

**A STUDY OF KNOWLEDGE MANAGEMENT AND ORGANIZATIONAL
CULTURE: ENABLING ROLE OF ICT IN NORTH INDIAN HIGHER
EDUCATION INSTITUTIONS**

A Thesis

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award of the degree of

**DOCTOR OF PHILOSOPHY
in MANAGEMENT**

By

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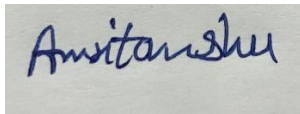


LOVELY PROFESSIONAL UNIVERSITY PUNJAB

2022

Declaration

I, Amritanshu, hereby declare that the work presented herein is genuine, work done originally by me and has not been published or submitted elsewhere for the requirement of a degree programme. Any literature data or work done by others cited in this dissertation has been given due acknowledgement and listed in the reference section.

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Amritanshu

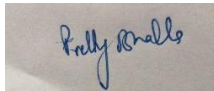
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Certificate

This is to certify that the dissertation titled “**A study of Knowledge management and Organizational culture: Enabling Role of ICT in North Indian Higher Education Institutions**” carried out by Ms. Amritanshu; D/o Dr. Inder Pal has been accomplished as a duly registered Ph.D. research scholar of Lovely Professional University (Phagwara), under my guidance and supervision. This dissertation is being submitted by her in the partial fulfillment of the requirements for the award of the Doctor of Philosophy in management from Lovely Professional University.

Her dissertation represents her original work and is worthy of consideration for the award of the degree of Doctor of Philosophy.

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ABSTRACT

In today's knowledge economy, Knowledge management (KM) has become very critical subject. Knowledge is considered as a currency of existing economy, a critical asset of organizations and a tool for developing a sustainable competitive advantage. Many business organizations are using KM to get better return on investments, to improve their productivity, and to generate competitive advantages. Knowledge management has been hailed as one of the most important developments in the fields of information studies and management science in the recent decades. By capturing, organizing, documenting and sharing organizational knowledge, Knowledge management helps today's complex organizations to make better decisions, to create competitive advantage and to solve their problems effectively. Present study explains the Knowledge management as a cycle of processes such as Knowledge creation, Knowledge organization, Knowledge storage, Knowledge dissemination, Knowledge application, and Knowledge effectiveness, conducted by the organizations to create competitive advantages and new opportunities. Higher education institutions (HEIs) are also adopting the new essential elements of this progressive society such knowledge, skills, and innovation. Effective utilization of Knowledge Management is taken as a very critical factor that supports organizations to develop a competitive advantage. Educational Institutions are also realizing the importance of this factor and started treating Knowledge as a push factor for organizational change and innovation, which are the main forces behind the survival of any organization in this dynamic environment. Higher education institutions (HEIs) use knowledge in many forms like academics use their professional tacit knowledge, teaching skills and research capabilities in higher education institutions. The objective of the present study is to explore the knowledge management processes of North Indian higher education institutions and also to understand its' relationship with organizational culture (OC) of these institutions. The study also explores the Information and communication technology (ICT) as moderator in the relationship between knowledge management (KM) and Organizational culture (OC). Organizational culture is defined as norms, practices, beliefs, and value system that is shared by all the members of an organization and differentiate or build the behavior and structure of an organization. In the 21st century, policy makers and academics have directed their attention toward

the emphasis on and approach toward technology, including specifically information and communication technologies (ICT) within the educational systems of developed and developing countries. Present study explains the ICT as human skills around information and communications devices or equipment like radio, DVD, television, video players, telephone, satellite systems, computer network, hardware and software, and services integrated with these technologies, used to generate, share, store and manage information. It includes ICT infrastructure and human skills required to make use of this ICT infrastructure and ICT tools. Literature review have highlighted the many gaps in the existing literature, some studies reviewed were able to explain the positive significant relationship between the OC and KM or ICT and KM processes. However, some studies conducted in this field have not found any relationship between OC and KM and ICT and KM. There is no such study found on knowledge management, organizational culture with moderating impact of ICT in existing literature. Some of studies from other countries are focusing on relationship between “KM and OC”. Some studies explain that ICT infrastructure facilitate knowledge management process. There is a need to conduct the study, which explains the impact of ICT on relationship between KM and OC in Indian higher education institutions.

During literature review, research gap reflects that there is a reasonable discrepancy in the reported relationship between knowledge management and organizational culture, so the main objective of the present study is explaining the nature of relationship between Knowledge management and organizational culture in higher education institutions by answering the following research questions:

- Is there a significant relationship between Knowledge management and Organizational culture?
- Does information and communication technology (ICT) moderate the relationship between the Knowledge Management and Organizational Culture? Is the effect of organizational culture on knowledge management more pronounced in the presence of information and communication technology (ICT) in North Indian higher education institution?

Main Objectives of the Study are;

To identify current knowledge management processes adopted by the North Indian Higher education institutions.

To compare knowledge management processes of the North Indian Higher education institutions.

To analyze the organizational culture adopted by selected Universities.

To study the relationship between Organizational culture and knowledge management process in North Indian Higher Education institutions.

To explore the moderating effect of ICT on the relationship between organizational culture and knowledge management process in North Indian Higher Education institutions.

For the conduct of present study, a descriptive form of cross-sectional research design has been adopted. Self-developed questionnaire has been used to collect the data from 500 respondents of North Indian higher education institutions. Various univariate, bivariate and multivariate techniques has been used to analyze the collected data. To analyze the basic nature of data, descriptive Statistics have been used. To check the multivariate normality Skewness, Kurtosis, and Mahalanobis Distance have been examined. To compare knowledge management processes of various categories of North Indian Higher education institutions One-way Anova has been used. Confirmatory Factor Analysis has been conducted for the validation of various Instruments. To study the relationship between Organizational culture and knowledge management process and the relationship between various types of organizational culture and knowledge management process in North Indian Higher Education institutions, Structural Equation Modeling has been applied. Moderation Analysis has been conducted to explore the moderating effect of ICT on the relationship between organizational culture and current knowledge management process in North Indian Higher Education institutions. Various software such Microsoft Excel, SPSS (Statistical Package for the Social Sciences) and Smart PLS3 have been used for data analysis.

This Study explains that Central universities are putting most of their efforts towards knowledge application process and putting least attention towards knowledge creation process. Deemed universities are putting most of their efforts towards knowledge storage process and putting least efforts towards knowledge creation process. Employees of State Private Universities pay more attention towards knowledge dissemination and knowledge application processes. These universities are putting least attention towards knowledge creation and effectiveness processes as compare to others. State public universities pay most of their attention and almost equal attention towards knowledge storage as well as Knowledge dissemination processes. These universities are putting least attention towards knowledge organization. NII and other institutions pay highest attention towards knowledge application. These HEIs put their least attention towards Knowledge effectiveness and Knowledge creation process.

The comparison of various knowledge management processes reflects that there is a significant difference in knowledge creation process, knowledge storage process, knowledge dissemination process, and knowledge application process among various categories of north Indian higher education institutions such as central universities, state public, state private universities, Deemed Universities and National Importance institutions and others but, there is a no significant difference in knowledge organization process and knowledge effectiveness process among various categories of north Indian higher education institutions.

Central universities are dominated by the Hierarchy culture, with the mixture of other three types of culture. The Adhocracy culture has got least scores and fourth rank in these universities. Dominating culture in Deemed universities is hierarchy culture and these universities are also the least dominated by the Adhocracy culture. Dominating culture in State private universities is again hierarchy culture and Clan culture has got least scores. Dominating culture in State Public universities is Hierarchy culture and Adhocracy culture is in least extent. NII and other institutions have dominated in Hierarchy culture; Clan culture has got least scores in these institutions. Results clearly shows that hierarchy culture has got dominantly best scores in every category of North Indian HEI's and market culture is second dominating culture in these HEIs.

There is a significant positive relationship between various types of organizational cultures such as Clan culture, Adhocracy culture, Market culture, and Hierarchy culture and knowledge management of North Indian Higher Education Institutions. There is also a significant positive relationship between Organizational culture and knowledge management of North Indian Higher Education Institutions. 70% of respondents of North Indian HEI's understand the importance of usage of ICT tools and putting efforts to utilize these ICT indicators effectively.

ICT moderates the relationship between Knowledge management and Organizational culture in North Indian Higher Education Institution. Results show that ICT has weak moderating effect on the relationship between organizational culture and knowledge management.

Present study significantly contributes towards the Knowledge management literature. Knowledge management is not a very old phenomenon as it has attracted a lot of attention from researchers, organizations and academics after 1995. The Impact of organizational culture on knowledge management process has started receiving some attention in foreign studies, However, literature does not provide a holistically study based on the relationship between knowledge management and organizational culture from Higher education institutional perspective. This study is the first empirical study in Indian higher education institutions which consider the relationship between organizational culture (which is considered as a prime factor behind the KM success or failure in literature) and moderating impact of ICT (which is taken as a significant part of as KM infrastructure in literature) on this relationship. As this study suggest HEIs should consider their organizational culture before implementation of KM initiatives that would help in the strategic planning of institutions. Their KM initiatives would be successful if institutions have balanced mixture of various types of cultures with dominating market culture and make their strategic plans accordingly. An assessment of organizational cultural and ICT practices helps in setting a achievable mission. Organizations align their organizational cultures with ICT practices for the facilitation of KM process, lead to generate organizational change. Literature review suggests that with the incorporation of the market culture type in organization will lead to improve the chances of successful implementation of

knowledge management. Present study is also a first study who has presented an ICT practices measurement tool for higher education institutions which consider ICT infrastructure and ICT human skills aspect of ICT practices together. Existing studies in literature based on Knowledge management has mainly focused on IT infrastructure and organizational environment. Present study has validated this ICT instrument and concludes that an ICT practice is a Reflective-formative higher-order construct with 'ICT infrastructure and ICT human skills as its dimensions. KM process scale and OC scales are also validated to analyze in Indian context. So, it can be explained that study contributes to the literature by presenting validated scales for KM process and ICT practices. The findings of the study contribute to the literature by providing empirical evidence related to Knowledge Management-Organizational Culture relationship in the Indian higher education institutions context. The study contributes towards the scholarly conversation regarding contextual role of ICT by presenting significant insights about the moderating role of ICT in Knowledge Management - Organizational Culture relationship.

PREFACE

The main purpose of this study is to explain the nature of relationship between Knowledge Management and Organizational culture in higher education institutions and to propose a framework for analyzing the relationship between Organizational Culture (OC) and Knowledge management (KM) with moderating impact of Information and Communication Technology (ICT). Chapter I defines Knowledge Management, Organizational culture and Information and Communication Technology (ICT) variables. Chapter II explains the review of literature presents the research gap and identifies the need for the study. Chapter III presents the methodology of the study. It explains the research design and provides description of research instrument, Sample profile, data analysis techniques and limitations of the present study. The chapter IV presents the practice of validating and measuring the various constructs analyzed in this study. It presents the descriptive statistics of collected sample data and deals with the reliability of various constructs given in this study. It also explains about the validity of various scales and deals with the validation and measurement of Organizational culture (OC) scale i.e. (OCAI), Knowledge management (KM) scale and Information and Communication Technology (ICT) scale. Chapter V explains the current Knowledge Management processes and analyzes the current organizational culture of North Indian Higher Education Institutions (HEIs), which is the first objective of present study. It also presents the results of data analysis regarding the current knowledge management processes adopted by the North Indian Higher education institutions and the results of data analysis regarding comparison of knowledge management processes of the North Indian higher education institutions which is the second objective of present study. This chapter also presents the organizational culture adopted by selected institutions, which is third objective of present study. Chapter VI explains the assessment of the impact of Organizational culture on Knowledge management. It presents the procedure used to measure Organizational culture- knowledge management relationship and also reflects the proposed model of Organizational culture- knowledge management relationship. Chapter VII presents the results of moderation analysis for impact of ICT on Knowledge management-Organizational culture relationship. Chapter VIII explains the significant findings, discussion, conclusion, Implications and suggestion for future practitioners and researchers.

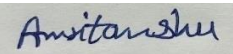
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I would like to dedicate my thesis to my Husband, Manish Vashisht, the best person I know, who always kept me going and this work wouldn't have been possible without him. I owe my deep sense of gratitude to my Dad ji, Dr. Inder Pal; my Mom, Late Mrs. Meera, and my one-year old Son, Yunaay, who have always been a source of unlimited strength and motivation to me.

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LIST OF ABBREVIATIONS

S.No	Description	Abbreviation
1	Knowledge Management	KM
2	Organizational Culture	OC
3	Information and Communication Technology	ICT
4	Higher Education Institutions	HEIs
5	Smart Partial Least Square 3	Smart PLS 3
6	Average Variance Extracted	AVE
7	Organizational Culture Assessment Instrument	OCAI
8	Competing Value Framework	CVF
9	The Organization for Economic Cooperation and Development	OECD
10	Five-Tier Knowledge Management Hierarchy	5TKMH
11	Composite Reliability	CR (ρ_c)
12	Confirmatory Factor Analysis	CFA
13	Reverse Knowledge Transfer	RKT
14	Degree of Freedom	DF
15	Research & Development	R&D
16	Ministry of Education	MOE
17	knowledge Management Performance Measurement	KMPM
18	Information Technology	IT
19	Human Resource Management	HRM
20	knowledge-Oriented Cultures	KOC
21	Ministry of Human Resource Development	MHRD
22	Small and Medium Enterprises	SMEs
23	University Grant Commission	UGC
24	National Importance Institutions	NII
25	Standardized Factor Loadings	SFL
26	Heterotrait- monotrait	HTMT
27	Variance Inflation Factor	VIF
28	Resource-Based View	RBV
29	Structure Equation Modeling	SEM
30	Head Of Department	HOD

CHAPTER – 1

INTRODUCTION

In today's knowledge economy, Knowledge Management (KM) has emerged as a very critical subject. Moreover, Knowledge is viewed as a currency of the existing economy, a critical asset of organizations, and a tool for developing a sustainable competitive advantage (AF-Ragab and Arisha, 2013). Many business organizations are using KM to get better returns on investments, to improve their productivity, and to generate competitive advantages (García, 2009; Lawson, 2003; Attallah et al., 2015; Dalkir, 2017). As per the established paradigm, Knowledge is considered as an ability of people and employees to continuously create and update themselves to fulfill new challenges and opportunities (Toro & Joshi, 2012). To know the concept of Knowledge even in a better way, it is necessary to know the difference between data, Information, Knowledge, and its various types. Data is any random word or numbers out of context, and data with context is called Information, but this Information does not explain any pattern. A pattern relationship between data and Information becomes Knowledge (Uriarte, 2008; Peachey & Hall, 2005). Different authors and researchers have explained the different types of Knowledge. (Dalkir, 2017; Nassuora et al., 2011; Hass et al., 2007; Fleck, 1996) have explained the two kinds of Knowledge: Tacit Knowledge and Explicit Knowledge. Explicit Knowledge is to be stored and retrieved in the form of computer files and written documents. However, tacit Knowledge relates highly to the individuals, which is there in people's minds. It is to be accumulated through experiences and failure. (Nonaka, 1994; Fleck, 1996; Alavi, & Leidner, 2001) have explained that tacit Knowledge further is of two forms: Technical and Cognitive. Technical tacit Knowledge is about the personal human skills of the craft. Cognitive tacit Knowledge is about the human mantle model, values, and beliefs. (David & Fahey, 2000) have explained three kinds of Knowledge; First, Human Knowledge includes know-what, know-how, tacit and explicit knowledge. Second, Social Knowledge; embodied in teams' mainly tacit form, and third, Structured Knowledge; embodied in organizational processes and routine work.

Knowledge Management is a relatively new discipline, but it is argued that practitioners, experts, writers, philosophers, and teachers have been making use of it even when the actual term "Knowledge Management" was not in use. At that time, people use to share their knowledge and experiences so that they can learn something and should not repeat their mistakes again. So, knowledge sharing was in the form of monitoring sessions, town meetings, seminars, and workshops (Dalkir, 2017). Wells (1938) had used the term 'world brain', which was about universal organizational collective Knowledge, though he has not used the actual term Knowledge management. He stated that this world is full of Knowledge but, this Knowledge is not applied or misapplied. His main idea was organizations could select, update, organize and share world knowledge by using World Wide Web and Internet and apply it in order to get the best returns. In the 1970s, Peter Drucker and Strassman published their papers in which they have discussed the use of Information and explicit Knowledge in organizations. Then in the late 1970s, studies made on the diffusion of innovation by Everett Rogers and on information and technology transfer by Thomas Allen, which were responsible for today's KM framework of how the Knowledge is produced, used, and diffused in the organization. During this phase, the use of computer knowledge was recognized, and researchers have been started using this in KM.

In mid 1980s Peter Drucker was the first person that has used the term 'Knowledge workers.' It was the same time when organizations have recognized the importance of knowledge, but still many organizations were reluctant to develop their own knowledge related strategies. Then Peter Drucker and few other experts worked on the knowledge related terms like "knowledge creation", "knowledge engineering" and "knowledge-based systems. So, in late 1980s, the first book on knowledge management was published i.e., "The Knowledge Value Revolution" by Sakaiya. In 1989 International KM Network was started in Europe, but proper introduction of KM is given By Tom Stewart in his article "Brainpower" published in Fortune magazine (Vorakulpipat & Rezgui, 2008; Koenig & Neveroski, 2008; Denning, 2000). (Senge, 1990) had explained about the related term "Learning Organizations" and how they manage their knowledge. It has also stated the cultural dimensions of organizations. Then Bartlett, Dorothy, and Leonard-Barton had developed different theories of

knowledge management. In 1995, a book ‘wellsprings of knowledge-building and sustaining source of innovation’ had been issued by Leonard–Barton. In this book, very effective knowledge management strategies have been introduced. In 1995, a book related to the “Knowledge Creation term had been introduced by Nonaka and Takeuchi. They have explained about the knowledge management and transformation of knowledge. After 1990s there are different generations of KM came into existence. First generation of KM has focused on life cycle of KM, Improved storage of KM, better learning capabilities, technology, use of intranet and Internet. Second-generation of KM has focused on Knowledge processes, organizational learning, innovation in knowledge sharing and logical variations. Now a days, many experts are still introducing new topics in KM and they are still trying to predict its future (Uriarte, 2008; Vorakulpipat and Rezgui, 2008; Koenig & Neveroski, 2008; Denning, 2000; Dalkir, 2017). Over the past few decades, knowledge management is emerged as a most significant phenomenon in the subjects of information and management studies. Knowledge management supports the organizations to create competitive advantage and to solve their problems effectively in today’s complicated environment (Abdullah et al., 2005; Downes, 2014).

