090	.076	.448	-.140	.298	-.156	.442
AFC1	.116	.206	.048	-.082	.721	.135	.190
AFC2	.361	.222	-.031	-.074	.441	-.006	.341
AFC3	-.001	.175	.058	.016	.642	.124	.011
AFC4	.043	-.027	.038	-.170	.003	.047	-.834
AFC5	-.119	-.011	.020	.020	-.002	.802	-.097
AFC6	-.064	.060	.056	.175	.699	-.334	-.182
AFC7	.039	.082	.034	.014	.099	.830	.029
TKS1	.530	.118	.090	.653	-.001	.090	-.060
TKS2	.193	-.118	.078	.810	.005	-.109	.086
TKS3	.532	.133	.056	.617	-.015	.066	.073
TKS4	.521	.135	.135	.516	.071	.061	.179
INST1	.735	.092	.008	.205	.015	-.101	-.061
INST2	.804	.025	.077	.098	.047	-.051	-.038
INST3	.799	.052	.110	.092	.052	-.015	.011
INST4	.772	-.021	.040	.093	.011	.008	.066

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 6 iterations.

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Table 16: Diagnostics of regression models for assumtions								
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Durbin watson statistic**	**Collinearity Statistics**	
		B	**Std. Error**	**Beta**			**Tolerance**	**VIF**
TFM as dependent variable								
1	**(Constant)**	**2.673**	**.294**		**9.087**	**1.939**		
	INST	**.071**	**.056**	**.061**	**1.263**		**.966**	**1.035**
	AFC	**.403**	**.049**	**.391**	**8.150**		**.966**	**1.035**
1	**(Constant)**	**2.562**	**.294**		**8.717**	**1.911**		
	INST	**.400**	**.049**	**.388**	**8.145**		**.976**	**1.025**
	TKS	**.106**	**.055**	**.092**	**1.924**		**.976**	**1.025**
EXPL as dependent variable								
1	**(Constant)**	**3.956**	**.249**		**15.899**	**1.730**		
	TKS	**.225**	**.073**	**.193**	**3.064**		**.626**	**1.597**
	INST	**.113**	**.074**	**.096**	**1.522**		**.626**	**1.597**
1	**(Constant)**	**2.840**	**.300**		**9.476**	**1.778**		
	INST	**.179**	**.057**	**.152**	**3.154**		**.966**	**1.035**
	AFC	**.347**	**.050**	**.333**	**6.890**		**.966**	**1.035**

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Table 17 : SPSS output of boot starpping formediation testing of Affective Commitment in the relationship of Instrumental Ties and acquisition component of absorptive capacity

Dependent, Independent, and Proposed Mediator Variables:
DV = ACQ
IV = INST
MEDS = AFC
Sample size
401

IV to Mediators (a paths)

	Coeff	se	t	p
AFC	.2229	.0561	3.9741	.0001

Direct Effects of Mediators on DV (b paths)

	Coeff	se	t	p
AFC	.2677	.0486	5.5054	.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
INST	.1778	.0564	3.1507	.0018

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
INST	.1182	.0555	2.1273	.0340

Model Summary for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.0933	.0888	20.4827	2.0000	398.0000	.0000

****

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.0597	.0600	.0003	.0214
AFC	.0597	.0600	.0003	.0214

Bias Corrected Confidence Intervals

	Lower	Upper
TOTAL	.0260	.1098
AFC	.0260	.1098

****

Level of Confidence for Confidence Intervals:
95
Number of Bootstrap Resamples:
1000

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Table 18 : SPSS output of boot starpping for mediation testing of Tacit Knowledge Sharing in the relationship of Instrumental ties and acquisition component of absorptive capacity

Dependent, Independent, and Proposed Mediator Variables:
DV = ACQ
IV = INST
MEDS = TKS
Sample size
401

IV to Mediators (a paths)

	Coeff	se	t	p
TKS	.6152	.0399	15.4242	.0000

Direct Effects of Mediators on DV (b paths)

	Coeff	se	t	p
TKS	.1562	.0705	2.2151	.0273

Total Effect of IV on DV (c path)

	Coeff	se	t	p
INST	.1778	.0564	3.1507	.0018

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
INST	.0818	.0710	1.1521	.2500

Model Summary for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.0362	.0313	7.4653	2.0000	398.0000	.0007

****

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.0961	.0966	.0005	.0532
TKS	.0961	.0966	.0005	.0532

Bias Corrected Confidence Intervals

	Lower	Upper
TOTAL	-.0089	.2065
TKS	-.0089	.2065

****

Level of Confidence for Confidence Intervals:
95
Number of Bootstrap Resamples:
1000