1.1 Knowledge Management: Definitions and Dimensions

There is no universally accepted sole definition of Knowledge Management. Over the period of times, various experts and researchers have defined KM in their own way. A few definitions, discussed by various researchers and authors are given below;

“A continuous process of managing all forms of knowledge, with a view of realizing organizational goals to create the better opportunities” (Quintas et al., 1997)

“KM is an important activity for boosting the competitive advantages of any organization through systematic model of Knowledge.” (Walters et al., 2002)

“Knowledge management is about acquiring a systematic strategy for managing the organizational knowledge asset in a best possible way.” (Dunn and Neumeister, 2002)

“Term Knowledge management is often used for the cycle of processes that includes the generation, organization, distribution, and application of knowledge.” (Uriarte, 2008)

“A Combination of planned activities that encompasses the recognition of required knowledge, generation, and distribution of newly captured knowledge among employees of organization to make a best usage of it.” (Omerzel et al., 2011)

“Knowledge management is an orderly practice for creating, capturing, and understanding, allocating and utilizing knowledge and finally leading this whole process towards the achievement of organizational goals.” (Thakur & Sinha, 2013)

Brian Newman defined Knowledge management as “the cluster of processes that includes the generation, distribution, and implementation of knowledge.” (El-Badawy et al., 2015)

“Knowledge Management (KM) is a process of attaining, developing, sharing, and implementing all types of knowledge within an organization to achieve its organizational objectives.” (Agarwal and Marouf, 2017)

Many researchers have explained KM on their own way as Novins (2002) explained the meaning of knowledge management as “storage of right kind of information, and finally captured & applied this right information by the right type of people.” There are two types of knowledge that we obtain i.e., one in the code form and another is to be obtained through experience. Every person has got different meaning out of the obtained knowledge as per his opinion and experience. García (2009) explained that regulating the possessed-stock of information and analyzing its benefits, are the main steps for managing the organizational knowledge asset in a best way. Once these steps are conducted appropriately, then next step is to manage this knowledge carefully and effectively to improve the value of the organization. To manage the knowledge asset, an organization has to capture, create, transfer, and utilize its knowledge in its various processes and operations. Managing knowledge means associating employees with the knowledge, which they implement in their daily operational activities. Every organization has its own system of managing explicit knowledge and tacit knowledge, although explicit knowledge is

comparatively easier to manage than tacit knowledge. Tacit knowledge is a personal form of knowledge and very difficult to recognize. Once a right form of tacit knowledge is recognized, then next process of converting this knowledge into explicit knowledge is to be started. Finally, this knowledge is to be shared with other employees to get best benefit out of it. Nonaka (1996) has explained process of creating and converting one form of knowledge into another, with the help of two processes. The first process explains the creation of knowledge through individuals. The second process explains the interchange among the explicit and tacit knowledge. These two processes further trigger the four ways of knowledge generation; ‘Socialization’: individual tacit knowledge is transformed into mass tacit knowledge through the mode of group discussions, and conference. ‘Externalization’: tacit knowledge is transformed into explicit form of Knowledge through the drafting of manuals, reports etc. ‘Combination’: one kind of explicit knowledge is transformed into another kind of explicit knowledge. ‘Internalization’: individuals convert explicit knowledge into tacit knowledge.

Another study has presented a detailed reference for new researchers, who are trying to explore the area of Knowledge Management. Authors have examined and categorized the studies as per their specific subject matter related to the KM filed. Researchers have presented KM studies in five categories such as Knowledge Management Systems, Managerial& Social issues of KM, Ontology of Knowledge and KM, Role of Information Technology, and Knowledge Measurement (AF-Ragab and Arisha, 2013). It is very important for the organizations to develop or define their KM framework. As developing their own knowledge management framework would help in providing the guidelines for implementation of KM processes successfully, that would lead to save their time and efforts and also help in eliminating inaccuracies. Therefore, many researchers, authors and practitioners have proposed various KM framework models. Based on existing literature, Knowledge Management framework models have been categorized as Infrastructure-based view and Process-based view. Infrastructure based view includes various facilitators of Knowledge Management as its dimensions or sub-constructs such as people, knowledge processes, Organizational strategies, rewards, technology, and culture (Abdullah et al., 2005; Stankowsky, 2005; Alavi et al., 2005; Karadsheh et al., 2009;

Nassuora, 2011; Attallah et al., 2015; Pawlowski and Bick, 2015; Masa'deh et al., 2019). On the other hand, Process-based view includes sequential and overlapping cycle of processes or practices (conduct to manage the organizational knowledge) as its dimensions such as knowledge Creation, Collection, Filtration, Organization, Storage, Transfer, Application, and Effectiveness (Wiig, 1993; Meyer and Zack, 1996; McElroy, 1999; Parikh, 2001; Horwitch and Armacost, 2002; Lawson, 2003; Edler, 2003; Chin-Loy, 2003; Wilkens et al., 2004; Baastrup and Stromness, 2003; Akhavan et al., 2014; Downes, 2014; Aziz et al., 2018; Hussain et al., 2019). Most of knowledge management studies in India were focused on the knowledge frameworks which have been adopted by various organizations. Knowledge is generated by various organizations, needs to compose, line up, transfer, incorporate and finally fuse with organization practices (Sinha et al., 2012; Abdullah, 2014). Another study has explained the four dimensions of knowledge management process (1) Generating, (2) recovering, (3) sharing, and (4) utilizing (Alavi and Leinder, 2005). (Karadsheh et al., 2009) has given seven processes of Knowledge Management framework, which are as follows;

1. Knowledge Infrastructure: It is about creating appropriate culture, technology and skills that facilitate and support the KM framework in organization.
2. Knowledge Combination: In this step organizations describe different methods to collect the recognized, captured and generated knowledge into a portfolio.
3. Knowledge Filtration: In this step, organizations filter the required knowledge and finally classify and categories it as per its usability.
4. Knowledge Storage and Retrieval: In this phase, they focus on data mining, learning processes and tools, organizational memory process.
5. Knowledge Transfer: In this process organizations work on transferring the knowledge from one person to another, within the organizational groups and transfer the implicit knowledge to explicit knowledge.
6. Knowledge Utilization: It is the phase about implementing the knowledge management tools.

7. Knowledge Roles and Skills: In this process, explained the importance of roles and skills existence in creating, storing, transferring and application of knowledge

Wiig (1997) defined four steps of KM framework cycle. First step, 'Building Knowledge' includes capturing knowledge, analyzing the captured knowledge, then reconstruction of this knowledge, codification of knowledge and finally organizing the knowledge. Second step, 'Holding Knowledge' includes remembering or retaining this knowledge and gathering it in repositories and creating organizational memories, immersing it in repositories or making it the part of business procedures, and finally archiving this knowledge. Third step 'Knowledge Pooling' includes coordinating the teams of experts to work on joint projects to develop the knowledge-based networks, then recognizing the source of knowledge and assembling it into the repositories or library for further references, which make this knowledge easily accessible and retrieve as and when required. Finally, 'Applying Knowledge' includes usage of knowledge in various activities like to perform routine jobs, usage of knowledge to analyze some problems, to explain the difficult situation, to recognize the problem and solution of this problem, to identify the experts with whom the problem should be consulted. There are some other KM frameworks, which have defined same KM cycle in three to seven processes such as (Leonard-Barton, 1995) has introduced four dimensions of KM processes such as Creative problem solving and Sharing, Importing the external technical knowledge, and Absorption of same knowledge, Conducting Experiments and Developing prototypes, finally Implementation and Integrations of new methodologies and tools. This framework mainly explains the usage of knowledge management in finding the solution for the given problems through experimentation process. Spijkervet & Van-der-Spek (1997) have introduced four processes such as Developing, Distributing, Combining and Holding the knowledge. Choo (1996) has given three processes such as Sense making; includes the interpretation of information, Knowledge creation; includes the transformation of information, Decision making; includes the processing of information. Levy et al., (2010) has explained the KM audits in an organization and thrown light on current KM framework adopted by the organization. This included six KM dimensions such as requirement, creation, access, transfer (within and between departments), implementation, knowledge evaluation. Mageswari and Sivasubramanian (2013) have

proposed five KM processes such as capturing, creating, storing, sharing, and applying. This framework they have used to measure the KM processes of manufacturing organizations in India.

(El-Badawy et al., 2015) have explained the six dimensions of KM framework: generation of knowledge (Knowledge capturing and content generation), Indexing processes, filtration, linking, and distribution and, application. Thakur and Sinha (2013) have explained the KM framework and role of technology in implementation of KM process in Indian organizations. They have discussed that Knowledge management framework has been included the various processes such as creation, capturing, synthesizing, understanding, transferring and utilizing the knowledge, these processes help to achieve organizational goals.

1.1.1 Knowledge Management in Higher Education Institutions

As the world has entered the 21st century, Higher Education institutions (HEIs) is facing the environment where people are more interconnected and have better awareness about the opportunities. Higher education institutions (HEIs) are also adopting the new essential elements of this progressive society such as knowledge, skills, and innovation (Cranfield & Taylor, 2008). Effective utilization of KM is taken as a very critical factor that supports organizations to develop a competitive advantage. Educational Institutions are also realizing the importance of this factor and started treating Knowledge as a push factor for organizational change and innovation, which are the main forces behind the survival of any organization in this dynamic environment (Sinha, Arora, & Mishra, 2012). Higher education institutions (HEIs) use knowledge in many forms like academics use their professional tacit knowledge, teaching skills and research capabilities in HEIs (Omerzel et al., 2011). During the last decades, many HEIs had started adopting knowledge management processes. HEIs should focus on two main objectives of KM processes in order to get the best outcomes; (i) Focus on knowledge sharing process between employees to improve the employees' skills, knowledge and capabilities. (ii) Focus on tacit knowledge through explicit knowledge, so that knowledge strategies should reflect in its institutional plans and vision (Attallah et al., 2015). There are many researchers who have proposed the success factors for implementing the knowledge management process. A

very few researchers have attempted to propose the KM framework instruments to measure the KM processes in Higher Education institutions (Omerzel et al., 2011). Pawlowski (2015) has discussed global Knowledge management framework. He introduced six processes of KM framework in an education organization; Knowledge recognition, procurement, development, transfer, storage and utilization.

Another knowledge management instrument to assess the knowledge management processes in Higher Education institutions with six processes has been proposed by (Lawson, 2003). It is based upon six KM processes such as Creation, Capturing, Organizing, Storing, Disseminating, and Application. This framework is based on three studies;

1. Wiig (1993) -mentioned above.
2. Parikh (2001) Acquisition, Organization, Dissemination, Application
3. Horwitch and Armacost (2002) Creating, Capturing, Organizing, Transferring, Usage (Lawson, 2003; Nezhadgholi et al., 2013; Chin-Loy, 2003; Allameh et al., 2011)

(Wilkins et al., 2004) has proposed another instrument to examine the KM process, which is explained with the help of four processes: Generation, Storage, Transfer, and Application. Many other researchers have used this framework to measure the KM processes of HEIs in various countries (Biloslavo et al., 2007; Harorimana, 2009; Omerzel et al., 2011). Other six processes for higher education institutions are Creation, Organizing, Storing, Disseminating, Application, and Effectiveness (Sinha et al., 2012; Nayak, 2014). Various studies have proposed instruments to measure the KM processes in higher education institutions. However, Study based on UK has measured KM only with four processes in higher educational sector (Wilkins et al., 2004) and study based on the US has measured KM with six processes (Lawson, 2003). There is no instrument available that has taken the current environment of Indian higher education sector into account while measuring the KM in Indian higher education institutions. It is clear that in this last decade, world has become more connected through various social media platforms, which has further changed the way of distribution, and storage of knowledge, even in Higher education

sector (Sinha, Arora, & Mishra, 2012). Trends of past studies shows that researchers are more emphasizing on knowledge transfer and other areas are still not much developed, which makes it necessary to know the concept of KM beyond the process of knowledge transfer construct because KM is just not about Knowledge transfer but a very vast area of KM is still remaining to expose Peachey and Hall (2005).

The main purpose of the present study is to explore the current position of knowledge management processes of North Indian higher education institutions and also to understand its' relationship with Organizational culture (OC) of these institutions. The study also explores the moderating role of Information and communication technology (ICT) on the relationship between knowledge management (KM) and Organizational culture (OC). Following paragraphs throw a light on the brief introduction of these constructs.

1.2 Organizational Culture: Definitions and Dimensions

Organizational Culture is defined by various researchers and experts but before explaining the organizational culture, meaning of 'culture' should be clear. Based Webster's dictionary, culture is defined as an idea, craft, expertise, habit, practice, or faith of a group of individuals. Every organization has its own culture. Simply it means how people in any organization work or behave. (Chidambaranathan et al., 2015) proposed that it is really significant for administrators and supervisors of organizations to know about their OC types for achieving organizational efficacy and strategic outcomes. A few Definitions of organizational culture by different experts are given below:

Hofstede (1980), "Organizational culture viewed as the joint programming of individuals' brains like common faith, principles and customs that discriminate the members of one institution from another."

Taylor (2004) "Organizational culture created from interpretation of messages about how individuals are supposed to conduct themselves in the organization."

James-Nganga & Nyongesa (2012) "Organizational culture is combination of significant assumptions often not declared but is to be shared by the members of an organization." Two main presumptions are; 1) Beliefs that include reality and are reinforced by experiences. 2) Values that include ideals which are preferable.

Many researchers have discussed the organizational culture construct and introduced various frameworks, dimensions to measure this construct. Dimensions discussed by (Hofstede, 1980) are “Power-distance, Uncertainty avoidance, Individualism / collectivism, Masculinity/femininity, Future orientation, Performance orientation, Human orientation, Assertiveness” (Abu-Jarad et al., 2010; Fleury et al., 2009). Another organizational culture assessment instrument ‘Denison Organizational culture Survey’ (DOCS) has been introduced by Denison and Neale (2000). It is based on four culture traits; Involvement, Consistency, Adaptability, and Mission (Imam et al., 2013; Pardo et al., 2015).

1.2.1 Organizational Culture in Higher Education Institutions

Zhu & Engels (2014) stated that OC influences the teachers and students’ perceived requirement for innovation regarding student–teacher differences, implementation of innovative policies in higher education institutions. Another study has explained McNay’s Model given by Ian McNay (1995), which is developed to assess the OC of HEIs. This model has reflected two dimensions; ‘type and intensity of control’ and ‘focus on strategy and policy. This model presents four quadrants that include many types of higher education institutions’ organizational culture. First is Enterprise; includes strict policy and lenient operational control, relationships with stakeholders, market focus, and external opportunities (2) Corporate; includes strict policy and operational control, centralization, executive authority. Third is Collegiate; lenient policy and operational control, delegation of authority, individual freedom. Forth is Bureaucratic includes lenient policy and strict operational control, follows rules and regulations (Lacatus, 2013). Another framework ‘Competing Value framework’ (CVF) has been given by Quinn and Rohrbaugh (1981) in which they have introduce a quad matrix of OC framework. These four forms of culture are; Adhocracy culture, Clan culture, Market culture, and Hierarchical culture. These various types of cultures are based on six different characteristics. The horizontal dimension is about inward organizational focus versus outward focus and vertical dimension is related to the structure preferences; balance and regulation versus flexibility and discretion. Each quadrant formed by the crossing of two basic dimensions and represented a specific form of OC. Every organization represents a

certain OC model. Then (Cameron and Quinn, 1999) has presented the extension of CVF framework i.e., Organizational culture assessment instrument (OCAI). This instrument is meant to assess the OC in any organization. There are many researchers who have used CVF and OCAI instruments to examine the organizational culture in HEIs (Omerzel et al., 2011; Beytekin et al., 2010; Jacques et al., 2009; Mozaffari, 2008; Lacatus, 2013). It is based on the six characteristics of OC such as dominating organizational characteristics, Leadership, Management style, Organizational Glue, Strategic emphasis, Success criteria. Four types of organizational cultures which are based on these characteristics are given in a Table (1.1).

Table 1.1: OCAI Framework

<p><u>Clan culture:</u> Dominant Characteristics: Personal place, like an extended family. Organizational Leadership: Mentoring, supporting, or nurturing. Management style: Teamwork and participation. Organizational cohesiveness/Glue: Loyalty and mutual trust. Strategic Emphases: Building high trust, openness, and participation Criteria of Success: Development of human resources, employee commitment, and concern for people.</p>	<p><u>Adhocracy culture:</u> Dominant Characteristics: Dynamic and entrepreneurial place. Organizational Leadership: Innovation entrepreneurship or risk taking. Management style: Individual risk taking, innovation, freedom, and uniqueness. Organizational Glue: Commitment Strategic Emphases: Capturing new resources and generating new opportunities. Criteria of Success: Having the most unique or newest products</p>
<p><u>Hierarchy culture:</u> Dominant Characteristics: Controlled and structured place Organizational Leadership: Coordinating, organizing, Management style: Security Organizational Glue: Formal rules and policies. Strategic Emphases: Maintaining stability, control and smooth operations Criteria of Success: Efficiency, smooth-scheduling and low-cost production</p>	<p><u>Market culture:</u> Dominant Characteristics: Results oriented and achievement oriented. Organizational Leadership: Aggressive, results-oriented focus. Management style: Competitiveness and Achievement. Organizational Glue: Achievement and goal accomplishment. Strategic Emphases: Taking competitive actions and achievement. Criteria of Success: Competition and market leadership</p>

(Beytekin et al., 2010; James and Nyongesa, 2012; Mozaffari, 2008; Lacatus, 2013; Omerzel et al., 2011; Allameh et al., 2011)

1.2.2 Organizational Culture and Knowledge Management

There are many studies, which consider the Organizational culture as a facilitator of Knowledge management (David & Fahey, 2000; Abdillah, 2014; Abu-Jarad et al., 2010; Agrawal, 2001; Akhavan et al., 2014; Omerzel et al., 2011; Suri, 2005). Organizational culture is taken as most influential component of knowledge management and organizational learning (Jans and Prasamphanich, 2003). It is the knowledge driven economy and it is proved by the worldwide management scholars that knowledge act as a major analytic asset today. OC is considered as the prime factor which is responsible for the failure KM processes Pillania (2006). Organizational culture facilitates two significant areas related to KM; preparedness to team up and faith among employees. Dissemination of Knowledge triggers the need of human interactivity, free conversation and open discussions (Alavi et al., 2005; De Long & Fahey, 2000). It is not possible to develop the Culture that facilitates the sharing of knowledge in those organizations, where knowledge is viewed as sign of power, reputation or push factor for career growth (Wiewiora et al., 2013). Thus, organizations should try to build such value system that is based upon the formation of collective objectives and open discussions (Cabrera & Cabrera, 2005). Mostly, development of such culture needs the rework on the employers-employees' relationships and try to make them harmonious and empathetic and recreation of customs of free interaction, discussion, and collectivism (Morawski, 2005). Some researchers have given three aspects of Organizational Culture that facilitates knowledge management. First is Values; shape behavior of employees that leads to knowledge creation about customers. Second is Norms; related to knowledge sharing process because employees may feel sharing of human knowledge leads to power risk that also lead to particular type of behavior, which is against social norm of how to interact with others, and will act as barrier to knowledge sharing processes and finally third is practice; like weekly meetings, performance appraisal also shapes behavior of staff, which affects knowledge processes.(Abu-Jarad et al., 2010; Schein, 1990; Gray, 1998; David and Fahey, 2000). OC facilitates the successful knowledge management processes that trigger human resources to re-analyze the existing practices and explore new opportunities. The creation of environment of freedom of exchange of thoughts and embracing their faults facilitate such perspectives (Davenport & Prusak, 1998).

De-Long and Fahey, (2000) explained that organizational culture has very strong association with KM. Cultural plays the prime role in measurement and application of knowledge appropriately. Organizational culture only facilitates to understand what form of knowledge should be exchanged in organization and what form of knowledge should be in personal control. Knowledge embedded in human mind can be exchanged with other employees to transform into structured form of knowledge of any institution (Wei and Miraglia, 2017). Organizational culture determines the behavioral center of KM. Culture give rise to the presumptions about the definition of knowledge and, consequently, it determines what type of knowledge is to be managed; OC also play a mediating role between the individual and organizational knowledge relationship; OC generate the supporting environment for exchange of ideas without any hesitation that finally leads to the effective generation, distribution, and application of knowledge (Prystupa-Rządca, 2017). Every organization should evaluate its organizational culture, and make it clear if their existing culture supports or undermines the Knowledge Management processes in their organization (Tuggle and Shaw, 2000). Organization must take into account its OC while performing the Knowledge Management audits. Organizations should develop such OC, which facilitate better KM practices and lead to organizational effectiveness in positive way (Levy et al., 2010). To refrain from the culture related hurdles, organizations should align their knowledge generation and transfer process with OC (Sánchez et al., 2013). Many studies have explained that Organizational culture affect the success of KM in organization and also explained the relationship between the features of OC and KM (Mageswari et al., 2013; Mudor, 2014; Alkhaldi et al., 2015). They reflect that impact of OC is visible on individual behavior, organizational mission, vision, procedure and policies, job satisfaction, motivations, policies and planning, innovations, commitments and goals (Nezhadgholi et al., 2013).

Specifically, while going through the literature based on KM and OC in India, there are some conceptual and literature review-based studies, who have discussed some of the barriers related to organizational culture that Indian organizations face while implementing the KM processes. These studies were based on pharmaceuticals, and IT Sectors (Agrawal , 2001; Rai, 2011). Some empirical Studies have also proved the significant relationship between KM and OC in manufacturing and IT based

organizations in India. (David, Bhakre & Dubey, 2015; Mageswari et al., 2013) However, another Indian study was failed to find any significant relationship between Organizational Culture and KM in pharmaceuticals and petroleum marketing sectors (Pillania, 2006). Literature does not reflect any Indian higher education sector based study, who has attempted to find the relation between these two variables.

There are some conceptual and literature review-based studies, which have discussed Knowledge Management and Organizational Culture in higher education settings and found that there are very less researches in higher education institutions than commercial sectors (Thomas, 2004; Ali, Ghoneim, Roubaie, 2014; Standing and Benson, 2000). Existing literature also reflect some empirical studies who have proved the significant relationship between OC and KM in various sectors (Lawson, 2003; Román et al., 2004; Allameh et al., 2011; Abdillah, 2014; Pardo et al., 2015; Sharimllah et al., (2007). Empirical Studies explained the relationship between the OC and KM in higher education institutions, are based on western countries, East-Asian and western-Asian countries. However, there are some contradictory studies available in literature, which have proved no significant relationship between OC and KM. Omerzel et al., (2011) a Slovenia based study contention that organizational culture and knowledge management has no significant correlation in higher education institutions. Chidambaranathan et al., (2015) has failed to explain any significant relationship between various types of organizational culture and knowledge management process in HEIs of Qatar. An Indian study based on petroleum marketing, software design and pharmaceutical sector also didn't find support for the relationship between OC and KM (Pillania, 2006). (Mubin, & Latief, 2019) an Indonesian study also failed to prove the significant relationship between these variables in construction company. Discrepancy in reported relationship between OC and KM triggers further investigation.

1.3 Information Communication Technology (ICT): Definition and Dimensions

Information Communication Technology (ICT) is defined as “expertise around computing and communication tools, software that drive these devices, applications that operate on them and systems that are assembled with them” (Mid-Pacific ICT Center, 2014). There is no universally accepted single definition of ICT practice in

existing literature so far. Moreover, a few definitions of ICT have been proposed by various experts and researchers. “ICT is considered as a set of technological instruments utilized to generate, share, accumulate and control information. ICT includes radio, television, video, DVD, telephone, satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing and electronic mail” (UNESCO, 2002; Toro & Joshi, 2012).

(Chen et al., 2015) have proposed the framework for the assessment of computer competency, in which thirteen ICT based areas, had been summed up into three groups. First, ‘Basic ICT skills’ reflect expertise in operating the computer systems, understanding about operating system, searching Internet, and connections and online networking. Second, ‘Advanced ICT skills’ reflect imaging, utilization of database and technological tools. Third, ‘Multimedia related skills and attitude towards ICT’ reflect attitude of employees towards the multimedia ICT sources. (Allahawiah et al., 2013) have given four dimensions of IT competencies are Devices, Software, Security, and Usability. Lopez, (2009) have explained the three dimensions of ICT: ICT Knowledge, ICT operations and ICT infrastructure. One more IT sector based study has explained the two dimensions of ICT; IT infrastructure, IT skills (DeOpacua, 2006). (Teltscher-Susan et al., 2014) explain the prime institutional and technology related complexities that developing countries deal with during the development of ICT tools. They also provide suggestions to address these challenges. Another study has explained a basic table of 13 indicators on Information and Communication Technology, which enable measuring the position and importance of ICT in organizations. This list had been introduced by the international community and United Nation Statistical Commission, and which is helpful to measure the ICT by households and businesses, the ICT production areas, international import and export in ICT related products and ICT in educational field (Force, 2005). (Lam et al., 2009) have discussed that human and organizational hindrances have an impact on the ICT tools’ effectiveness. They have proposed a list of factors that hinder the use of ICT and also explained some consequences that act against the application of ICT in the construction industry.

1.3.1 Information Communication Technology (ICT) in Higher Education Institutions

Various researchers and practitioners consider technological up-gradation as significant factor for economic and social growth. Therefore, Administrators and academics of developing and developed economies have started focusing on technology advancement; particularly started making policies to incorporate information and communication technologies (ICT) related strategy in educational field. (Kreijnsa et al., 2014) have defined ICT in terms of education system as "a set of instruments facilitating, assisting, and strengthening the educational reform." Government usually examines education system in terms of ICT resources" (Hernández-Ramos et al., 2014). Krishnaveni & Meenakumari (2010) explained that use of ICT practices eliminates the difficulties and upgrade the entire management of HEIs. They have explained the various areas, where ICT plays an important role such as General administration, Information administration, Student administration and Staff administration. (Chen et al., 2015) explained that ICT affect teaching effectiveness and student learning worldwide. It is important to integrate ICT into educational field. In 2008, UNESCO has focused on integrating ICT into national educational policy. ICT not only act as a facilitator for education sector, but also effective in knowledge management processes of any institution. By providing the ICT related facilities to the teachers and students, their learning and teaching practices can be improved (Collins et al., 1991). Another study (Jamieson- Proctor et al., 2007) has discussed the ICT framework for education institution in which they have explained Curriculum Integration Performance Measurement Instrument". This instrument is based on the detailed review of the current international and Australian literature studies. This study has explained the definition of ICT and assessment of ICT curriculum incorporation in education field. This instrument based on two-factors such as 'ICT changes' and 'ICT usage.'

Literature reveals various instruments that attempt to measure ICT practices of different organizations. All these ICT instruments mainly focus on measuring ICT Infrastructure of various organizations (DeOpacua, 2006); (Teltscher-Susan et al., 2014); (Kreijnsa et al., 2014); (Krishnaveni & Meenakumari, 2010). However, some

theoretical studies explained that KM processes not only depend upon the ICT infrastructure, but also depend upon the attitude and skills of Human-resources, who are handling ICT practices (Aurum et al., 2008; Omona et al., 2010). (Suri, 2005; Lam et al., 2009) explain that ICT practice is not only about the infrastructure but, human skills are also has major role to play in ICT. Therefore, there is a need to develop measurement tool which would be able to measure human as well as infrastructural aspect of ICT practices.

1.3.2 Information Communication Technology (ICT) in Indian Higher Education Sector

Government of India has also recognized the importance of ICT in education field and also supporting higher education institutions through their national policies to introduce ICT infrastructure to enhance their educational activities. Main purpose of National policies on Education is to promote equity, sustenance, and access in educational field. The government of India has launched its very first National Policy on Education (NPE) in 1968. This policy has created with the objectives of promoting national development, developing a strong common sense of citizenship and culture, and national unification. This policy has paid attention towards through reformation of the education system with the motive of improvement in quality of education at all levels. It has given special importance to the technological and science field and also considered the need of building high moral values education as it has very close relationship with the life of the citizens. National educational policy of 1986 has been improvised in 1992 and it has emphasized on using Educational Technology (ET) for the better access, quality and control of education field. Central government has launched two schemes under these policies. They introduced Educational technology and Computer Literacy in educational field. In 1998, Prime minister of India has launched a National IT Task Force with the target of providing Internet, computers, and software to HEIs for the educational purpose by the end of year 2003 and these center-sponsored efforts caused the formation of another policy named, ICT in education field. These National policies have emphasized the significance of ICT in HEIs and also included ICT based HEIs in National Mission. During the Twelfth Plan various plans of the Eleventh Plan had been taken forward with the purpose of making

these schemes more effective, and sustainable. Government has started Digital Infrastructure Initiatives under which the connectivity of universities and colleges has been upgraded. Government has also taken initiatives to develop computer labs in all institutions and has provided the laptops and low-cost devices for faculty and students as per the institutional requirements. These efforts also include initiatives of providing smart classrooms; Facilities of interactive video-conference. Government have also taken some Content Initiatives and other efforts like examination wings of universities have been connected with computers and provided robust online solutions such as online system for data; automated libraries, and grants management. It is clear that ICT has a very significant role in enhancing strong and effective administration in educational field. Technology is not only applicable in student administration, but also utilize in different resource management in any educational institution. The different features related to the teaching-learning processes require practitioner's attention to decide when to implement ICT (Suri, 2005).

1.3.3 Information and Communication Technology (ICT), Knowledge Management and Organizational Culture

Many researchers and experts have explained that ICT support the administration in exchange of knowledge and information. However, various authors have explained that ICT plays a very significant role in KM process. It facilitates the designing, structuring, storing and disseminating knowledge systems (Kumar et al., 2006; Vangala et al., 2017). (Tung-Sheng et al., 2011) have explained that with the application of ICT practices and technological instruments, Importance of KM has been realized by the knowledge society. Kamasak (2012) discussed that Information System and technology are the most significant factors that enhance the knowledge management process.

There are a very few studies which discussed these three variables i.e., Knowledge Management (KM), Organizational Culture (OC) and Information and Communication Technology (ICT) altogether. (Aurum et al., 2008) explained the enablers of KM processes such as leadership, ICT, organizational culture, organizational process and measurement. ICT has an obvious mechanism for KM. Culture also pushes the participants to exchange their knowledge among one-another.

Another study explained that corporate cultures based on hierarchy culture and market culture has no effect on the usage of Information and Communication Technology for KM (Lopez-Nicolas et al., 2009). Organizational culture and IT support have positive relation with the Knowledge Management process, which in turn have positive relation with innovations. Organizational culture, IT support and KM process are very important to achieve a favorable level of innovations (Mohsin et al., 2015). Another study has explained that different features of the teaching-learning processes require practitioner's attention to decide when to implement ICT and organizational culture (Suri, 2005). Study based on higher education sector that covers all these three variables altogether, is missing in existing literature. A few researchers have also questioned the role of ICT systems in the knowledge management processes. They explain that face to face interaction between employees encourages the trust that further facilitates knowledge transfer and application processes but ICT hinder this face-to-face interaction between employees (Sefollahi, 2018). Another study has explained that for the successful implementation of KM processes in organizations, there should be more importance given to the people and organizational culture of organization as compare to ICT but it is visible that organizations are giving more importance to the ICT than organizational culture (DeOpacua, 2006). There is no literature evidence found on the relationship between ICT and OC in any sector.

Some conceptual and literature-review based studies explained, ICT support knowledge management processes (Song, 2007); (López et al., 2009); (Soualhia and Mejbri, 2014). A few empirical studies also attempted to find the relationship between knowledge management and ICT (DeOpacua, 2006; Hafeez-Baig and Gururajan, 2012; Allahawiah et al., 2013). Particularly, There is no empirical study based on higher education sector, which proves the relationship between ICT and KM. Although, There are some conceptual and literature review based studies which explain that in globalized world, ICT act as facilitator of KM processes in academic sector (Toro and Joshi, 2012; Omona et al., 2010; Bhusry and Ranjan, 201; Shah and Mahmood, 2015). Ultimately, it is clear that there are studies, which have explained the relationship between OC and KM and ICT and KM. But, literature does not prove any relationship between ICT and OC. This scenario makes it possible to find the moderating impact of ICT on the relationship between OC and KM in higher

education sector. Therefore, this study attempts to identify the Current KM processes and Organizational culture of North Indian higher education institutions. It also compares the KM processes of North Indian HEIs. This study proposes the conceptual model which reflects Knowledge Management and Organizational culture relationship. It also establishes the role of Information and communication technology as a moderator between Knowledge Management and Organizational Culture.

1.4 Higher Education Sector in India

Once, First Prime Minister of India, Mr. Pandit Jawaharlal Nehru had explained that pursuing knowledge can help Indian economy, solving its major problems like poverty, wastage of resources in large quantity, and superstition. By developing a reestablished, reawakened educational sector, India can be restructured into a real knowledge power that can lead to actualize the growth and prosperous future. In the current globalized environment, world's wealth more likely depends upon the access to knowledge than natural resources (Bangotra & Chahal, 2016). Since higher educational institutions act as a feeder to every type of organization, challenges of current globalized environment get shifted back to the higher education institutions. It is the responsibility of the Higher Educational Institutions to develop innovative strategies related to administrative and academic operations, to develop the students 'skills that would help them further dealing with challenges of knowledge-based globalized economy. Particularly, in case of India, after the economic liberalization of 1991, world is looking at India as one of the fastest growing economies, having maximum population in the age group of 18-23, which is a very large talent pool of educated human assets. However, as per need of the hour, India should have focused on the quantity and quality of education. Under the mission of producing more quantity and quality of higher education, India has opened up door for private sectors to invest in education sector. With this step, there was an exceptional growth in number of higher educational institutions during 2004 to 2012. As per the report of MHRD of India, 2016, the number of universities has gone up 34 folds i.e. from 20 universities in 1950 to 677 in 2014. As per Ministry of Human Resource Development (MHRD) in India, universities/institutions are categorized as Central Universities, State Private Universities, Deemed Universities, State Public

Universities, and National Importance Institutions and Others. In India, "University" describe as "a Higher educational institution established or incorporated by or under a Central Act, a Provincial Act or a State Act and contains any institution in concern with that University, that is recognized by University Grants Commission (UGC) under the UGC Act, 1956" (MHRD, 2016) .The Government of India gives grants to the UGC to establish Central Universities and National Importance Institutions in India. The Central Government also has right to declare any institution as "Deemed University" as per the recommendations of UGC or MHRD. There are total 773 Higher Education Institutions/Universities in India, including National Importance Institutions and Others (NII & others =96). It includes 185 State Private universities, 45 Central Universities, 318 State public Universities, 129 Deemed Universities, 96 NII & Others (i.e. 74 Institutions of National Importance and 22 others). The total number of colleges has been also increased by 74 folds from 500 in 1950 to 37,204 in 2014.Present research is focusing only on North Indian Higher Education Institutions. So, there are total 197 HEIs in North India out of total 773 institutions i.e. 43 State Private universities, 16 Central Universities, 78 State public Universities, 31 Deemed Universities, and 29 NII & Others.

In this complex globalized economy, every type of organizations demands unique and special kind of skills amongst its employees, which is only possible with the improved quality of education. Quality of education can be improved, only if the higher educational institutions learn to deal with uncertainties. "Knowledge Management" is considered as a one of the best strategic tools to deal with uncertainties (Bangotra and Chahal, 2016).

1.5 Rationale of the study

Knowledge Management is not a very old phenomenon as it has attracted a lot of attention from researchers, organizations and academics after 1995. While Knowledge Management is implemented to every field in this internet era, higher education institutions are regarded as a mother of Knowledge Management as they generate knowledge in the structure of documents, processes, results through experiences, percipience, thoughts, point of views, and interpretations that every person carries in his mind. Academic Institutions, mainly the Higher Educational

Institutions act as mother source for distribution of knowledge and creation of new knowledge as well. As per (Metaxiotis & Psarras, 2006), worldwide, higher education institutions have three prime missions and all these three missions are Knowledge Management centric; first is 'Teaching' - to make their students to be good learners for all their life, Second is 'Research' – to stretch the boundaries of individual knowledge and to develop the creativity, and third is 'Service' – to prepare the individuals to serve the national, and international society. In the business perspective, efficient Knowledge Management framework in HEIs helps them to be in continuity and new created knowledge enhances the institutional ability to make better decisions. Relevancy of Knowledge Management in Higher Educational field can be realized with the fact that students of these institutions act as carrier of knowledge and transfer this knowledge in all those fields which they take as their professions. HEIs handle today's prime issue i.e. 'employability' and employability depends upon quality of Knowledge. Therefore, it is higher educational institutional field, where Knowledge Management has prime role to play. Hence, it is very significant that the area of Knowledge Management is to be critically examined, gaps to be discovered, models to be developed for discovered gaps and to be analyzed in higher educational field. Therefore, present study based on knowledge management in HEIs.