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Table 19 : SPSS output of boot starpping for mediation testing of Affective Commitment in the relationship of Instrumental ties and Assimilation component of Absorptive Capacity

```
Dependent, Independent, and Proposed Mediator Variables:
DV =   ASM
IV =   INST
MEDS = AFC

Sample size
      401

IV to Mediators (a paths)
         Coeff      se       t           p
AFC    .2229    .0561   3.9741    .0001

Direct Effects of Mediators on DV (b paths)
          Coeff      se       t         p
AFC    .5436    .0559   9.7247    .0000

Total Effect of IV on DV (c path)
          Coeff      se       t         p
INST    .1964    .0696   2.8233    .0050

Direct Effect of IV on DV (c' path)
           Coeff      se       t         p
INST    .0753    .0638   1.1791    .2391

Model Summary for DV Model
     R-sq    Adj R-sq       F      df1      df2              p
   .2078    .2038   52.2056    2.0000  398.0000    .0000

**************************************************************

       BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)
           Data      Boot     Bias      SE
TOTAL    .1212    .1227    .0016    .0338
AFC       .1212    .1227    .0016    .0338

Bias Corrected Confidence Intervals
       Lower     Upper
TOTAL    .0612    .1987
AFC      .0612    .1987
**************************************************************
Level of Confidence for Confidence Intervals:
 95
Number of Bootstrap Resamples:
 1000
```

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Table 20 : SPSS output of boot starpping for mediation testing of Affective Commitment in the relationship of Tacit Knoweldge Sharing and Assimkilation component of Absorptive Capacity

Dependent, Independent, and Proposed Mediator Variables:
DV = ASM
IV = TKS
MEDS = AFC

Sample size
401

IV to Mediators (a paths)

	Coeff	se	t	p
AFC	.1845	.0561	3.2924	.0011

Direct Effects of Mediators on DV (b paths)

	Coeff	se	t	p
AFC	.5514	.0556	9.9110	.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
TKS	.1368	.0695	1.9691	.0496

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
TKS	.0350	.0631	.5549	.5793

Model Summary for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.2057	.2017	51.5249	2.0000	398.0000	.0000

****
BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.1018	.1017	.0000	.0309
AFC	.1018	.1017	.0000	.0309

Bias Corrected Confidence Intervals

	Lower	Upper
TOTAL	.0452	.1743
AFC	.0452	.1743

****
Level of Confidence for Confidence Intervals:
95
Number of Bootstrap Resamples:
1000

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Table 21 : SPSS output of boot starpping for mediation testing of Affective Commitment in the relationship of Instrumental Ties and Transfrmation component of absorptive capacity

Dependent, Independent, and Proposed Mediator Variables:
DV = TFM
IV = INST
MEDS = AFC
Sample size
379

IV to Mediators (a paths)

	Coeff	se	t	p
AFC	.2074	.0571	3.6311	.0003

Direct Effects of Mediators on DV (b paths)

	Coeff	se	t	p
AFC	.4033	.0495	8.1497	.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
INST	.1542	.0595	2.5930	.0099

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
INST	.0705	.0558	1.2630	.2074

Model Summary for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.1650	.1606	37.1537	2.0000	376.0000	.0000

****
BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.0837	.0845	.0008	.0262
AFC	.0837	.0845	.0008	.0262

Bias Corrected Confidence Intervals

	Lower	Upper
TOTAL	.0414	.1474
AFC	.0414	.1474

****
Level of Confidence for Confidence Intervals:
95
Number of Bootstrap Resamples:
1000

.

Table 22 : SPSS output of boot starpping for mediation testing of Affective Commitment in the relationship of Tacit Knowledge Sharing and Transfrmation component of absorptive capacity

Dependent, Independent, and Proposed Mediator Variables:
DV = TFM
IV = TKS
MEDS = AFC

Sample size
379

IV to Mediators (a paths)

	Coeff	se	t	p
AFC	.1749	.0569	3.0730	.0023

Direct Effects of Mediators on DV (b paths)

	Coeff	se	t	p
AFC	.4000	.0491	8.1450	.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
TKS	.1757	.0588	2.9884	.0030

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
TKS	.1057	.0549	1.9240	.0551

Model Summary for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.1696	.1652	38.4100	2.0000	376.0000	.0000

****

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.0700	.0716	.0016	.0245
AFC	.0700	.0716	.0016	.0245

Bias Corrected Confidence Intervals

	Lower	Upper
TOTAL	.0263	.1207
AFC	.0263	.1207

****
Level of Confidence for Confidence Intervals:
95
Number of Bootstrap Resamples:
1000

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Table 23 : SPSS output of boot starpping for mediation testing of Tacit Knowledge Sharing in the relationship of Instrumental Ties and Exploitation component of Absorptive Capacity

Dependent, Independent, and Proposed Mediator Variables:
DV = EXPL
IV = INST
MEDS = TKS

Sample size
379

IV to Mediators (a paths)

	Coeff	se	t	p
TKS	.6166	.0411	15.0016	.0000

Direct Effects of Mediators on DV (b paths)

	Coeff	se	t	p
TKS	.2250	.0735	3.0635	.0023

Total Effect of IV on DV (c path)

	Coeff	se	t	p
INST	.2515	.0593	4.2429	.0000

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
INST	.1127	.0741	1.5216	.1290

Model Summary for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.0688	.0639	13.8937	2.0000	376.0000	.0000

****

BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.1388	.1387	-.0001	.0441
TKS	.1388	.1387	-.0001	.0441

Bias Corrected Confidence Intervals

	Lower	Upper
TOTAL	.0539	.2328
TKS	.0539	.2328

****

Level of Confidence for Confidence Intervals:
95
Number of Bootstrap Resamples:
1000

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Table 24 : SPSS output of boot starpping for mediation testing of Affective Commitment in the relationship of Instrumental Ties and Exploitation component of Absorptive Capacity

Dependent, Independent, and Proposed Mediator Variables:
DV = EXPL
IV = INST
MEDS = AFC

Sample size
379
IV to Mediators (a paths)

	Coeff	se	t	p
AFC	.2074	.0571	3.6311	.0003

Direct Effects of Mediators on DV (b paths)

	Coeff	se	t	p
AFC	.3474	.0504	6.8899	.0000

Total Effect of IV on DV (c path)

	Coeff	se	t	p
INST	.2515	.0593	4.2429	.0000

Direct Effect of IV on DV (c' path)

	Coeff	se	t	p
INST	.1794	.0569	3.1536	.0017

Model Summary for DV Model

R-sq	Adj R-sq	F	df1	df2	p
.1526	.1481	33.8457	2.0000	376.0000	.0000

****
BOOTSTRAP RESULTS FOR INDIRECT EFFECTS

Indirect Effects of IV on DV through Proposed Mediators (ab paths)

	Data	Boot	Bias	SE
TOTAL	.0721	.0721	.0000	.0218
AFC	.0721	.0721	.0000	.0218

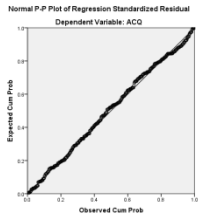
Bias Corrected Confidence Intervals

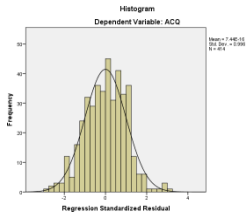
	Lower	Upper
TOTAL	.0347	.1226
AFC	.0347	.1226

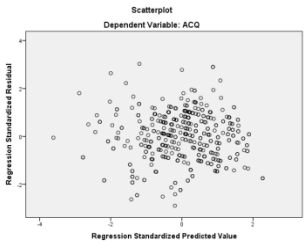
****
Level of Confidence for Confidence Intervals:
95
Number of Bootstrap Resamples:
1000

ANX—B

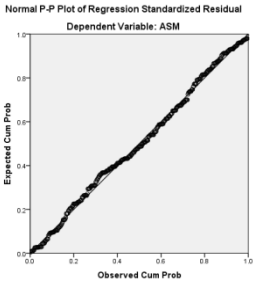
Dependent Variable : ACQ Independent variable : FORM, INT, JR

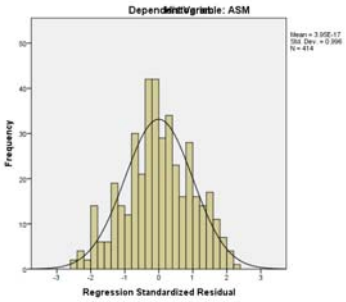






Dependent Variable : ASM Independent variable : FORM, INT, JR





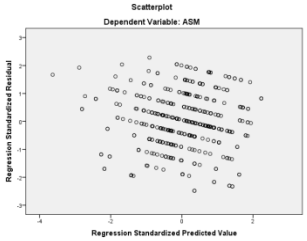


Figure 1 : normality and homoscedasticity test of dependent variables (ACQ and ASM)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.472	Retain the null hypothesis.
2	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.779	Retain the null hypothesis.
3	The distribution of Standardized Residual is normal with mean -0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.704	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

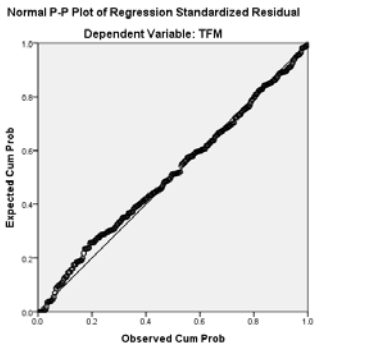
Hypothesis Test Summary

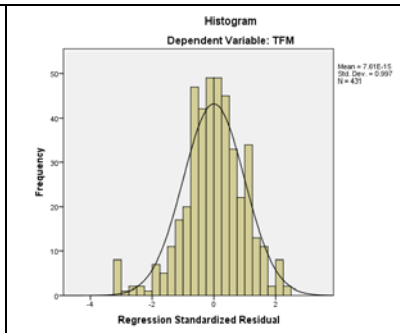
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.487	Retain the null hypothesis.
2	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.607	Retain the null hypothesis.
3	The distribution of Standardized Residual is normal with mean -0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.554	Retain the null hypothesis.