Various theoretical studies in literature reflect that researchers consider 'Organizational Culture' a major push or pull factor of knowledge management (Pillania, 2006; Lawson, 2003; Hendriks, 2004). The Impact of organizational culture on knowledge management process has started receiving some attention in foreign studies. However, literature does not provide a holistic study based on the relationship between knowledge management and organizational culture (Ali, Gohneim, & Roubaie, 2014; Pardo et al., 2015). There is also a discrepancy in the existing literature about the relationship between these two variables as some studies proved significant relation, but others studies were failed to prove the significant relationship between OC and KM (Sharimllah et al., 2007; Omerzel et al., 2011; Lawson, 2003; Akude, 2014; Allameh et al., 2011; Chidambaranathan et al., 2015; Adeinat, & Abdulfatah, 2019). This triggers the need to test the relationship between these two variables. There is no detailed study available in literature, which explains the relationship between the OC and KM in Indian Higher Education Sector. Studies

reviewed explained the relationship between the OC and KM in Higher education institutions, are based on western countries, East Asian and western Asian countries. A very few Indian studies which explain the relationship between OC and KM are based on manufacturing, IT, Banking sectors but no study is based on higher education sector (Agrawal, 2001; Rai, 2011; pillania, 2006; Mageswari et al., 2013; David, Bhakre, & Dubey, 2015; Patel, & Patil, 2019). Present study significantly contributes towards the Knowledge management literature. As empirical study that considers the relationship between organizational culture and Knowledge management in Indian higher education sector, is absent in existing literature. Present study achieves this objective of explaining the relationship between OC and KM in Indian Higher education institutions through below given hypotheses;

H7: There is no significant relationship between Clan culture and Knowledge management of North Indian Higher Education Institutions.

H8: There is no significant relationship between Adhocracy culture and Knowledge management of North Indian Higher Education Institutions.

H9: There is no significant relationship between Market culture and Knowledge management of North Indian Higher Education Institutions.

H10: There is no significant relationship between Hierarchy culture and Knowledge management of North Indian Higher Education Institutions.

H11: There is no significant relationship between Organizational culture and Knowledge management of North Indian Higher Education Institutions.

There is no much literature exist based on KM in higher education sector which provide the detailed explanation of various KM processes in Higher education sector. A few existing studies provide contradictory statements and findings regarding various KM processes in HEIs. As an Iran based study explains that universities put most of their attention towards knowledge storage than other processes (Allameh et al., 2011). (Omerzel et al, 2011) a Slovenian study explains that universities put more of their efforts towards knowledge transfer as well as storage process. (Namdev-Dhamdhere, 2015) based on south Indian academic institution has explained that the created knowledge in the academic institutions is not well stored. Most of the times

captured and created knowledge in south Indian higher education intuitions; remain unknown to all the employees. Such knowledge might be functional if it is well recorded and maintained. HEI's have treasure of knowledge but they are unable to organize this knowledge properly, hence utilization of this knowledge is really less. Another Indian study (Agrawal, 2001) has explained that Employees of Indian organizations tend to pay more attention towards knowledge application process than knowledge creation process. To know the clear picture of various KM processes in Indian HEIs, it is required to identify the various KM processes and also to compare these various KM processes of Indian higher education sector. It would help in maintain the Knowledge management processes of HEIs in better way. Present study attempted to identify current knowledge management processes adopted by the North Indian higher education institutions. It has also attempted to compare the various knowledge management processes of the North Indian higher education institutions through below given hypotheses;

H1: There is no significant difference in knowledge creation process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H2: There is no significant difference in knowledge organization process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H3: There is no significant difference in knowledge storage process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H4: There is no significant difference in knowledge dissemination process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H5: There is no significant difference in knowledge application process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H6: There is no significant difference in knowledge effectiveness process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

Information and Communication Technology (ICT) plays a very significant part in facilitating strong-effective management and administrative functions in Higher education field. ICT facilitates not only student administration but also different resource administration in HEIs. It helps in the exchange of information and also facilitates the access to higher education (Christiana, 2008; Singh, 2008). (Omerzel et al., 2011; Wilkens et al., 2004; Nezhadgholi & Aghaei, 2013) explain that an effective implementation of ICT plays significant role in the success of KM process in HEIs. (Vyas et al., 2021; Agrawal et al., 2020; Soualhia & Mejbri, 2014; Funda, 2019) explain that ICT has significant impact on the Knowledge Management process. Previous studies explain that ICT infrastructure supports KM process in organizations. Some studies explain ICT-based KM in which they discuss only about ICT infrastructure that act as a push or pull factor for the KM process (Kumar & Kumar, 2006; García, 2009). Suri, (2005) and Lam et al., (2009) explain that ICT practice is not only about the infrastructure but, human skills also have a major role to play in ICT. Empirical study that focuses on the human aspect of ICT practices along with infrastructure that facilitates the KM process of any organization, have been absent in existing literature (De-opacu, 2006; Krishnaveni and Meenakumari, 2010; Allahawiah et al., 2017). This triggers the need of a study, which explains both the aspect of ICT practices as ICT infrastructure and ICT human-skills and also discusses about how it affects the KM process in the higher education sector. Present study is also a first study who has presented an ICT practices measurement tool for higher education institutions which consider ICT infrastructure and ICT human skills aspect of ICT practices together.

As existing literature made it very much clear that ICT is a very significant part of KM infrastructure. Various social sciences-based studies focused on educational field have used ICT as a moderator on the various relationships such as HRM and educational success or learning expectation and outcomes or information literacy and digital skills. ICT also act as moderator on the various relationships

between different variables based on different sector other than education sector such as ICT as moderator on the relationship between KM and organizational performance (Islam, & Islam, 2017; Pavel, 2018). Previous studies restricted to the KM sector for testing relationship between ICT and KM, using ICT as independent variable (Aurum et al., 2008; Omona et al., 2010; Andreeva & Kianto, 2012; Allahawiah et al., 2013; Vyas et al., 2021; Agrawal et al., 2020; Soualhia & Mejbri, 2014; Funda, 2019). Study that explains ICT as moderator between the relationship of OC and KM have been absent in existing literature. It requires explaining the role of ICT as moderator on the relationship between OC and KM. Present study is the first study, which explains moderating impact of ICT (which is taken as a significant part of KM infrastructure in literature) on relationship between Organizational culture and Knowledge management. Present study achieves this objective of explaining the moderating impact of ICT on relationship between OC and KM through below given hypothesis;

H12: There is no significant moderating effect of ICT on the relationship between Organizational culture and Knowledge management in North Indian Higher Education Institutions.

The major contributions of present study are; first, it contributes to the literature of knowledge management by presenting a measurement instrument for KM processes in higher education sector. Second, it presents empirical evidence in support of relationship between KM and OC. Third, it provides and validates instrument to measure ICT practices, which consider both infrastructure as well as human aspect of ICT. Fourth, it presents ICT as moderator on the relationship between OC and KM in higher educational settings. As this study suggest HEIs should consider their organizational culture before implementation of KM initiatives that would help in the strategic planning of institutions. An assessment of organizational cultural and ICT practices help in setting an achievable mission. Organizations align their organizational culture with ICT practices for the facilitation of KM process, lead to generate organizational change.

1.6 Structure of Thesis

This study has been structured in a way, where the current chapter (i.e., **First Chapter**) reflects the brief introduction to all the constructs under study and higher education sector in India. It also throws a light on rationale of the study and describes the structure of thesis.

The second chapter explains the detailed literature review on knowledge management (KM) and its framework in Higher Education Institutions, Organizational Culture and its framework in Higher Education Institutions and ICT and its Framework.

The third chapter explains the methodology of study, objectives, hypotheses of study, scope of study, sample profile, and research setting. It also describes the procedure of designing the research instrument, construct specifications, content validity and pilot testing of constructs, tools and techniques for data analysis, research process and limitations of the study.

The fourth chapter presents the practice of validating and measuring the various constructs in this study such as KM, OC, and ICT scales.

The fifth chapter describes the identification of the current Knowledge Management processes and the current organizational culture of North Indian Higher Education Institutions (HEIs).

The sixth chapter presents the assessment of the impact of Organizational Culture on Knowledge Management and presents the procedure used to measure Organizational culture- Knowledge management relationship.

The seventh chapter explains the moderating role played by Information and Communication Technology (ICT) in Knowledge management - Organizational culture relationship. The eighth chapter explains the significant findings, discussion, conclusion, implications and suggestions for future practitioners and researchers.

CHAPTER 2

LITERATURE REVIEW

For the comprehensive explanation of present study, it is important to understand what has been done in past in the discipline of knowledge management, Organizational Culture, and ICT in higher education sector. This will allow understanding the research gap that present study can attempt to fill. Hence, it is strongly required to review the existing literature that can be associated with the research problem under study. This chapter has been assigned to fulfill this requirement. This section will give the readers an idea about the different studies by different authors in field of Knowledge Management and its framework in higher education institutions. It also covers the different studies based on organizational culture framework in various sectors, and OC framework in higher educational institutions. This section throws a light on different studies based on the relationship and effect of Organizational Culture on Knowledge Management in other sectors and Academic sector. Finally, it explains the studies based on Information and Communication Technology (ICT), Organizational Culture (OC) and Knowledge Management (KM).

As per the requirement of present study, literature review is divided into four categories, which is explained in a Table 2.1 given below.

Table 2.1: Overview of Literature Study

2.1 Knowledge Management (KM) Construct	2.2 Organizational Culture Construct (OC)	2.3 Knowledge Management (KM) and Organizational Culture (OC)	2.4 Knowledge Management (KM), Organizational Culture (OC) and Information and Communication Technology (ICT)
2.1.1 Studies Based on Knowledge Management and its Framework	2.2.1 Studies in field of Organizational Culture and its Framework	2.3.1 Studies based on the relationship between KM and OC or related terms like Knowledge Culture	2.4.1 Studies based on ICT and its Framework 2.4.2 Studies based on ICT and KM

2.1.2 Studies Based on Knowledge Management and its Framework in Higher Education Institutions	2.2.2 Studies Based on Organizational Culture in Higher Education Institutions	2.3.2 Studies based on Knowledge Management and Organizational Culture in Higher Education Institutions	2.4.3 Studies based on ICT and Organizational Culture
			2.4.4 Studies based on KM, Organizational Culture and ICT

2.1 Knowledge Management Construct (KM)

2.1.1 Studies based on Knowledge Management and its Framework

Various literature review based studies has discussed the various aspects of KM and its related Terms. Peachey and Hall (2005) explained the direction and trends of future research in knowledge management based on Lit review. Different studies based on KM frameworks published in top journals are discussed here. This study tried to find out the gap and shortcoming of the current literature. As per Hicks, Dattero, & Galup (2006) there are various definitions and terms are available in literature about Knowledge management. These various terms, sometimes have similar meaning but, sometimes have conflicting definitions as these terms are focused on the other areas of research. There is very less literature present which focus on the various terms that facilitate KM such as classification of data, information, and related terms. Beesley & Cooper (2008) study has reflected the management of KM processes in order to reflect the common terminology, which is accepted and used by most of the researchers in the field. Existing literature based on various discipline has been combined to explain the various steps taken by an individual in order to create the innovation though knowledge acquisition and various knowledge processes. This study has also explained the various terms provide the description of such steps and activities. Acceptance of a common vocabulary to understand the KM processes develop a platform to understand these processes in a better way. Peinl (2011) has presented literature review based paper. This paper has explained the list of various significant knowledge management instruments to assess the KM processes. These instruments have given a definition for KM instruments and this study have also the categorized these instruments which would help in

recognizing the potential duplicate instruments. AF-Ragab and Arisha (2013) paper has facilitated with the literature review and has provided the list of KM publications by putting them in various categories. This study has also given a detailed reference for new researchers, who are trying to explore the area of Knowledge Measurement. Researchers have reviewed 350 articles in total, given in peer-reviewed journals and conferences. This study has just included the studies of last decade. Authors have examined and categorized the studies as per their specific subject matter related to the KM field. Researchers have presented KM studies in five categories such as Knowledge Management Systems, Managerial & Social issues of KM, Ontology of Knowledge and KM, Role of Information Technology, and Knowledge Measurement. This study has not addressed some issues related to the counter studies and theoretical gaps. As this knowledge management subject has very vast field, so researchers were unable to cover the KM research entirely. This paper threw a light on KM field through a detailed sketch of KM research, facilitating researchers with new point of views that would help them for future research studies, and also presented a literature review related to the various significant knowledge management frameworks.

Various studies have proposed the KM frameworks based on the KM infrastructure or various KM processes. Researchers have discussed significance of KM process in various sectors, measures of KM processes and have also proposed methods for the improvement of KM process. Baastrup and Stromness (2003) have proposed a framework to measure KM process and explained that how organizations and governments can perform in a better way & develop better policies, once they understand the KM processes in better way. Edler (2003) found that increasing importance of knowledge management in sector of production and innovation became a challenge for the management of organizations, and policy makers. This study has explained the widespread knowledge management processes and also proposed improvements if required to increase the production and innovation capacity. (Wilkins et al., 2004) provides the combination of resource-based thinking and theories of organizational learning and knowledge management. Study reflects the analysis of the processes of Knowledge interaction and their relation to core competencies and dynamic capabilities. Hicks, Dattero, & Galup (2006) proposed a

five-tier knowledge management hierarchy Model to facilitate a life-cycle of knowledge initiatives that would further direct to the superior knowledge managers to implement KM initiatives. It could also be associated with inventory knowledge assets, analyze KM processes, and manage knowledge resources in any organization. (Davenport et al., 1996) & (Edler, 2003) have proposed the framework for redesigning the strategies for the improvement of knowledge work process. Researchers discussed that how organization can manage more efficiently their two most precious assets Knowledge and people, who create and use knowledge for the betterment of organization. As per (Davenport et al., 1996) for the improvement of KM processes such as Knowledge creation, distribution and utilization either firms can use traditional method, in which knowledge workers should decide on their own that how to create and use a particular knowledge to get best out of it or they can use reengineering methods/strategies that have been used for administrative work and operational work. Researchers have suggested an intermediary method in which firm can develop a knowledge strategy and this strategy should reflect all the knowledge processes. Haas and Hansen (2007) have discussed how knowledge related capabilities translated to performance related outcome. Different types of knowledge affect the work activities differently. It is proved that various forms of knowledge have various types of usability for task units. Every type of knowledge has its own effect on the organizational performance. Iranzadeh & Bahrami (2013) has attempted to examine how knowledge management helps in improving the creativity of the employees of an Azerbaijan Organization. This empirical study has reflected that knowledge management processes has significant effect on the improvement of creativity of human assets. As per AF-Ragab and Arisha (2013) Knowledge is considered as a currency of existing economy, a critical asset of organizations and a tool for developing a sustainable competitive advantage. Consequently, it has attracted many researchers and has increased the no. of publications covering a wider range of divergent and overhanging research fields.

Various researchers have proposed KM frameworks based on different KM processes. They have defined various KM processes in their own way. However, various definitions of KM processes or dimensions given under different instruments proposed by various researchers have been discussed below;

According to Baastrup and Stromness (2003), Organization for Economic Cooperation and Development and Statistics Canada have formed a panel which includes the statistical offices from various parts of the world such as Canada, France, Italy, the Netherlands and Sweden and a few spokespersons of various research organizations from Australia, Denmark, Germany and Ireland. They have proposed an instrument to measure the knowledge management processes i.e. a questionnaire to measure and understand the KM in any organization. It has presented a list of items under various KM processes like Acquisition, Transferring, Utilizing and Effectiveness processes to measure the KM framework of any organization. 'Knowledge Acquisition' has been defined as a process of acquiring knowledge from external sources like other sources of industry or research institutions through the utilization of internet sources or participating in projects with external experts. Then, 'Knowledge Transfer' has been defined as a process of distributing or communicating knowledge through the updating the databases of good work practices, new lessons or through the preparation of lists of experts develop written documentation like lessons, training manuals, articles, paper for publication, through the arrangement of collaborative work by virtual projects teams with external experts. 'Knowledge Utilization' has been defined as a process of implementing knowledge within organization to improve process of knowledge transfer from old to new workers, to support the merger or acquisition decision of organization to further help in capturing and utilizing knowledge within your new organization, to improve the accessibility of knowledge to the organization. Finally, 'Knowledge Effectiveness' is defined as a processes of realizing the outcomes of knowledge application in terms of increased capability in capturing knowledge from research institutions or from other businesses, Improved skills and knowledge of employees, Improved efficiency and productivity of employees, in terms of adaptation new product development as per customers' requirements and improvements in retaining the knowledge workers in organization.

Edler (2003) study has proposed five dimensions to measure the KM processes in private sectors. First dimension 'KM strategies and policies' cover the indicators which measure the operative role of Knowledge Management processes based on Man-power. In this dimension various written policies and strategies related to KM, values system that encourage knowledge transferring, programs for the

retention of employees, strategic alliances for the purpose of capturing knowledge have been covered. Second dimension 'Capturing and Accusation of Knowledge' explains how to capture and protect the knowledge acquired from various external sources such as industrial associations, competitors, and suppliers, research institutions, universities, national research labs. It has also included capturing external knowledge and sharing it with other members of organization. This strategic process is very defensive in nature. Third dimension 'Knowledge Communication' contains the variables regarding vertical knowledge sharing such as motivating experienced employees to share their knowledge to new or less experienced employees, encouraging employees to go for further educational courses, arranging off-site training to update employees' skills. Fourth dimension 'Knowledge Integration process' mainly contains the variables related to integration and utilization of knowledge within the company to create the competitive advantage, to support in integrating the knowledge within organization, to support the knowledge capturing process from external sources, to improve knowledge communication process within and outside the organization, to improve efficiency by integrating knowledge to increase production and to protect the theft or loss of information of organization. Then, Fifth dimension 'Knowledge Effectiveness Process' explain how these four knowledge management processes are effective to improve their knowledge communication horizontally and vertically, to improve the productivity and efficiency of employees, to improve the current skills of employees, to increase the scope or boundaries of business geographically or in terms of customer relations, to develop the new products or services.

(Wilkens et al., 2004) presents a combination of learning theories which explains that for generating core competencies, organizations have to concentrate on the critical processes of knowledge management framework, such as Knowledge Generation, Knowledge Storage, Knowledge Transfer and Knowledge Application. 'Knowledge Generation' is defined as a process of capturing and generating knowledge by supporting employees to work on joint projects, setting standards for its own organization to compete with the best organizations of its field, including experienced practitioners in its business process, developing research activities, arranging joint R&D projects with other organizations, encouraging employees to

participate in R&D projects, supporting employees in their further education or to work in an international environment. 'Knowledge Storage' is defined as a process of archiving the knowledge or content related to the business processes, research projects. It also includes developing documentation of employees' skills, their competencies, expertise and achievements, storing data related to the biggest projects after completion. 'Knowledge Transfer' is defined as a process of creating efficient system of sharing knowledge with new employees and training them regarding different business processes. It also includes supporting employees' participation and collaboration among employees in various external projects, in presentations, debates, conferences on achievements of employees. 'Knowledge Application' process defined as implementing knowledge to best practices in business processes, research and development projects, solving new challenges, developing new strategies, policies or products, intellectual potential.

There are various KM cycle based frameworks introduced by different researchers in existing literature such as Jack KM cycle, McElroy KM Cycle, The Bukowitz and Williams KM Cycle, Wiig's KM cycle (Dalkir, 2005).