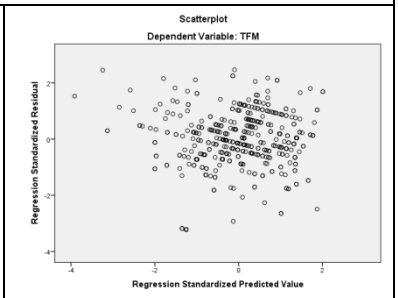
Asymptotic significances are displayed. The significance level is .05.

Figure 2 : verification of normality of residuals with Kolmogorov- spirnov test of normality

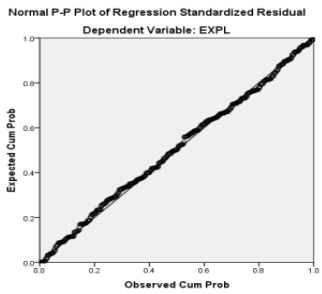
TFM as dependent variable

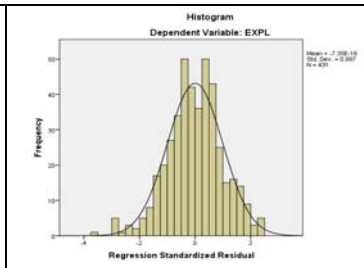






EXPL as dependent variable





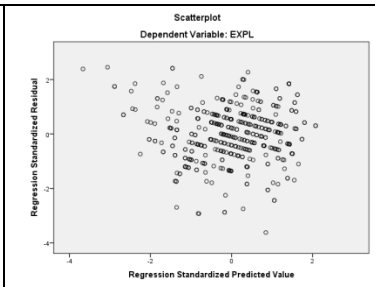


Figure 3 : Normality and homoscedasticity assumption test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.058	Retain the null hypothesis.
2	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.093	Retain the null hypothesis.
3	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.052	Retain the null hypothesis.
4	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.058	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

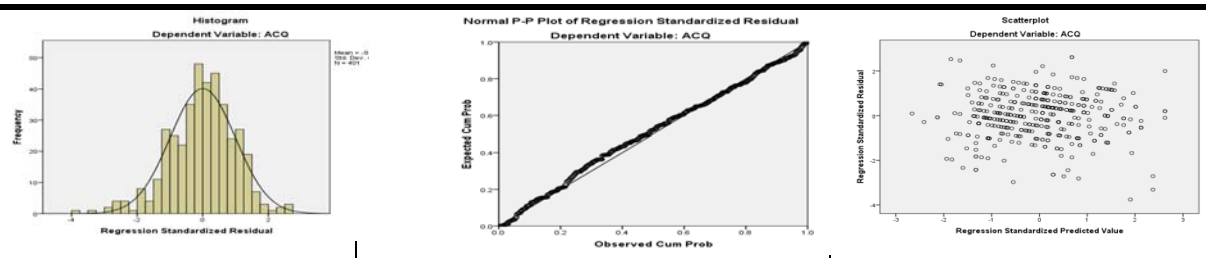
Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Standardized Residual is normal with mean -0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.272	Retain the null hypothesis.
2	The distribution of Standardized Residual is normal with mean 0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.367	Retain the null hypothesis.
3	The distribution of Standardized Residual is normal with mean -0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.707	Retain the null hypothesis.
4	The distribution of Standardized Residual is normal with mean -0.00 and standard deviation 1.00.	One-Sample Kolmogorov-Smirnov Test	.446	Retain the null hypothesis.

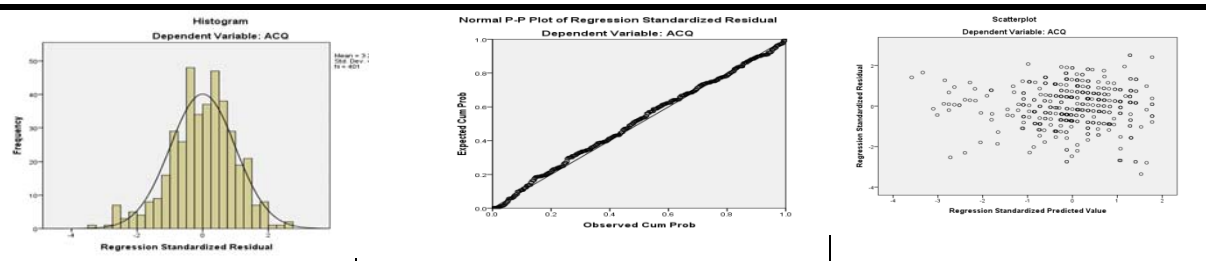
Asymptotic significances are displayed. The significance level is .05.