Jack KM cycle, was proposed by Meyer and Zack, (1996) based on five stages of KM cycle; Acquisition, Refinement, Storage, Distribution, and Presentation/utilization. 'Acquisition' process explained as capturing data or information which includes the information regarding sources, cost, and scope, width of information, its depth, credibility, accuracy, timeliness, and relevance. It is focused on the high quality of source of data to develop intellectual products. 'Refinement' includes the value added process through transferring knowledge from one form or medium to another, then reconstructing, relabeling, and cleaning up. This process creates value by developing knowledge which is readily usable. 'Storage' act as a bridge between the acquisition of knowledge and refinement, it provides repository for the further knowledge use. Storage includes storage of physical information, digital database, or KM software. 'Distribution' explains delivering processed knowledge to the end user through fax, e-mail or other medium, and also addresses the issue related to the form of knowledge, timeliness, frequency, and more. 'Presentation or Utilization' stage explains the application or utilization of knowledge

in various activities and also includes the effectiveness of each value-added process through the evaluation after implementation. Researcher evaluate if user made the use of this content efficiently or not. If not, it is considered that KM cycle has been failed to create value to the employees and finally to the organization.

McElroy KM Cycle proposed by McElroy (1999) describes key KM processes as ‘Individual and Group learning; knowledge formulation’, Knowledge integration; codifying knowledge’, and ‘Knowledge Evaluation. First stage ‘Individual and Group learning; knowledge formulation’ defined as a formulation of new knowledge at the organizational level, which includes think-tank, competitive intelligence, subscription services, library services, research activities, and personalized information services. ‘Knowledge Integration’ defined as introduction of new knowledge at organizational level it includes updating operating environment and discarding old ones, knowledge transmission through learning knowledge sharing, and through other social relationship. ‘Knowledge Evaluation’ defined as a conscious decision regarding implementation or integration of particular knowledge into organizational memory. This cycle proves that KM cycle is not only about the documentation management. It has much more than storage of knowledge that reflects the processes to recognizing knowledge content that adds value to organization and its employees.

The Bukowitz and Williams KM Cycle proposed by Bukowitz and Williams (2000). It has explained a knowledge management process framework that describes generation, maintenance and application of strategically managed knowledge to create value. The first stage, ‘Get’ defined as acquiring information required to make decisions, solve problems, or create new product, policy, strategy or to innovate. The next stage, ‘Use’ explains about combining the new knowledge and information in new ways to generate organizational innovation. It includes using intellectual assets and integrating into KM cycle through the use of think-tank creativity-enhancing methods. Next stage ‘Learn’ defined as a formal practice of learning from experiences or completed projects and utilize this learning in order to create competitive advantage. It includes the development of organizational memory, which further leads to improve the organizational learning process. Then, ‘Contribute’ stage of the KM cycle includes the providing knowledge to the right person who is responsible to use it

in a best way at given point of time. Next, 'Assess' stage describe as assessment of processed knowledge at group and organizational level. Assessment includes controlling intellectual capital, defining mission-critical knowledge and matching current intellectual capital against the future requirements of knowledge. It also includes understanding the effect of knowledge on organizational performance, recognizing new types of capital like human expertise, customer relationship, organizational knowledge bases, business processes, ICT, beliefs, values, and culture. 'Build and Sustain' step in the KM cycle deals with ensuring the organizational future intellectual capital will help in survival of organization and help in keeping competitive in future. It deals with the growth and maintenance of knowledge, creating new knowledge and utilizing existing knowledge. The final step 'Divest' explains the discarding the useless assets, which are no longer adding-up any value. It includes transfer internal knowledge to external sources to make it more useful.

Wiig's KM cycle introduced by (Wiig, 1993) which explains how knowledge can be generated and applied as individual or as organizational knowledge. This cycle proposed four steps in this cycle such as Building, Holding, Pooling, and Applying knowledge. First step, 'Building Knowledge' includes capturing knowledge, analyzing the captured knowledge, then reconstruction of this knowledge, codification of knowledge and finally organizing the knowledge. Next step, 'Holding Knowledge' includes remembering or retaining this knowledge and gathering it in repositories and creating organizational memories, immersing it in repositories or making it the part of business procedures, and finally archiving this knowledge. Next step 'Knowledge Pooling' includes coordinating the teams of experts to work on joint projects to develop the knowledge-based networks, then recognizing the source of knowledge and assembling it into the repositories or library for further references, which make this knowledge easily accessible and retrieve as and when required. Finally, 'Applying Knowledge' includes usage of knowledge in various activities like to perform routine jobs, usage of knowledge to analyze some problems, to explain the difficult situation, to recognize the problem and solution of this problem, to identify the experts with whom the problem should be consulted. There are some other KM frameworks, which have defined same KM cycle in three to seven processes such as (Leonard-Barton, 1995) has introduce four dimensions of KM processes such as

Creative problem solving and Sharing, Importing the external technical knowledge, and Absorption of same knowledge, Conducting Experiments and Developing prototypes, finally Implementation and Integrations of new methodologies and tools. This framework mainly explains the usage of knowledge management in finding the solution for the given problems through experimentation process. (Choo, 1996) has given three dimensions of KM framework such as Sense making, Knowledge creation, and Decision making. This framework emphasizes on capturing and creating the right kind of knowledge and finally use it for the right decision making. The (Nickols, 1999) has explained different KM processes under KM framework which includes Generation, Organization, Specialization, Storage, Retrieve, Dissemination, Conservation and Discarding processes of knowledge. This framework has focused on Conservation and Disposal of knowledge.

Hicks, Dattero, & Galup (2006) have explained the novel set of strategies and terminologies. Authors have developed a five-tier knowledge management hierarchy (5TKMH) model that will guide the managers regarding KM initiatives. 5TKMH has been created by expanding the knowledge hierarchy. It had associated an individual and an innovation tier in the knowledge hierarchy. Authors explain that 5TKMH contains all the forms of KM recognized in the literature, which further proposes an instrument for analyzing the KM initiatives in any organization. The definitions of five tiers are: 'Individual knowledge' which is defined as "knowledge embodied in human minds such as employee's skills and experiences." Second tier 'Facts', which are defined as the "values, various attributes and characteristics about the domain." Third tier, 'Influences' which are defined as a "preparation of data in some context, that is processed and organized for the presentation." Fourth tier 'Solutions' which are defined as "application of this processed data and provide clear instructions by the responsible managers or authorities to perform the routine job or to find a solution of a problem." Fifth tier 'Innovation' which is defined as "realizing the effectiveness of utilization of processed data by exploiting knowledge-based resources." It also explores the association between knowledge resources, and proposes a developmental factor for Knowledge initiatives inside the organization. This framework 5TKMH has not been empirically tested by developers, but various empirical studies based on this model, have tested it empirically. Others studies also used this model to measure the

KM process of various organizations. Iranzadeh & Bahrami (2013) has attempted to examine how knowledge management helps in improving the creativity of the employees of an Azerbaijan Organization. This study has explained the Hick's Model-5TKMH to measure the KM processes. This model contains five tiers of Km such as Individual knowledge, Facts, Influences, Solutions, and Innovations based on four Knowledge Management processes such as Knowledge generating, storing, transferring and implementing process. This empirical study has reflected that knowledge management processes has significant effect on the improvement of creativity of human assets.

Piscitello and Rabbiosi (2006) explained that at what degree RKT (reverse knowledge transfer) from subsidiaries to parent company affect the innovativeness in product development or technology development of parent company. It explains that if there is a positive impact of RKT on innovativeness of technology development, RKT are; transformation at managerial level, transformation at professional level, teamwork, transfer of knowledge manually or database transformation and organizational intranet, reporting system and many more. It is proposed that RKT has positive impact on the innovative capacity of Parent company especially when the person-based mechanism is adopted for RKT. Teamwork and manager's transfer mechanisms have better impact on innovative capacity than ICT and written media.

Beesley & Cooper (2008) study explained 'Knowledge Creation' process, act as an outcome to someone's curiosity or solution to some problem, which includes purposeful involvement of individuals or any organization in observations, collection of data, facts to develop a new ways or methods of understanding a particular process or problem. 'Knowledge Transfer' is defined as a process by which employees capture, create and transfer knowledge with each another to develop mutual understanding and social relationship. It includes two-way communications among team members or members of organizations or community. 'Knowledge Adoption and Application' is the process of embodying knowledge into the business process, routine work, creating new products or services. It further lead to create the next process i.e. 'Innovation' which explains that employees explore knowledge, expand it, reconstruct it, and finally create existing knowledge networks , which further linked to

creativity, and Innovation. All these processes are interlinked and overlapped. These processes help knowledge workers to understand the management and implementation of these activities in a better way, and enable them to identify the knowledge management capabilities adopted by various sectors within wider business community. This study has not conducted empirically; therefore, in-depth case studies-based research is needed to be conducted related to knowledge management processes, implementing a common vocabulary as a platform to draw the inferences. This study would help in adopting the common vocabulary for reference to understand knowledge management processes that would improve the implementation of current KM system. It would also facilitate knowledge workers from various sectors to understand each other in a better way using common vocabulary and would ultimately lead to facilitate the conversation between academia and industry. This whole process would provide the various opportunities to the students and workers in education sector. Academic knowledge workers can implement this vocabulary into their curriculum.

(Karadsheh et al., 2009) proposed the conceptual framework of KM. He has stated the seven steps of KM framework; Infrastructure, Combining, Filtration, Storage, Transfer, Utilization, and Knowledge Roles and skills. First step 'Knowledge infrastructure' includes creating appropriate culture, technology and skills that facilitate and support the KM framework in organization. It includes the business strategies, leadership style, management style, organizational focus and practices to encourage the employees to participate in KM activities. Next step, 'Knowledge Combination' includes organizations describe different methods to collect the recognized, captured and generated knowledge into a portfolio. It includes encouraging employees to go for further educational courses, arranging off-site training to update employees' skills In 'Knowledge filtration' step, organizations filter the required knowledge and finally classify and categories it as per its usability. It includes retaining knowledge and gathering it to save it in organized form in repositories. In 'Knowledge Storage and retrieval' phase, they focus on data mining, learning processes and tools, organizational memory process. Under 'Knowledge Transfer' organizations work on transferring the knowledge from one person to another, within the organizational groups and transfer the implicit knowledge to

explicit knowledge. It includes vertical knowledge sharing such as motivating experienced employees to share their knowledge to new or less experienced employees 'Knowledge Utilization' is the phase about implementing the knowledge management tools to perform a routine jobs, usage of knowledge to analyze some problems, to explain the difficult situation, to recognize the problem and solution of this problem. In 'Knowledge Roles and Skills' process, it explained the importance of roles and skills existence in creating, storing, transferring and application of knowledge. It includes realizing the effectiveness of knowledge that is utilized in form of improved skills, improved knowledge capturing, sharing and implementation processes, improved product, services, and copy rights. Researchers claimed that knowledge roles and skills process is the most valid process to enhance the performance of any organization.

There are many researchers in existing literature, who have focused only on Knowledge sharing process. Peachey and Hall (2005) explained that there are different areas under KM such as knowledge creation, storage, retrieval, application but more no. of studies found in area of knowledge transfer as compare to others. It reflected that in a given literature 47% of studies were based on knowledge transfer. Then second preferred area was knowledge storage and retrieval with 20% studies conducted on this construct. Then knowledge application 17% and knowledge creation construct based studies were 15% of published articles. So, it can create the imbalance in the field of KM in near future because trends of studies shows that researchers are more emphasizing on knowledge transfer and other areas are still not much developed. So, it triggers the need of understanding the concept KM beyond the transfer of knowledge construct because KM is just not about Knowledge transfer but a very vast area of KM is still remaining to expose.

Haas and Hansen (2007), an empirical study has proposed the development of productivity model based on knowledge transfer process in organizations. This study explained that sharing of knowledge in form of electronic documents or codes neither improves the quality of work nor signaling of competences to clients, it only saves time. On the other hand, sharing of knowledge through the discussion of expertise improves the work quality and signaling of competences of clients, but it doesn't save

time. High quality of documented knowledge cannot replace the benefit of expert advice.

Riege (2005) & Keyes (2008) have explained the possible barriers in knowledge sharing process. Riege (2005) proposed a structured starting point for the managers while auditing the Knowledge sharing processes and to provide the list of barriers in Knowledge sharing process. This study has defined 'Knowledge Sharing Process' as a key process among all the KM processes, which includes people-driven or technology-driven sharing of knowledge vertically and horizontally in an Organization. It has listed three dozen of Knowledge sharing barriers and categorized these barriers into three domains-individual, organizational and technical barriers. This gives an idea to the managers while auditing their knowledge sharing process and developing their knowledge strategies, it is necessary to consider the different barriers at different level. It also explains that KM processes are also based on the Organizational processes and Organizational culture. Though different organizations have their different organization culture, knowledge flow, existing communications and knowledge requirements but still this study gives a list of upcoming barriers to which a manager always have to consider while developing knowledge sharing strategies.

Keyes (2008) explained that support of knowledge worker in sharing knowledge among them is important. This study explained the relationship between the willingness to share knowledge and effective knowledge sharing. This qualitative study explained how the wastage of knowledge can be prevented. It also helped in understanding how to make organizations more productive by taking into account some factors that affect the willingness of knowledge sharing of knowledge workers. Author discussed the impact of willingness of knowledge exchange on the effective knowledge exchange. They also discussed the different organizational and cultural factors such as age of employees, gender, management support, tenure, use of IT, trust, and comfort level with their peers have ability to promote or resist knowledge sharing process.

There are some researchers, who have explained the facilitators of KM processes as a part of KM framework. (Aurum, Daneshgar, & Ward, 2008) has

analyzed the current KM in Software development practices in the Australian organizations. Authors presented the enablers of Knowledge management such as technology, leadership, culture, and organizational process as a part of KM framework. They claimed that software engineers are good in knowledge sharing process; however, they are not very good in utilization of Knowledge. Culture, leadership and technology enablers of KM were considered very important in these organizations. Technology had been taken as a mechanism for KM.

Komanyane (2010) has examined the knowledge management (KM) processes in the public sectors of Botswana. They also attempted to explain if there is any culture aspect and technological aspects to support the KM processes such as sharing and utilization of knowledge; whether managers are facilitating the employees with technical instruments to utilize the knowledge repositories and social networking. corporate manager/directors must be familiar with the subject of KM, its creation, sharing, and implementation processes in the organization. Authors have attempted to explain the position of KM processes; Public service managers' perception about the implementation of KM. Authors explained that organizations are focusing on information management instead of KM. Public service managers knew the value of KM. Managers have themselves recognized their various weaknesses, such as lack of implementation of KM processes among their staff, weak sharing strategies, absence of proper policies and KM systems. This study leads the managers to analyze and improve their current KM processes.

(Tung-Sheng et al., 2011) have explained that with the usage of ICT and technological devices, Importance of KM has been realized by the knowledge society. However, authors have tried to understand the effect of moderator KM on the association between technology and organizational effectiveness. It was the premise that technology is the most important factor for effective knowledge management, which is taken as a mediator to know the ultimate betterment in organizational effectiveness in a Research & Development (R&D) organization. It is found that knowledge management partially mediate the technology-organizational effectiveness linkage and knowledge management also act as an indirect predictor to organizational

effectiveness. KM has been also proved as a central mechanism that supports the impact of technology on organizational effectiveness.

There are some recent studies, which have attempted to propose the KM framework in various fields and defined the various dimensions of KM process.

Thakur and Sinha (2013) has defined the KM as a structured process for generating, capturing, combining, training, transferring, and utilizing the knowledge to realize the organizational goals. It is very important for every organization to support the proper flow of information. Knowledge management is an essential factor that can protect organizations from an early demise and help them to survive in this competitive environment. Today most of the organizations are focusing on developing their own knowledge management programs. Indian business organizations have also started realizing the importance of new business criterion. Most of the corporations have already introduced KM processes in their organizations. Researchers have focused on the KM processes in various business sectors at Bhopal. They have explained the benefits of KM in India. This study can be served as a good literature for the division of knowledge management. It explains a supportive role of technologies based on KM and their applications in various business organizations. Authors have also thrown some light on the problems, which act as hindrances for knowledge management processes in India. And have also identified if the organizations are familiar with the knowledge management subject. Author's main focus was to know how well the knowledge managers and initiators predict the application of KM processes and its usage. This study has examined effective utilization of a Knowledge based policy and also explained its future implications.

Downes (2014) explained that Knowledge management (KM) emerged as an important process for managing the knowledge asset of any organizational. There is very limited literature exists related to KM in non-profit organizations. This study claims that knowledge management is the essential process for the sustainability of non-profit organizations. In such organizations, knowledge helps employees to meet the requirements of their clients'. KM plays a very prominent role for Australian organizations in achieving performance excellence. This research investigates the effectiveness of KM process and also enlists the main factors that influence KM

process. Researchers have proposed KM instrument to measure the KM process, which includes sequential processes; Knowledge Creation, Storage, Transfer and Application. 'Creation of knowledge' is defined as generating knowledge from existing sources by recognizing the appropriate knowledge stored in human-minds, capturing knowledge by arranging collaboration among internal employees with external team members. 'Knowledge Storage' is defined as a retrieval of processed knowledge after cleaning-up data out of context. It focuses on data mining, learning processes and tools, organizational memory process. 'Transfer of knowledge' included communicating knowledge horizontally and vertically through various mediums such as email, telephones, intranet and local-networks. Organizations work on transferring the knowledge from one person to another, within the organizational groups and transfer the implicit knowledge to explicit knowledge. 'Application of knowledge' defined as implementing knowledge in developing new strategies, policies, services, competitive advantage and to improve further practices. It includes utilization of knowledge in performing a routine jobs or usage of knowledge to analyze some problems, to explain the difficult situation, to recognize the problem and solution of this problem. This study explained that there was moderate level of effectiveness of KM required for introducing the improvements in KM processes in Australian organizations. A good resourcing framework and commitment of employees in transferring the merits of KM were identified as main influencers of KM processes. They proposed that 'clan culture' has a positive effect on attitudes towards knowledge creation, interactions between workers, organizational structure, incentive system, and leadership. Interaction among employees is the main source of sharing knowledge in Australian organizations.

Pawlowski and Bick (2015) have proposed a networked model of KM in which various processes at three levels were described. This has been discussed at global level. First level includes 'business processes' that is main core processes of business such as human assets, production, Marketing and creating value for Customers. Second level contains 'knowledge management processes' which includes Knowledge Recognition, Creation, Development, Dissemination, Conservation, and Utilization. 'Recognition process' involves identification of right sources at right time to find the solution of particular problem or to create a new strategy or policy. It

includes the brain-storming, conferencing, reviewing old projects, interviewing existing teams working on other projects. 'Creation' process explained as capturing data or information which includes the information regarding sources, cost, and scope, width of information, its depth, credibility, accuracy, timeliness, and relevance. 'Development' includes the reconstructing, relabeling, filtering, reviewing, and cleaning up the captured knowledge. This process includes developing knowledge which is readily accessible. 'Dissemination' explains delivering processed knowledge to the end user through fax, e-mail or other medium, and also addresses the issue related to the form of knowledge, timeliness, frequency, and more. 'Conservation' provides repository for the further knowledge use, which includes storage of physical information, digital database, or KM software. 'Utilization' explains the application of knowledge in various activities such as routine work, business processes, developing new products or policies. It also includes the effectiveness of each value-added process through the assessment of implementation of knowledge. Third level reflects 'external practices with extraneous associates' which include cooperative associates, strategic alliances, consumers, offshore associates) It covers various functions like Cooperation, establishment, Awareness, Negotiation, Agreement, and Culture exchange. Last category of this model presents the measuring Instrument which is used to handle knowledge processes based on human and technology aspect of KM. (Iskandar et al., 2017) have analyzed and recognized the present topics on Knowledge management system (KMS). Authors have also provided the suggestion for future research work. Most popular topics related to the KMS are KM abilities and characteristics development, Big Data related topics on Knowledge management system, and integration of new technology issue on Knowledge management system.

(Aziz et al., 2018) study has proposed a measurement tool i.e. knowledge management performance measurement (KMPPM) model for analyzing KM processes in organization. Accordingly, this study has also explained the existing knowledge management (KM) processes and factors that have impact on the knowledge flow, and sharing of knowledge in organizations, especially the Ministry of Education (MOE) in Oman. The study has attempted to understand the existing knowledge management processes in the MOE and knowledge transfer process specifically. It explained the uni-dimensional scale for KM process which includes various activities

of capturing, storing and organizing the captured knowledge. Knowledge sharing has been explained as different factors that enable KM process. This study defined 'Knowledge Sharing Process' as transmitting the captured or know-how type knowledge between sub-units by using various mediums such as telephones, emails, meetings, shared technologies through revision of policies or strategies and review of models. This study has explained KM variables based on five factors: Knowledge management processes, Knowledge transfer, Shared trust, commitment, and Attitude. This study has explained that KMPM and its factors have significant correlation with Socio-Technical Enablers scale. Proposed model would help other researchers to examine the reality of KM initiatives by analyzing employees' work environment.

(Shujahat et al., 2019) has explained a new research model to examine the neglected and critical moderating impact of knowledge-worker productivity on the relationship between Innovation and various KM processes such as Creation, Transfer, and Implementation. This study defined 'Knowledge Creation' as a process of capturing and generating knowledge by supporting employees to work on joint projects, setting standards for its own organization to compete with the best organizations of its field, arranging joint R&D projects with other organizations, encouraging employees to participate in R&D projects, supporting employees in their further education or to work in an international environment. 'Knowledge Transfer' is defined as a process of transferring knowledge from one form to another or from one place to another. It includes archiving the knowledge or content related to the business processes, research projects. It also includes creating efficient system of sharing knowledge with new employees and training them regarding different business processes. It also includes supporting employees' participation and collaboration among employees in various external projects, in presentations, debates, conferences on achievements of employees. 'Knowledge Implementation' process defined as applying knowledge to best practices in business processes, research and development projects, solving new challenges, developing new strategies, policies or products, intellectual capital. Study is based on IT (Information Technology) sector of Pakistan. Authors found that knowledge-worker productivity is a mediating factor on the relationship of knowledge management processes i.e. 'Creation' and 'Implementation & Innovation'. However, it does not show any mediating role between knowledge

sharing and innovation linkage. The results explain the critical function of productivity of employees who directly involved in knowledge activities, in influencing the innovation. Moreover, the findings also consider the influence of the human and cultural aspects of knowledge management.

(Hussain et al., 2019) this empirical study, has analyzed the impact of knowledge Management on organizations' innovative capacity. This study has proposed the uni-dimensional KM framework based on overlapping, continuous five KM processes such as Knowledge Creation, Collection; Organizing, Transfer, and Implementation 'Knowledge Creation' is defined as a procedure of gathering new concepts and new information through learning. It includes linking the individual knowledge with organizational knowledge. 'Knowledge Collection' defined as gathering knowledge from both internal and external sources, which involves replacing employees existing knowledge with their new team members or collaborators to upgrade the level of their existing knowledge. It is a continuous process. 'Knowledge Organizing' process involves processing knowledge to enhance its quality and variety. Knowledge organizing includes having strategy to evaluate the knowledge as per the pre-developed standards, updating the knowledge resources through reviewing, restructuring and sorting it out. 'Knowledge Transfer' involves knowledge seeker's curiosity to gain knowledge and inquiring about Knowledge, skills, and abilities, which is required to absorb the created knowledge. 'Knowledge Implementation' involves utilization of knowledge in decision-making, protecting against data-loss, taking actions and solving the problems. Implementation of knowledge further lead to the creation of knowledge and consequently, this overlapping cycle of processes starts again. Study explains the role of KM in improving the innovative capacity in Small and Medium Enterprises. Moreover, study also explained the influence of KM process in developing the knowledge repositories of SMEs. In effect to know the impact of KM on innovativeness, survey has been conducted in SMEs across Jammu and Kashmir. It has been explained that KM processes are positively and significantly related to innovation capacity of the SMEs.

2.1.2 Studies based on Knowledge Management and its Framework in Higher Education Institutions

Lawson (2003) has proposed a Knowledge Management Assessment Instrument to assess the Knowledge Management Processes in Higher Education Institutions with six processes has been proposed by (Lawson, 2003). It is based upon six KM processes such as Creation, Capturing, Organizing, Storing, Disseminating, and Application. This framework is based on three studies Wigg (1993), Parikh (2001), Horwitch and Armacost (2002). ‘Knowledge Creation’ defined as creating and acquiring knowledge from various sources such as employees, business partners, customers and competitors. It includes the activities like encouraging staff for participating in various knowledge and information exchange processes, rewards system for providing new ideas, reviewing existing database to create new knowledge. ‘Knowledge Capturing’ includes the various activities such as providing feedback to employees’ ideas and maintain records for further development, using specific mechanisms to absorb and share knowledge among employees, customers and business partners and putting knowledge into action plans. ‘Knowledge Organizing’ consists of various activities such as reviewing knowledge on a regular basis, keeping knowledge updated, filtering different types of knowledge and integrating it with various sources, maintaining documents on employees ideas and knowledge. ‘Knowledge Storing’ defined as maintaining databases, information records, repositories using ICT applications to store knowledge. It includes utilization of different written documents such as newsletter, manuals, and research publications, patent and copyrights. ‘Knowledge Dissemination’ is the process of sharing knowledge with various stakeholders using Intranets, Internet, etc. It includes sharing timely reports with employees, customers and external organizations, displaying knowledge through libraries, resource center, other forums, lectures, conferences, and training sessions. ‘Knowledge Application’ is a process of employing knowledge to further creation of new knowledge and applying it to protect knowledge from illegal use, to competitive needs and to solve the problems This instrument has been used by various studies such as (Nezhadgholi et al., 2013; Chin-Loy, 2003; Allameh et al., 2011) to assess KM processes in various fields.

(Abdullah et al., 2005) stated that main business of educational institutions is to produce and share knowledge. It is very significant for HEIs to concentrate on KM framework, and their features in collaborative environment. This study has proposed the KM framework for Higher Education institutions, which includes five components. First is knowledge management architecture, which consists of portal design, artificial intelligence, and data mining system. Second is KM infrastructure, which includes facilities such as internet, intranet, extranet, local networks, KM software and other ICT tools. Third is KM processes or activities, which include Knowledge Creation, Storage, Dissemination, and Usage of knowledge. 'Knowledge Creation' defined as acquiring knowledge through collaboration, and external environment at right time from right people. It includes identification of Knowledge sources and forms of knowledge, transforming one form of knowledge to another, categorizing the knowledge. 'Knowledge Storage' process defined as keeping knowledge in repositories in the forms of documents or database. It includes maintaining the record, indexing, organizing and categorizing the knowledge to make it readily accessible. 'Knowledge Disseminating' includes transferring or sharing the knowledge in a collaborative environment, vertically and horizontally. 'Knowledge Usage' process involves the utilization of processed knowledge in a collaborative environment for various purposes like problem solving, decision making, innovation, creating competitive advantage and learning. Forth is KM related issues which include psychological and cultural aspects such as roles, norms, values, and technology. Fifth is KM audits which include maintenance and measurement of KM process.

Kumar and Kumar (2006) stated that IT based KM intervention are important for producing the better quality of educational services. This study described that IT based KM interventions has an impact on improving quality of Indian education by improving these parameters of Higher Education institutions like R&D processes, Planning and development processes, course curriculum development; administration process and student affairs. Study focused on how many Indian stakeholders believe that IT based KM tools improves the quality of education in all above-mentioned aspects. Researchers found that most of the stakeholders were agreed with the concept

that IT based KM system not only improve the quality of service but also help in reducing cost.

Biloslavo and Trnavcevic (2007) explains KM audit instrument on the basis of (Wilken et al., 2004) with the particular perspective of measuring the status of KM processes in higher educational institutions. This study explains that even if an academic institution is very successful, still it cannot institute the KM processes within the organization. From this prospective, higher education institutions are likely to have the same limitations as any other industry. It also recommends to the managers how to perform knowledge audits and measure the effectiveness of KM processes in their higher education institutions.

Cranfield and Taylor (2008) stated the two aspects of KM. Under first aspect, researchers discussed and investigated the features of academics of Higher Education institutions, which act as a promoter or barrier in the implementation of KM processes. Under another aspect, perception of KM and problems that HEIs has to deal with during the implementation of KM processes are explained. To understand the features of institutions and to investigate the KM processes, Stankowsky's Knowledge management pillars have been used. Stankowsky (2005) framework has explained the four facilitators or pillars of KM process such as Organizational Culture, Leadership, Learning, and Technology. All these pillars come under the roof of business strategy which is further influenced by external forces. Base of these pillars are multi-disciplines of organizations. Researchers concluded that slowly and gradually leaders of Higher education institutions have been started to prioritize the KM processes and tools. Two factors like 'Characteristics of higher education institutions' and 'perceptions of academic staff' have an impact on the culture of the institution that further contributes to the ability to adopt KM process as a tool. In higher education institution role of KM process has not been clearly understood by staff. Before implementing the KM processes benefits of these processes should be defined to the staff of Higher education institutions.

García (2009) Knowledge management is a very important factor that various organizations are utilizing to develop competitive advantage. Current changes in business settings trigger the need of knowledge management for the organizations.

This KM is to be used as raw material for implementing innovations. Similarly, HEIs are also facing many problems and challenges. Educational organizations have also realized the need to rethink regarding their operations, so that they can meet the increasing demands of students, Teachers, and accreditation institutions. On the basis of existing Literature, this study has explained the experiences and understanding of KM of various universities which are already using KM in their day-to-day operations. Authors have discussed that knowledge management tools and methods, which are useful for other business organizations are also applicable to higher education field.

Nassuora (2011) has reviewed the studies based on KM, Knowledge sharing in HEIs and reason behind the usage of KM process. KM processes bring the three core capabilities together i.e., People, Process and Technology. This study has summarized the Knowledge sharing technologies which facilitates the knowledge sharing process in Higher Education institutions such as internet, intranet, extranet, data mining tools, Online chat software, virtual teamwork, and many more. From the review of different studies by different authors, this study explained the benefit of KM activities to the Higher Education institutions. It is proposed that main reason for applying KM processes and Knowledge sharing process in higher learning institutions is to achieve a good ranking in continuous rating of newspapers and business magazines for developing competitive advantage.

(Bhusry et al., 2011) proposed KM framework in Higher Education institutions and explained that KM processes of higher education institutions are much unstructured in India. This study has explained the 'K-ASD Framework' for the assessment of KM processes of higher education intuitions. This framework includes 'Knowledge Acquisition System', 'Knowledge Structuring and Storage', and 'Knowledge Dissimilation System'. Knowledge Acquisition is defined as a mechanism of gathering and storing knowledge from various members of the institution and external resources. It involves insights in existing expertise, skills and information technology based database, then capture explicit knowledge, transform tacit knowledge to explicit knowledge. 'Knowledge Structuring and Storage' consists of activities like codifying the explicit knowledge so that it can be readily available to

the users to share, and utilize. It involves organizing, formatting, restructuring, filtering, and indexing the acquired knowledge. Basically it is the process of developing knowledge repository with all types of structured collection of the knowledge, which protect loss of data or knowledge. 'Knowledge Dissemination' explained as transfer of stored knowledge to make the best use of it at right time. Knowledge dissemination includes deployment of knowledge to the end users, who utilize it in updating various practices, technologies, developing new products and services. Knowledge can be transferred through training, further education and knowledge based software and other ICT based systems. This model is based upon the IT based KM system which facilitate the knowledge workers to acquire knowledge and finally store it to disseminate this knowledge among all the members. This process helps to make a better decision Researchers recommend that higher education institutions should adopt this framework to handle the complexities of competitive market and to provide the effective education. This study has also given a checklist to evaluate this framework based on functional domains and determinants.

Bhusry, Ranjan, & Nagar (2011) this study has stated the need of KM processes in HEIs and also examined the effect of IT based KM interventions. Researchers stated the KM framework for Higher Education institutions with different domains and determinants of each domain, which act as indicators of IT based KM initiatives. Conceptual framework for KM processes such as efficient knowledge Capturing, Encapsulation & Structuring, Dissemination, and Implementation & Effectiveness of the overall institutional knowledge towards the goals and objectives of any organization, has been proposed for higher education institutions. Authors explain under 'Knowledge capturing' principal knowledge sources such as faculty, students, HODs, administration, research and development staff, registrar and the training and placement services collect and create tacit and explicit knowledge through their routine activities. Under 'Knowledge Encapsulation and Structuring' captured knowledge is being stored as a central library resource for the further utilization by stakeholders. This knowledge repository contains the structured collection of explicit and tacit knowledge developed in an organization, which involves the documents, electronic database and the tacit knowledge, in form of skills and experiences of stakeholders, which is codified explicitly. 'Knowledge

Dissemination' contains the activities related to the sharing and transferring of knowledge repository, which is transferred to the end user after mapping with different practices and processes. It involves the transfer of stored knowledge to make the best use of it at right time. Knowledge dissemination includes deployment of knowledge to the end users, who utilize it in updating various practices, technologies, developing new products and services. Knowledge can be transferred through training, further education and knowledge based software. 'Implementation and effectiveness' contains the activities of stakeholders in which they utilize this knowledge in development of new strategies, practices, processes, and finding the solution of problems and in making decisions. Audit and assessment of the effectiveness of the framework is also an important step in this framework, which includes reviewing the all KM processes and feedback mechanisms. Authors suggest that if this IT based KM intervention model is to be implemented, it'll lead to produce the better return on investment for Higher Education institutions.

Ranjan (2011) proposed the knowledge-sharing framework on the basis of knowledge assets already exist in business school and evaluate the Knowledge sharing process of the business school. Author provided knowledge value chain for the sharing of knowledge resources. Researcher applied the proposed framework to analyze the benefits of knowledge resources and to measure the effect of knowledge transferring on business school. Author found that change in knowledge resources has an impact on the education material creation, publication, sharing and dissimilation. For the business schools effective IT infrastructure for knowledge sharing is important and it will help the online sharing of resources what'll lead to the creation of benefits in shape of academic and personal merits. Author suggested that business schools have to improve their knowledge sharing tools. It is very important to create and share knowledge resources for better ratings and process development. She had suggested the business schools for better achievements should develop a well-defined knowledge-sharing framework.

As per Sinha, Arora, & Mishra (2012) effective utilization of KM is taken as a very critical factor that supports organizations to develop a competitive advantage. Educational Institutions are also realizing the importance of this factor and started

treating Knowledge as a push factor for organizational change and innovation, which are the main forces behind the survival of any organization in this dynamic environment. Though, Higher Educational Institutions are trying to introduce radical overhaul and are focusing on different stages of planning and application of knowledge strategies in order to increase their productivity, competitiveness, organizational effectiveness. Their ultimate goal is to provide better services to the country by providing the skilled managers and leaders for future. However, KM processes are very expensive and there is always a risk of failure. Financial factors act as a limitation for deciding the boundaries for the expansion of knowledge activities. This requires reviewing and rethinking at knowledge management initiatives in Higher Educational Institutions, as these organizations are considered as a knowledge intensive organization. This study has proposed a framework which would guide to develop their Knowledge Management platform in Higher Education Institutions. It provides the steps to utilize the KM portal and also explains the sub parts of this portal comprehensively, which can be treated as guide book of the stakeholders of a higher education institution. These subparts are 'K2Doc' which includes a warehouse of documents, that stores general and technical knowledge related to course works, Fee structure, expenses, strategic Plans. It creates to make it easily accessible to the only staff. Then 'K2Learn' includes the database, learning material, codified information, presentation, notes, old question papers, online quiz, discussion forums , research papers and records that is made available to both faculty and students. Both K2Doc and K2Learn would contain the database that includes information regarding External and Internal sources. This involves stakeholders to disseminate the knowledge and collaborate on various projects. 'K2Research' contains the in-house expertise like case studies, ongoing research projects, working papers, current working student projects, templates, working tools and methodologies such as resume format, questions bank for viva, simulations, old videos of student viva, information regarding placements. 'K2DataBank' involves old student's projects for providing firsthand experience to new students and teachers for further references. 'K2Expert' includes the directory of experts in various domain such as academic experts, career counselors, consultants from various fields etc. 'K2Explore' involves the database for future reference like old closed queries and solutions to problems.

'K2Konnnect' include online discussion forums developed to facilitate student, staff, and management to disseminate information on different topics. K2TestTime includes the virtual platform for exams and tests to facilitate students to practice and appear for mock tests/exams. Through this framework, authors also propose the indicators that facilitate the effective implementation of KM activities in a Higher Education Institution, which ultimately facilitate these organizations to create competitive advantages in the academic market place.

Shukla (2012) has stated the KM model based on the 'Stankowski's Knowledge management (KM) pillars' introduced by Stankowsky (2005) in top tier learning institutions with the objective to know the reasons for adopting the KM practices and to examine the impact of KM practices. Author explained the benefit and application of the KM framework for curriculum development. This KM framework has included various determinants such as Top management support, Development of KM Strategies, KM Road map development, Defining KM process, Implementation, Knowledge creation and sharing, Development and Maintenance of KM Infrastructure, Measuring and Evaluating process. Author suggested that application of the recommended model would help in improving the quality of education and performance of Higher Education institutions.

(Nayak et al., 2014) stated that in this era of cut-throat market competition, Higher Educational Institutions understand the need of KM, to generate the competitive advantage. HEIs are directly into the knowledge-based business which includes creation and implementation of knowledge in their organizational processes. In this extremely competitive environment, Indian institutions are pushed to identify the requirement for knowledge management processes. This study has examined and compared the KM processes such as generation, capturing, organizing, storing, sharing, and implementing) in both public and private higher education institutions in South India. Researchers have used the Lawson (2003) model for assessing the KM processes. This study explained that there is no significant difference in various KM processes such as generation, capturing, organization and Knowledge application in

both the institutions. But both the institutions have shown the significant difference among knowledge storage, Knowledge sharing and KM effectiveness.