Figure 4 :verification of normal distribution of residual terms of dependent variables(TFM and EXPL)

Dependent Variable : ACQ Independent Variables : INST and AFC



Dependent Variable : ACQ Independent Variables : TKS and AFC



Dependent Variable : ASM Independent Variables : INST and AFC

Dependent Variable : ASM Independent Variables : TKS and AFC

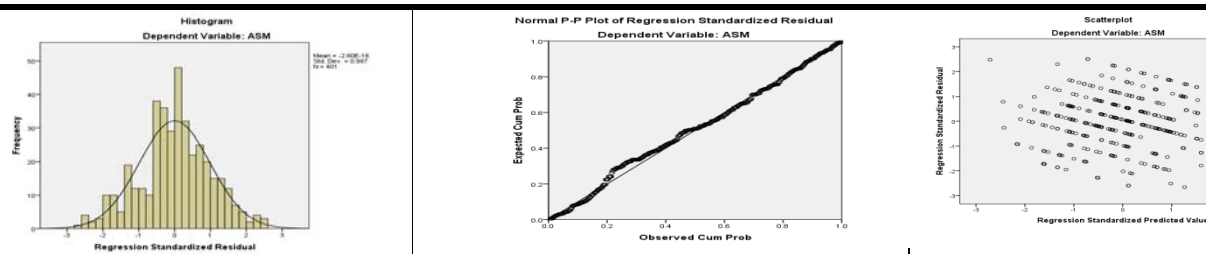


Figure 5: Graphical representation of diagnostic tests of regression models with ACQ and ASM as dependent variables

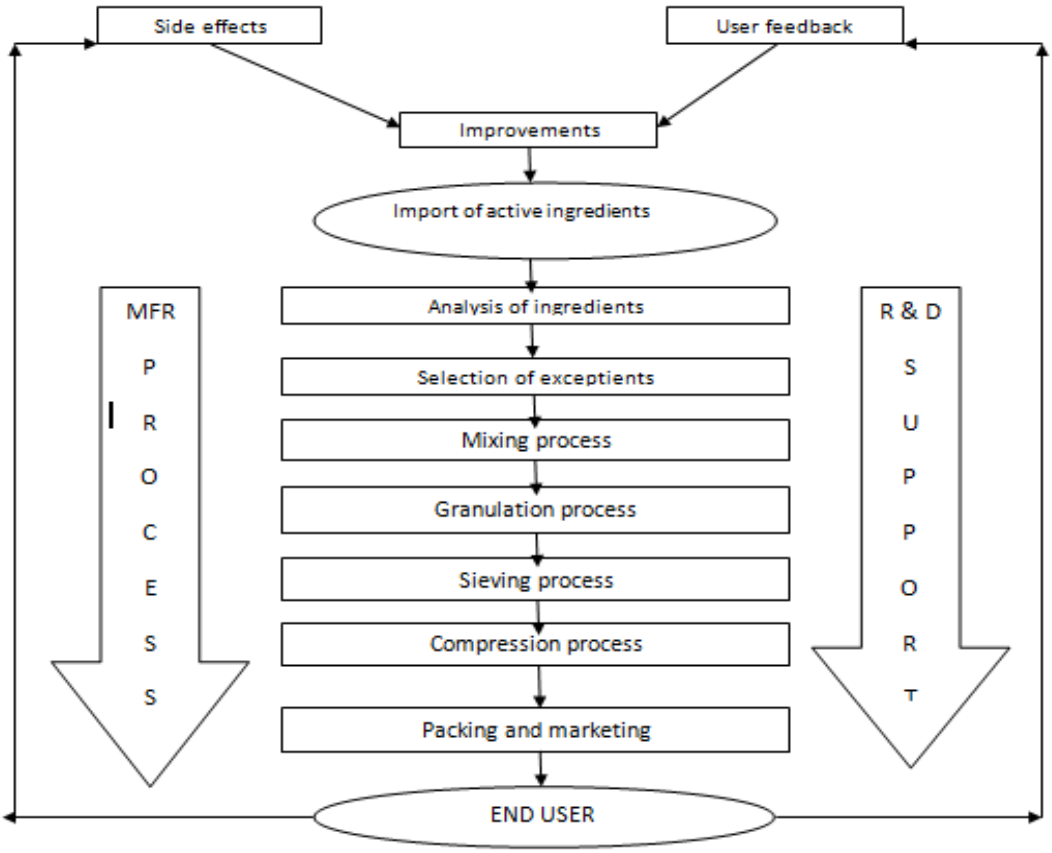
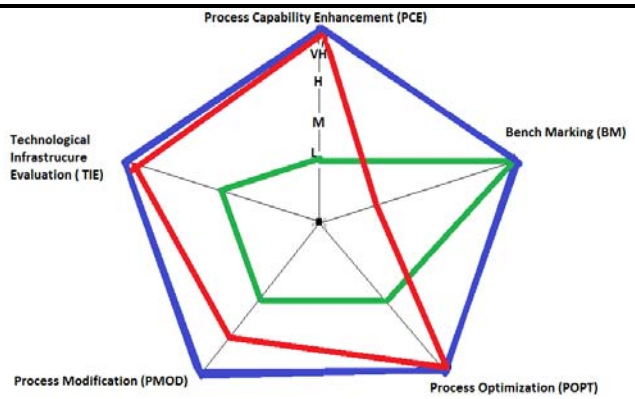
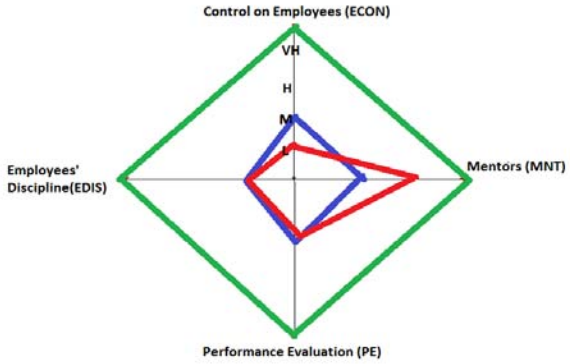