Namdev-Dhamdhare (2015) found that the created knowledge in the academic institutions is not well stored. Most of the times captured and created knowledge in higher education intuitions is remain unknown to all the employees, which is called grey literature. Such knowledge might be functional if it is well recorded and maintained. HEI's have treasure of knowledge but they are unable to organize this knowledge properly, hence utilization of this knowledge is really less. It causes the repetitions of the processes. It is necessary for the HEIs to develop the knowledge base of captured knowledge of staff and students of institutions and to describe the application of ICT for the development of Knowledge base and sharing of knowledge. Author has reviewed the literature and stated that higher education institutes are the center of KM for the society. In today's world everyone has free access to knowledge on Internet but Higher Education institutions are more focusing on capturing the tacit knowledge exchange of individuals. Knowledge generation and exchange is not the one-man job, it is necessary for the HEIs to work on the collaborative system with Government bodies and UGC, which are providing the funding and other help to generate the knowledge base.

(Attallah et al., 2015) Knowledge management is considered as a necessity in organizations. In literature, most of the studies are based on the examining the construct of KM in business sector. This study has focused on analyzing the success factors for the application of knowledge management in higher educational institutions. This paper has introduced a conceptual framework on the basis of existing literature related to business institutions and educational institutions. This study introduced the infrastructure based multidimensional constructs for KM framework which are suitable for the educational institutional based study. These constructs are Culture, Strategy, ICT infrastructure, Rewards, and Systematic processes. Study has also provided the details and directions for future research on knowledge related topic. This study has explained that Strategy construct is the very important factor that facilitates the success of KM initiatives. It is the most important factor to be considered by employees and organizations to apply the effective

knowledge management processes. This study has mentioned many studies that discussed the role of strategy in KM processes. Therefore, proposed construct 'strategy' is based upon the instruments given in literature such as (Nuryasin, Prayudi, & Dirgahayu, 2013); (Yaakub, Othman, & Yousif, 2014) and (Zwain, Teong, & Othman, 2014). Another construct i.e., 'Culture' is also very necessary for the effective and successful KM initiative. Literature based on KM field has reflected that relation between organizational culture and the successful application of Knowledge Management. This construct has been generated on the basis of (Nuryasin, Prayudi, & Dirgahayu, 2013), and (Basu & Sengupta, 2007) studies. Researchers have considered the same approach for introducing the other constructs. All the constructs are based upon the literature. 'ICT infrastructure' is also given by many researchers as a facilitator of KM initiatives. This construct is based upon the various studies such as (Choy & Suk, 2005), and (Nawaz & Gomes, 2014). Another construct 'Systemic Process' is based on the studies (Mathi, 2004), and (Zwain, Teong, & Othman, 2014), and Rewards construct is based on (Shoemaker, 2014), and (Zwain, Teong, & Othman, 2014). Authors have also discussed the sub-constructs of some of these constructs. As strategy construct of any organization includes elements, values-based organization, vision, innovative enhancement, Planning and senior management support. These are act as main factors of organizational strategies. Similarly, Culture also contains various sub factors such as motivation level, knowledge sharing behavior, and academic staff involvement. Authors explained that these all the factors are necessary to be examined by the organizations for the successful implementation of KM processes.

(El-Badawy et al., 2015) explained that due to the difference in market demand and output of HEIs, need for managing knowledge in higher education institutions has been realized. Most of the Knowledge management researches are based on the technical aspect rather than the humane aspect of knowledge, which contains the employees of HEI's who directly communicate with the system. This study examines the interaction of age and gender of staff of private Egyptian educational institutions, and its impact on Knowledge Management. Researchers proposed that age and gender did not have any impact on knowledge management

processes. The generalized linear model showed the interactional effect of age and gender on knowledge disseminating process.

Agarwal & Marouf (2017) has defined the KM as a process of attaining, developing, exchanging, and implementing all types of knowledge within an organization to achieve its organizational objectives. Author claimed that higher education institutions are very slow in taking the Knowledge Management initiatives. (Agarwal & Marouf, 2014) has introduced the framework for KM initiatives which is based on the 10-step processes. These steps were categorized under four practices such as Plan, Design, Apply and Scale-up. To assess the institutional existing state of readiness, third step of process under design practice is to be combined with the activities like gaining top management support, assigning a KM related group, and recognizing KM objectives and priorities. Authors have proposed that assessment of existing state of readiness is to be done through focus group interviews or direct interviews to explain the KM capabilities associated with people, processes, culture, and technology within the higher education institution. While there are many instruments explained by various researchers in literature based on the measurement of readiness of KM initiatives, but not many of the instruments have been used to assess the readiness in university setting, taking faculty members as a target population. Study has discussed the various quantitative and qualitative method of collecting KM readiness data in HEIs. This research paper has proposed a design of a research model, an instrument to assess the readiness, and a protocol to conduct the interviews for KM readiness assessment in higher education institutions. Readiness assessment instrument contains both individual faculty readiness and overall organizational readiness to initiate KM processes. When the survey instrument includes questions regarding individual faculty readiness, the protocol of interview is based upon the organizational readiness factors Survey instruments included the items from various literature studies and authors also included a few items based upon the current environment. This survey instrument and interview protocol act as a guide for the other researchers, who wants to assess the readiness in higher education filed. Authors have discussed that their future efforts will be on developing the assessment tool for organizational factors, and developing an interview protocol for individual readiness factors, and then finally integration of these instruments.

(Masa'deh et al., 2019) research study has analyzed the impact of Knowledge Management (KM) infrastructure, which includes technologies, structure, and culture of organization, on the improvement of job satisfaction with regards to developing economies like Jordan. This study has proposed a multidimensional view on KM framework which includes structure, technology and culture as its facilitators to be examined under KM framework. This study has reflected that relationship between KM Infrastructures i.e., Technologies and Culture and job satisfaction is positively significant, whereas 'Structure' sub-construct under KM infrastructure shows no correlation with job satisfaction. Also, the findings have reflected that no significant difference among population in terms of age, experience and academic rank regarding the perceptions on the relationship between KM infrastructure and job satisfaction have been found. However, it has showed the significant difference among groups by gender regarding the perceptions on the correlation between KM infrastructure and job satisfaction.

Mahdi, Nassar & Almsafir, (2019) explains that in this competitive era, organizations have already started realizing the power of acquiring knowledge and applying it in an effective way to create the sustainable competitive advantage. As universities and private colleges are directly dealing in the knowledge resources and these are the organizations that are actually creating leaders and business leaders for the future business world. Knowledge management process would provide a direction to the managers to develop the strategies for their future activities and would also help them stay competitive in market. Knowledge-based view and Resource-based view do not provide any clear picture about the extent to which the KM helps to create the competitive advantage. This study helps in explaining about and why how the competitive advantage can be developed through KM from the KBV and RBV of higher education sector. This study has used the structural equation modeling (SEM) method to understand the co-relation between the various variables of KM and competitive advantage through deductive approach. This study has explained that co-relation between KM and competitive advantage is positively significant. Study concluded that it is important for the private universities to create, accumulate, disseminate and implement knowledge to create the competitive advantage and this

process should be supported by the recognition of knowledge and developing organizational objectives throughout every operation/activity of the organization.

It is clear that most of the studies in the field of KM are based on Western countries and Western-Asian countries. Patel & Patil, (2019), a literature review based Indian study has also explained that most of the research in the field of KM has been conducted in abroad. These abroad based study also focused mostly on IT sector. However, the literature on Knowledge Management in higher education sector is very less. Mainly, KM studies based on Indian higher education sector are surprisingly negligible.

Section 2.1 throws a light on the various studies, which discuss about KM frameworks in various sectors, and KM framework based studies in higher education sector as well. Studies in above section made it clear that there is no much literature exists based on KM in higher education sector, which provides the detailed explanation of state of various KM processes exist in Higher education sector (Kamasak, 2012; Patel & patil, 2019). A few existing studies of literature provide contradictory statements and findings regarding various KM processes in HEIs. (Namdev-Dhamdhere, 2015) based on south Indian academic institution has explained that the created knowledge in the academic institutions is not well stored. Created knowledge might be functional if it is well recorded and maintained. HEI's are unable to organize this knowledge properly; hence utilization of this knowledge is really less. Another Indian study (Agrawal, 2001) has explained that Employees of Indian organizations tend to pay more attention towards knowledge application process than knowledge creation process. Present study attempted to identify current knowledge management processes adopted by the North Indian higher education institutions. It has also attempted to compare the various knowledge management processes of the North Indian higher education institutions through below given hypotheses;

H1: There is no significant difference in knowledge creation process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H2: There is no significant difference in knowledge organization process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H3: There is no significant difference in knowledge storage process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H4: There is no significant difference in knowledge dissemination process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H5: There is no significant difference in knowledge application process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H6: There is no significant difference in knowledge effectiveness process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

2.2 Organizational Culture Construct (OC)

2.2.1 Studies based on Organizational Culture and its Framework

Schein (1990) explained the organizational culture as an environment and practices that any organizations create around their managing of employees, or to the adopted values and beliefs of an organization. In this study, review of the concepts regarding defining and analyzing organizational culture for organizational psychology has been explained. Authors explained various dimensions to measure the Organizational culture such as Leadership, Group boundaries, Reward and Punishment criteria, Power distribution and ideology. Leadership includes various characteristics of a leader such as mentorship, coordinating, organizing, entrepreneurship, motivating, controlling. Group boundaries include inclusion, exclusion, and sense of cohesiveness, sense of belongingness, membership and team-spirit. Reward and Punishment Criteria includes the definition of heroic and sinful behaviors as a member of an organization or group. 'Power distribution' includes hierarchical order, criteria, and rules & regulations, managing feelings of aggression,

competitiveness and anxiety. Ideology includes common practices, religion, values and beliefs which are unexplainable but exist in every social group. Author has discussed that consideration of OC, while designing or changing the most of the HR strategies is very important. There are so many strategies or programs which are failed because the management did not consider the OC. Author also discussed about the organizational cultural levels, culture change, and dynamics of culture.

Gray (1998) has explained through review of literature that Organizational Culture is an assumption, faith, experience and values, which possessed by the member of the organization. Main purpose of this research paper was to review the definition and concepts of OC by different authors such as Meyerson and Martin (1987); Sackman (1991); Hofstede (1991); Baron and Walters (1994); Harrison (1972); Handy (1985), Trompenaars (1993) and Schneider (1994).

Meyerson and Martin (1987) has explained three paradigms which emphasize on integrating mechanism or social glue that binds the members of group or any organization together. First paradigm is 'shared' which includes important manifestation of organizational culture such as a common language, shared values, shared belief, shared practices or mutually agreed appropriate behaviors. Second Paradigm is based on the fact that organizations do not present a single monolithic, dominant culture. Instead, Organizational culture consists of a collection of values, beliefs and manifestations, Some of these manifestation and values can be contradictory that exist in same culture. It represents disagreements, debates, multiple sources of development of culture instead of leader-generated sources. Third Paradigm based on acceptance of ambiguity, complexity, lack of clarity, irreconcilable interpretations. It has no shared values, no clear manifestations, inconsistency. This does not represent a harmonious type of culture but portrayal a culture full of conflict, individuals' viewpoints, and disagreements and ignorant.

Sackman (1991) has introduced three perspectives regarding organizational culture. First is 'a holistic perspective' which includes feelings, thinking, symbolic interactions, and reacting. It consists of historically derived ideas and values. Second is 'a variable perspective' which includes expressions of organizational culture such as verbal behavior such as language, speeches, humor, jargon, stories, legends, and

myths, and physical behaviors such as values, practices, rituals, and ceremonies." Third is 'a cognitive perspective' which includes ideas, values, concepts, blueprints, beliefs, or norms, shared understandings.

Hofstede (1991) has introduced six dimensions of organizational culture for comparison purpose. First dimension is 'Process oriented vs. Results oriented'. Under Process oriented cultures members avoid any kind of risks and put limited effort in their work. Under results-oriented cultures members are risk-takers and put their hard efforts in their work. Second dimension is 'Employee oriented vs. Job oriented'. This is based on a "leadership model-Blake and Mouton's Managerial Grid (1964)." Employee orientation is about individuals own purpose of performing responsibilities. Job oriented based on group-focus and purpose of group in performing activities. Third dimension 'Parochial vs. Professional' includes the employees identify themselves with their organizational identity called parochial but Professional employees identify themselves with their type of job. Fourth dimension 'Open System' vs. 'Closed System' based on communication climate. Open systems is welcoming with new-entrants or outsiders, but closed systems does not entertain outsider and behave secretly. Fifth dimension 'Loose Control' vs. 'Tight Control' is based on internal structure of organization. Members of loose control organizations are flexible about cost and meeting times. Members of tight control organizations are cost-conscious, strict about meeting times, strict unwritten codes, ethics and behavior. Sixth Dimension 'Normative vs. pragmatic' based on issue of customer orientation. Pragmatic organizations are market driven but normative units consists of inviolable rules based jobs.

Baron and Walters (1994) have introduced a model based on four underlying components of culture, and the interactions between these components. These components have relationship between one-another within the model and it also influence various processes of organizations vice-versa. First component 'Values' includes written value statements or shared beliefs with leaders of organization which are not in written form. It explains that dominating values lead to shape the business plan and explain objectives of organizations and vice-versa, creating cycle of this process. Second component 'Systems and Policies' include shared culture but not

shared beliefs about the management of organization. The systems and policies influence culture, alternatively, the culture lead to the success of systems and policies. Third component 'Structure and technology' facilitate the creation of particular type of culture and reinforce it or, may lead to culture change.

Harrison (1972); Handy (1985); Trompenaars (1993) and Schneider (1994) all these studies introduced four types of culture. As it is clear, organizational culture models are either dimension-based or typology-based. These are typology based models, which explain overall culture with the help of four various types of culture differentiated based on some characteristics of culture. These types are presented as its dimensions and these models have been validated as multidimensional model by many researchers. Harrison's Model explained in terms of orientations. First 'Power orientation' reflects entrepreneurial units. Second 'Role orientation' reflects bureaucracies and strong procedures, hierarchy, consistency and predictability. Third 'Task orientation' reflects teams, achievement and intrinsic motivation. Fourth 'Support orientation' reflects relationships, bonding, and family like environment.

Handy (1985) introduced four types of Organizational culture; 'A power culture' consists of powerful head like God-man who rules by whim and impulse. 'A role culture' reflects stereotyped environment and bureaucracy based on logic, rationality, hierarchal structure, its functions or departments. 'A task culture' based on job or project orientation based on performance, power and influences of matrix kind of organizations. 'An Individual culture' based on assisting and serving a cluster of individuals and their own values.

Schneider (1994) introduced Collaboration Culture, Cultivation Culture, Control Culture, and Competence Culture to explain the organizational culture. 'Control Culture' reflects power, order, hierarchy, centralized goal, definition, reward and punishment, and formal systems. 'Collaboration Culture' reflects teams, teamwork, partnership, cooperation, versatility, adaptive behavior, individual talent, feeling of ownership and pride. 'Competence Culture' reflects achievement, performance, personal and organizational excellence, creativity, technological advance, technical excellence and insecure environment. 'Cultivation Culture' reflects growth, skills, free-flowing behavior, flexible relationships, trust, commitment,

feeling of freedom and potential. Author has explained in comprehensive manure about the characteristics, strengths and weaknesses of these cultures. Every Unit, Organization, Industry or Community, has mixture of these four types of culture. Some types are more dominating than others.

Author explained that sometimes there are few assumptions and beliefs which are unspoken/ unwritten but followed by every member of organization, which also explains the organizational culture. Organizational culture is not static; it keeps on changing with new experiences. It reflects that new things always add on in culture, but new experiences don't wipe out the learning of old experiences so culture change is a slow process.

(Scott et al., 2003) has presented a review-based study in which various quantitative instruments, available to assess the culture and cultural change have been discussed. A detail literature review has been conducted using various online portals. As this study is based on the healthcare services filed, sources like Medline, Cinahl, Dhdata, Psych lit, and the database of the King's Fund in London have been searched. Various papers and articles published till 2001 have been included. Under detailed research all the citations of reputed papers and the gray literature have also been taken into account. Experts from related field have been contacted for their advice to recognize, which were not available online database. This research has been focused on those tools which are quantitative, having a good track record in measuring culture, or good face value, in health care settings. This study has discussed the various dimensions of organizational culture covered by each instrument, the number of variables included under each construct of every instrument, the measurement scale utilized by various instruments, examples of those studies based on these instruments, the scientific properties of the instrument, and its strengths and weaknesses. Authors have segregated thirteen instruments as per the inclusion criteria, of which nine studies has used in health care organizations. Study clearly classified the organization culture measurement tools based on typological approach and dimensional approach, Instruments based on typology approach, assess the organizational culture based on mixture of two and more "types" of organizational culture and Instruments based on dimensional approach, which assess a culture based on number of continuous

variables. Typological based Instruments are Competing Value Framework, Harrison's organizational ideology questionnaire, Quality Improvement Implementation Survey. CVF and Harrison's model has been already discussed in other studies. Quality Improvement Implementation Survey introduced by Shortell et al. 2000. It is based on the CVF Instrument. It is based on four types of culture such as Group culture, Developmental Culture, Hierarchy culture, and Rational Culture. These cultures are differentiated on the basis of five Key dimensions such as character of organization, leadership style, cohesion, goals or priorities, and rewards. Assessment results reflect mixture of these four different culture types. Dimensional approach based instruments are Organizational Culture Inventory, MacKenzie's Culture Questionnaire, Hofstede culture instrument. Organizational Culture Inventory introduced by Cooke and Lafferty (1987). It is based on the Shared norms and expectations that provide direction to thinking and behavior individuals. It reflect the 12 thinking styles of individuals such as "oppositional, helpful, conventional, affiliate, approval, dependent, avoidance, power, competitive, competence, achievement, self-actualization." It is the multidimensional scale based on three sub-dimensions, which consists of these 12 thinking styles. Three sub-dimensions or culture types are security culture, satisfaction culture and security culture. MacKenzie's Culture Questionnaire was introduced by MacKenzie (1995).It is based on 76 items long survey questionnaire related to various dimensions such as "employee commitment, attitudes towards innovation, action orientation, conflict resolving style, belief about innovation, trust, attitudes towards change, management style, leadership style, openness, teamwork and cooperation, human asset orientation, consumer orientation, organizational direction." There are various instruments available to the researchers for the measurement of organizational culture, that have various characters, limitations, different scope in terms of dimensions coverage, ease of usability, or scientific properties. Researchers can choose any of these instruments based upon the nature of their organization, availability of resources, characteristics of their research team, the purpose of their study, and required usability of the results.