Figure 6 : Technology Transformation process

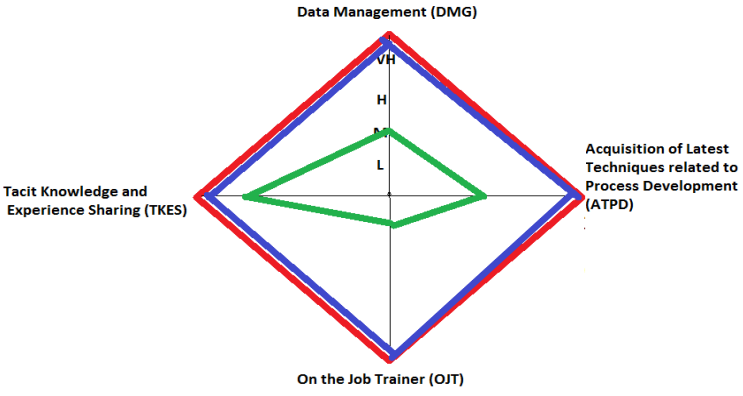
.



(a)



(b)



(c)

Perceived roles of DM

Perceived roles of MM

Perceived roles of EMPL

Figure 7: Web diagram showing extent of agreement with middle managers' roles

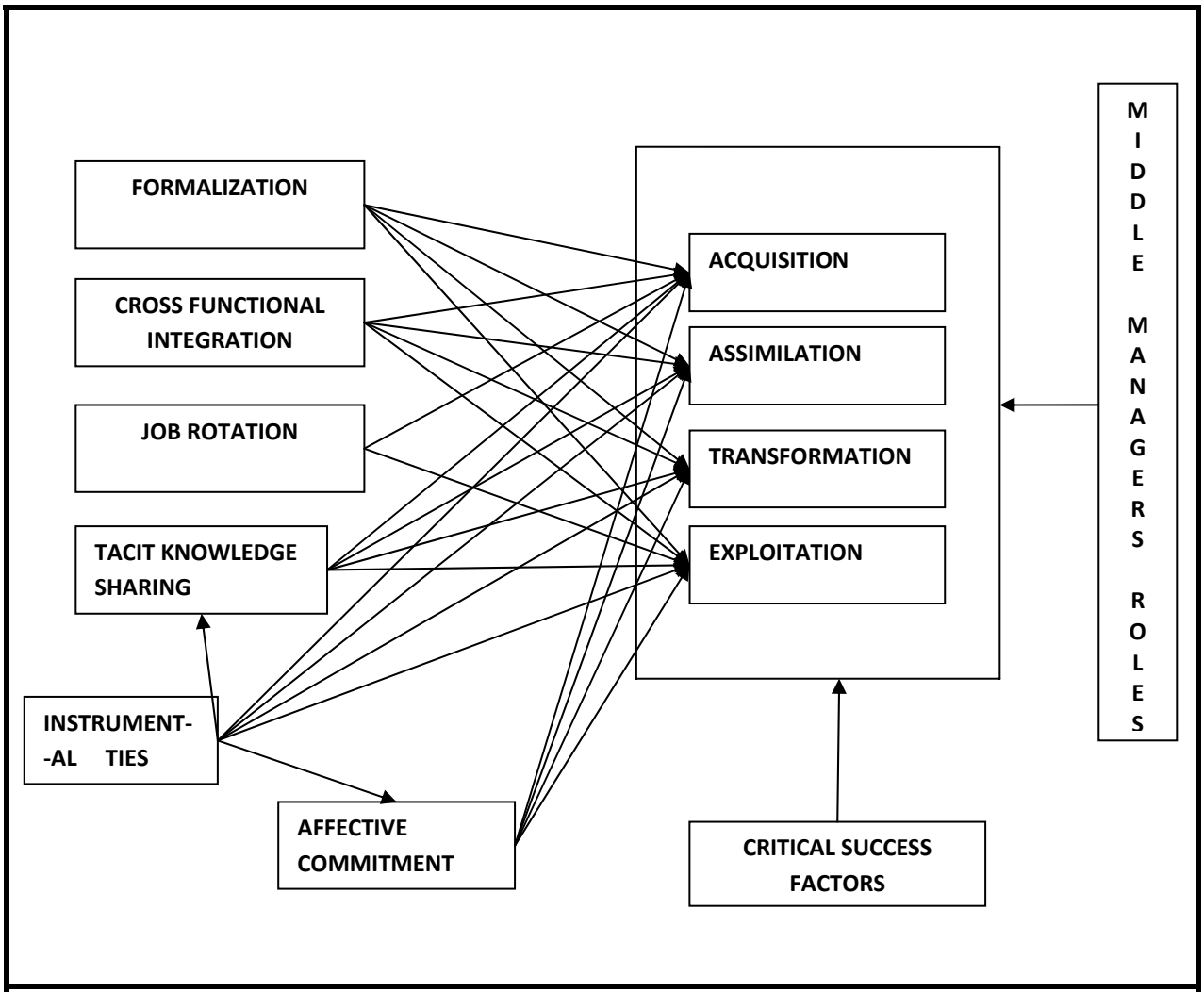


Figure 8 : Absorptive Capacity Framework

Appendix-1

Introduction. This survey is part of doctoral research of Absorptive Capacity framework for pharmaceutical industry. Absorptive capacity is the ability of firm to recognize new external knowledge, assimilate and apply to operations. As per university policy the survey will be used for Academic Purpose only and no attempt will be made to identify any individual/firm in any publication.

Your Goodself and your Organization

Gender -------- Male/Female Age ------ years Job Type ---- Permanent/Contract

Qualification -------- Under graduate / Graduate/Masters / PhD/ Others

Designation -------- Supervisor/Manager/General Manager/ others

Length of service ---------- years Organization Category ----- Local /Multinational
Age of Organization ---------- years No of Employees ----------

Type of Organization ---------- Manufacturing/ Sales

Acquisition(.79)

1. Our unit has frequent interactions with corporate headquarters to acquire new knowledge.
2. Employees of our unit regularly visit other branches.
3. We collect industry information through informal means (e.g. lunch with industry friends, talks with trade partners).
4. Other divisions of our company are hardly visited.(reverse-coded)
5. Our unit periodically organizes special meetings with customers or third parties to acquire new knowledge.
6. Employees regularly approach third parties such as accountants, consultants, or tax consultants.

Assimilation(.76)

7. We are slow to recognize shifts in our market (e.g. competition, regulation, demography). (reverse-coded)
8. New opportunities to serve our clients are quickly understood.
9. We quickly analyze and interpret changing market demands.

Transformation(.72)

10. Our unit regularly considers the consequences of changing market demands in terms of new products and services.
11. Employees record and store newly acquired knowledge for future reference.
12. Our unit quickly recognizes the usefulness of new external knowledge to existing knowledge.
13. Employees hardly share practical experiences. (reversecoded)
14. We laboriously grasp the opportunities for our unit from new external knowledge.

(reverse-coded)
15. Our unit periodically meets to discuss consequences of market trends and new product development.

Exploitation(.71)
16. It is clearly known how activities within our unit should be performed.
17. Client complaints fall on deaf ears in our unit.b (reversecoded)
18. Our unit has a clear division of roles and responsibilities.
19. We constantly consider how to better exploit knowledge.
20. Our unit has difficulty implementing new products and services. (reverse-coded)
21. Employees have a common language regarding our products and services.

Tacit knowledge sharing

22. I share my job experience with my co-workers
23. I share my expertise at the request of my co-workers
24. I share my ideas about jobs with my co-workers
25. I talk about my tips on jobs with my co-workers.

Instrumental Ties

26. In the office, my coworkers and I exchange advice.
27. My coworkers and I offer assistance with one another during office hours
28. My coworkers and I get along well in the office.**
29. My coworkers and I make a good team for coordination in the office.

Affective commitment (.86)

30. I would be very happy to spend rest of my career with this organization(R).
31. I enjoy discussing my organization with people outside of it.
32. I really feel as if this organization's problems are my own.
33. I think that I could easily become as attached to another organization as I am to this one.
34. I do not feel like "emotionally attached" to this organization(R).
35. This organization has a great deal of personal meaning for me.
36. I do not feel a strong sense of belonging to my organization.

Formalization (.87)

37. Written operating procedures specify the precise sequence of steps required to perform each processs in company.
38. The workers regularly follow written operating procedures.
39. Written job descriptions exist for most employees.

40. The workers regularly follow written quality control procedures.
41. Written policies/procedures specify how to assess product quality.
42. Written performance evaluation policies/procedures exist.
43. First-line supervisorsrmanagers regularly follow written employee performance evaluation policies/procedures.
44. Written policies/procedures specify how inventory should be controlled.
45. Written policies/procedures specify how production scheduling should be done.

Cross Functional Integration (.80)

46. Cross-functional teams make important decisions on a regular basis.
47. Important cross-functional decisions are often made by consensus.
48. Cross-functional teams require minimum management supervision.
49. Cross-functional teams are formed to undertake special projects.
50. Cross-functional teams are an important source for new ideas.
51. Cross-functional teams are formed to solve problems.
52. Cross-functional teams frequently organize around projects and tasks.
53. Important decisions are often made by cross-functional consensus.
54. Senior management values the input of cross-functional teams.

Job Rotation (.82)

55. Employees in our unit are regularly rotated between different functions.
56. Employees are regularly rotated between different subunits.

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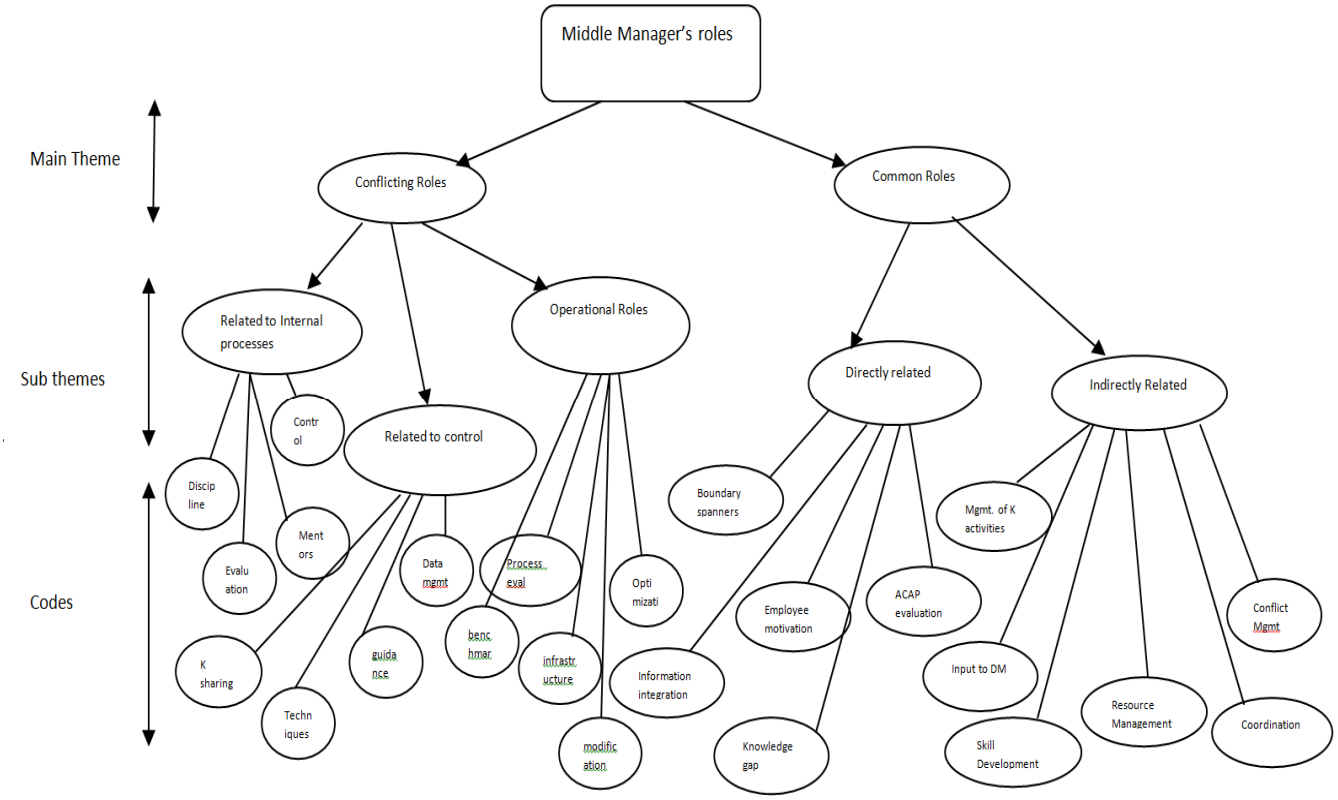
Appendix-2

Thematic analysis of Roles of Middle Managers



Appendix-3

Thematic analysis procedure given by Braun and Clark, 2006

Process	No.	Criteria
Transcription	1	The data have been transcribed to an appropriate level of detail, and the transcripts have been checked against the tapes for 'accuracy'.
Coding	2	Each data item has been given equal attention in the coding process.
	3	Themes have not been generated from a few vivid examples (an anecdotal approach), but instead the coding process has been thorough, inclusive and comprehensive.
	4	All relevant extracts for all each theme have been collated.
	5	Themes have been checked against each other and back to the original data set.
	6	Themes are internally coherent, consistent, and distinctive.
Analysis	7	Data have been analysed – interpreted, made sense of – rather than just paraphrased or described.
	8	Analysis and data match each other – the extracts illustrate the analytic claims.
	9	Analysis tells a convincing and well-organized story about the data and topic.
	10	A good balance between analytic narrative and illustrative extracts is provided.
Overall	11	Enough time has been allocated to complete all phases of the analysis adequately, without rushing a phase or giving it a once-over-lightly.
Written report	12	The assumptions about, and specific approach to, thematic analysis are clearly explicated.
	13	There is a good fit between what you claim you do, and what you show you have done – ie, described method and reported analysis are consistent.
	14	The language and concepts used in the report are consistent with the epistemological position of the analysis.
	15	The researcher is positioned as *active* in the research process; themes do not just 'emerge'.

Source : Braun and Clark (2006)

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