Cameron & Quinn (2006) has measured the organizational culture using the 'competing value framework' (CVF). This framework has been purposed by Quinn and Rohrbaugh (1981) in which they introduced a matrix of quadrant of OC

framework. These four types of cultures are; Adhocracy culture, Clan culture, Market culture, and Hierarchical culture. These various types of cultures are based on different characteristics such as Innovation, flexibility, growth, new resources, competition, and leadership style. The horizontal dimension is about inward organizational focus versus outward focus and vertical dimension is related to the structure preferences; balance and regulation versus flexibility and discretion. Each quadrant formed by the crossing of two basic dimensions and represented a specific form of OC. Every organization, community or industry represents a certain OC model with mixture of these four types of culture. Then (Cameron and Quinn, 1999) has presented the extension of CVF framework i.e., ‘Organizational culture assessment instrument ‘(OCAI). This instrument is meant to assess the OC in any organization or industry and have included and summarize many other dimensions given by different studies such as dominating attribute, bonding and strategic emphasis, leadership style. Then, Cameron & Quinn, 2006 has introduced the revised study in which they have included and adjusted many dimensions which cover the characteristics of many OC based studies. This updated OCAI defines the organizational Culture profile with the mix characteristics of four various cultures; Adhocracy, Clan, Market, and Hierarchical culture. These four cultures are differentiated with six characteristics of OC such as Dominating organizational characteristics, Leadership style, Management style, Organizational Glue, Strategic emphasis, Success criteria. There are many researchers who have used CVF and OCAI instruments to assess the Organizational Culture in HEIs (Omerzel et al., 2011; Jacques et al., 2009; Mozaffari, 2008; Lacatus, 2013). Various studies have discussed and assessed the dimensionality of this scale. (Kalliath et al., 1999) has explained OCAI instrument as multidimensional scale, considering the various types of culture as its four dimensions. (Helfrich, Mohr, & Meterko, 2007; Heritage, Pollock, & Roberts, 2014; Choi et al., 2010) have examined the dimensionality of OCAI scale. All four studies have conducted the confirmatory factor analysis. (Helfrich, Mohr, & Meterko, 2007) have also conducted exploratory factor analysis on various types of cultures. These studies have validated the dimensionality of model based on four sub-cultures. Researchers explain that the CVF framework is multidimensional scale, but

its dimensions (four types of culture) provide a valid matrix for assessing overall organizational culture, which is mixture of these four types of culture.

Fleury (2009) stated the relationship between the OC and development of new competences in organization. This study has discussed how OC influence, develop, and restrict the organizational competences. To discuss this concept author has presented two case studies of companies with strong culture and very competent in business terms. Author also stated that only in few cases OC restrict competence, where the technically perfect product has more value than marketing, brand and image related competences. Cases discussed by the Author shows that OC can influence the development of the competences and these both the terms have delicate relationship that needs to be researched further.

(Abu-Jarad et al., 2010) using review of studies they discussed the definitions and measurement of organizational culture, definition and measurement of organizational performance and studies explaining correlation between the organizational culture and organizational performance. This paper stated the studies by different Authors at different time related to the definitions and dimensions of organizational culture and organizational performance and authors also explained the correlation between both the variables. Researchers explained that understanding the organizational culture and trait possessed by the organization could differentiate the organization with high performance and low performance.

Goic (2013) has examined the different aspects of the organizational culture, organizational structure and the dynamics of culture change in Croatian organizations. It has also explained the relationship between the characteristics of organizational culture, organizational structure and organizational dynamics of change. Organizational culture has been measured with uni-dimensional scale with five statements based on three characteristics of organizational culture i.e. Attitude of members, Organizational environment, Importance of performance/result. It includes that Acceptance of common values and desirable behavior reflect the strength and integrity of the organization; Importance given to values and ways of work practices by new employees taken as a factor of success. Study has proposed that there is no statistical correlation between the organizational culture and organizational structure,

but there were indications of using strong organizational structure exist with strong organizational culture. There was very strong correlation found in organizational culture and organizational dynamics. Author explained that Croatian enterprises do know the importance of organizational culture but they do not work effectively on developing efficient organizational culture and use of organizational structure efficiently is also neglected. Study stated that organization should put effort towards the development of strong and active organizational culture, which should be embraced by every employee.

Raval (2014) has discussed and used a standardized framework 'OCTAPACE' for measuring the organizational culture of hospitality and banking sector. This model contains 40-item which defines the organization's ethos based on eight values such as Openness: 'Acceptance includes Broad-mindedness; Confrontation includes Crisis, Dispute, and Encounter; Trust includes Confidence, and Assurance; Authenticity includes Credibility, and Legitimacy; Pro-action includes Preparedness; Autonomy includes Liberty, and Sovereignty; Collaboration includes Alliance and Team work; finally, Experimentation includes Research and Innovation. This framework gives the full profile of Organizational Culture.

2.2.2 Studies based on Organizational Culture in Higher Education Institutions

According to Tierney (1988) for the assessment of Organizational Culture in academic system, there is a need of close disclosure of determinants like use of time, space, and communication by members of organization. This study has provided a framework for diagnosing the culture of HEIs, university or colleges based on literature review. This framework for diagnosing the culture in Higher Education institutions based on academic environment, mission, socialization, information, strategy and leadership aspects. Author explained that OC is important to learn about the administration and organization of HEIs and also help in solving administrative problems.

Maassen (1996) developed organizational culture assessment instrument for higher education institutions by using literature review method. This instrument is used to explore the concept of OC in colleges or to know about the college culture. Author has defined Academic Culture in terms of the set of attitudes, faith, and values

that bind a particular group of academics together.” Author found that academic organizational culture is based on different determinants such as discipline, impact of Institutional administration on administrators, national context, international context like country culture, employees of university, and academic professions. In this study, Author has discussed the different instruments for measuring academic culture given by different researchers.

Mozaffari (2008) has attempted to measure and explain the OC of Iranian Universities congruent with the leadership style and managerial skills. This study has used the Competing value framework (CVF) based OCAI framework; The Management Skills Assessment Instrument(MSAI); and Organizational Leadership Assessment instrument (OLA) to measure the organizational culture, Leadership style and Management skills effectiveness in organizations and to explain the association between the OC, leadership style, and managerial skills effectiveness. All three instruments have been purposed by Cameron and Quinn (2006) study. They have developed these three quantitative instruments. OCAI guide investigators to recognize the dominant CVF culture out of four organizational culture types in any organizational. MSAI is used by the leaders to examine their own existing strengths, weaknesses, competencies, and skills. All these things then guide them to a desired form of culture as recognized by the OCAI. Organizational Leadership Assessment (OLA) instrument explains managerial behaviors based on the eight supervisory roles such as facilitator, mentor, broker, innovator, controller, coordinator, producer, and director. Study concludes that no compatibility between the current culture of Higher Education Institutions and the culture desired by faculty has been found. Study stated that currently in Iranian universities, hierarchy culture is a dominating culture, which is characterized by result oriented, coordination, and competitiveness based culture. But faculty and administration desired the dominating adhocracy culture i.e. creativity and risk oriented culture with visionary and innovative leadership style. Researcher believes that more congruence between the OC and leadership style leads to the possession of better managerial skills and also more congruence between the OC and managerial skills leads to better effectiveness in university.

(Jacques et al., 2009) explained the impact of organizational culture and job satisfaction on the service quality of HEI. This study has explained that how OC and job satisfaction are associated with the service quality of HEI and evaluated the implementation of the quality assurance system launched in Greece. Researcher used CVF based instrument to measure OC. They stated that hierarchy culture is relevant for administration and both clan and hierarchy types of cultures are dominated in staff members.

Trivellas & Dargenidou (2009) study is based on analyzing the effect of organizational culture and job satisfaction on the quality of education provided by HEIs. It also helps to explain the doubts regarding the success of implementing the quality assurance and recently introduced examination criteria in Greece. This study is based on the survey of faculty and administrative employees of HEIs. Authors have designed the questionnaire to analyze the culture, job satisfaction, service quality, and internal processes of higher education institution. They have utilized CVF (Competing Values Framework) to analyze the organizational culture, while quality of services provided by higher education institutions have measured with the instrument introduced by 'Owlia and Aspinwall' based on the quality dimensions related to teaching aspects and 'Waugh's instrument of administration quality'. Study suggests that particular type of culture is associated with different factors of service quality of higher education. Hierarchy culture is dominating culture among the administration; Clan and Hierarchy types of culture are dominating cultures among teaching faculty. This study helps in explaining the nature of the relationship between organizational culture, job satisfaction and quality of services provided by higher education institutions that would further facilitate the managers to think carefully about the teaching service quality, decision regarding the up-gradation of service quality, and also help in planning regarding the successful examination and application of processes. Study helps to understand the overall culture profiles of both the administrators and academics. Study also purposes the significance of adhocracy culture in learning the divergence of various forms of service quality of HEI.

(Beytekin et al., 2010) has explored the university's current organizational culture and developed its favorable culture to develop the suitable policies for the

better performance of organization. Research has applied the CVF (competing value framework) to assess the culture of a University. Out of four cultures faculty has adopted the hierarchy type of culture in which they concentrate on internal maintenance and faculty work as per formal rules and policies. But, strategic objectives of the university are based on adhocracy type of culture and somewhat market type culture as they concentrate on better results and competitive strategies. This study has suggested that organizational culture should be aligned with the strategic objective of the organization for better result.

Aktaş, Çiçek & Kıyak (2011) in this competitive environment, Academicians and practitioners both want to achieve the desired organizational efficiency level. They have understood the importance to examine the dimensions that influence organizational efficiency. Study explains that taking organizational culture as one of the dimensions of organizational efficiency, it is important to learn about the impact of various types of organizational culture using OCAI framework on organizational efficiency. The impact of organizational environment has become very critical on the strategy that facilitates to attain a better standard that can also have a critical impact on the association between organizational culture and organizational efficiency. It has also examined the moderating impact of stability or variability of internal and external environment on this relationship. Study has listed factors that influences the efficiency are values of self-direction, Power of managers, and stimulation. This is the survey-based study which is conducted in health care sector. Study has purposed that organizational cultures types have relationship with some factors of organizational efficiency. The stability or variability of internal and external environment and the top manager's values also act as a moderator on the relationship between these two variables.

James, Ng'ang'a & Nyongesa (2012) stated that for developing the strong and cohesive organizational culture, management has to contribute enough time to communicate desirable values to the member of institutes, which leads to enhance the performance of institution. Three factors for developing desired culture; A sincere leader, which establish strong values; a sincere commitment towards the organization as per shared values; a sincere contribution for the benefit of stakeholders. There are

three aspects that help in developing preferable organizational culture. First, organizations should develop strategically relevant culture; second, they should concentrate to develop a strong culture; third, Culture must have adoptability for change.

Fumasoli and Stensaker (2013) study is based on the lit. Review of 25 years studies in a field of organizational studies. Different culture-based studies in educational field show that researcher's main focus was on 'external policy change' and 'response of institution toward this change'. Internal policies, belief, transformations and culture aspects of organizations were ignored in these studies, which are the main aspects of organizational culture. These should be studied deeply, so that research should serve the purpose of administration and decision maker and guide them in developing policies. This study purposed the research agenda of organizational change in a field of higher education.

Lacatus (2013) stated that Organizational culture study helps the Higher Education institutions to understand the factors, which help them to develop and perform. In this study author used the lit. Review method. Different models of organizational culture such as CVF model and McNay's model of university culture were discussed thoroughly. MCNay's Model is explained by Ian McNay (1995), which is developed to assess the organizational culture of HEIs. Two dimensions of this framework are; 1) 'Type and intensity of control' 2) 'Focus on strategy and policy'. This model presents four quadrants that include many types of higher education institutions' organizational culture. First 'Enterprise' includes strict policy and lenient operational control, relationships with stakeholders, market focus, and external opportunities. Second, 'Corporate' includes strict policy and operational control, centralization, executive authority. Third 'Collegiate' includes lenient policy and operational control, delegation of authority, individual freedom. Forth 'Bureaucratic' includes lenient policy and strict operational control, follows rules and regulations. A few other OC models in contemporary universities were also discussed precisely.

(Imam et al., 2013) has assessed the organizational culture of higher education institution, using Denison model of organizational culture explained by Denison

(2000). This model has defined culture based on four traits such as involvement trait, mission trait, adaptability trait, and consistency trait. These traits support capabilities of any organization in adapting the resources and external environment. Authors have also explained the impact of organizational culture on organizational performance of HEIs and used individual readiness for change as a mediator. This study has also presented the comparison of various variables of organizational culture. Study summarized that individual readiness for change act as a partial mediator between organizational culture and organizational performance. Author suggested to the leaders of HEIs that organizational culture and individual readiness for change support in improving the organizational performance. It also helps in increasing overall productivity of HEI's.

Zhu & Engels (2014) examined the perception of teachers and students of university about the organizational culture and their views about the instructional innovation with regards to the student–cantered learning. Authors stated that organizational culture influences the teachers and students perceived requirement for innovation regarding student–teacher differences, implementation of innovative policies.

2.3 Knowledge Management (KM) and Organizational Culture (OC)

2.3.1 Studies based on Relationship between Knowledge Management and Organizational Culture or related terms like Knowledge Culture

As per David and Fahey (2000) Organizational Culture shapes and helps in knowledge management processes of the organization. Four various modes with which culture influence the behavioral center of KM processes (Generation, Exchange and Utilization) were demonstrated. In first way, Author discussed the types of knowledge require to manage and how culture affects the different types of knowledge. In Second way, culture explains that what kind of knowledge is to be regulating in which department. Management has to develop such culture which supports the exchange of individual knowledge and influence to transform it into the organizational knowledge. A strong trusts culture of organization helps in knowledge sharing at individual level and low trust culture hinders the knowledge flow in organization. In third way, Author defines that culture establish a context for the social interactions. Culture represents the rules and practices of organization such as

‘one should not interrupt a superior or meeting hours, and frequencies.’ So, it develops the environment for social discussions, which further supports the knowledge transfer between the different levels of hierarchy and proper use of knowledge. In a fourth way, Author explains that culture affects new knowledge creation and adoption. The different characteristics of efficient culture help in Improving knowledge creation and knowledge practices.

Tuggle and Shaw (2000) stated the effect of organizational culture on the successful knowledge activities in organization. Every organization should evaluate its organizational culture, and make it clear if their existing culture supports or undermine the Knowledge Management processes in their organization. On the basis of existing literature, a model of change, culture and KM has been presented. In which researcher explained that the acceptance and rejection of any KM processes depend upon the impact of those processes on the Employee’s individual work style Such as activities, meetings, and attitude. It helps to explain whether this change is conducive to the individual work style or not. Researchers concluded that if organizational culture welcomes the change in work routine, then it is considered a favorable culture for KM processes. This model will help to understand the OC suitability and hindrance for KM processes. They recognized 17 cultural factors that affect KM processes. With the help of these factors’ managers can evaluate the impact of these factors on activities, meetings, and attitude to understand, which type of culture act as facilitator or which type act as hindrance for KM processes.

Agrawal (2001) has discussed some of the barriers, which Indian organizations face while implementing the KM processes. Study has also explained the problem in implementing KM processes and also discussed how to manage KM processes in Indian organizations; finally, it has discussed about the things to be done to create organizational culture for managing knowledge workers. This qualitative research study has included five various organizations from different industries such as software designing, financial services based, consultancy and biotechnology. It has also included additional a few heads of knowledge workers from three organization in which author is giving KM solutions. It is found that KM processes and its success are highly dependent on the way of managing knowledge by organization’s knowledge

workers. These are the knowledge workers, who create and assess knowledge from external or internal sources. Whether it is tacit knowledge or explicit knowledge, they have to be in contact with the customer or user of product to know the value, they have perceived from it and to create new knowledge. Few barriers in KM processes are; Lack of top management involvement in creating Organizational culture that facilitate KM processes, KM system that is created by management, is not that efficient of providing relevant knowledge, and culture which is considered as the biggest barrier for KM system. Finally, researchers have explained that Organizations should provide proper time and resources to knowledge search and knowledge generation process. Organizational culture should be full of trust, care and openness which facilitate free knowledge sharing.

Chin-Loy (2003) analyses the role of organizational culture as a moderator on the knowledge management and organizational benefits linkage. It also analyses the effect of KM on organizational benefits. It has addressed the organizational strategic management related issues like transferring knowledge and creating new abilities for implementation through learning processes. This study has used (Cameron and Quinn, 1999) OCAI instrument for assessing OC profile in terms of four kinds of organizational culture (Clan, Market, Adhocracy, and Hierarchy), and (Lawson, 2003) 'Knowledge management assessment instrument' (KMAI) for assessing the Knowledge Management. Based on competing values framework, study proposed that organizational culture act as a significant positive moderate between KM and organizational benefits.

Román, Ribiere, & Stankosky (2004) the USA based public and nonprofit organizations have initiated to adopt the Knowledge Management processes rapidly. However, they are trying to understand the importance of human and cultural aspects that facilitate knowledge management system, instead of focusing only on the technical aspects of knowledge management. This study has examined and listed the culture profile of an organization, using OCAI that reflect the four organizational culture types such as Adhocracy, Clan, Market, and Hierarchy culture. It has also explained the current strategic policy for knowledge transfer, and successful knowledge management systems. Researchers have found very encouraging results

and purposed that knowledge managers, leaders and many others can get benefits by learning about the knowledge management and integration of human and cultural aspects that facilitate KM process in an effective way.

(Alavi et al., 2005) has defined the relationship between organization culture and knowledge processes. Under this study, authors have considered KM tool as uni-dimensional scale and attempted to find the relationship between multidimensional multi-cultural CVF instrument of Organizational culture and overall Knowledge Management Process. Authors want to explore if organizational value affect the use of KM tools and also wanted to know the outcomes of using KM instrument in software development organization. Under this study, researchers assumed that there is a relation between organization value, KM behavior and KM outcomes. Authors found that organization has developed four types of knowledge repositories and portal such as business research related knowledge, their best practices related knowledge, market and customer related knowledge and intellectual property related knowledge. It was found that there is a delay in knowledge posting that means portals are not that efficient. This is due to the multicultural environment at every level of organization. Both top down and bottoms up approaches were working. This difference leads to different outcome of KM processes for every employee or user of KM tool because organizational value system or culture influences the choice of technology tools used by the employees.

Pillania (2006) explains that it is the knowledge driven economy and it is proved by the worldwide management scholars that knowledge has become a highly analytic factor today. Organizational culture is considered as the prime factor for the non-performance of KM processes. Researchers have conducted this research to know the current organizational culture profile that facilitate knowledge management processes in the various sectors such as pharmaceuticals, software, and petroleum marketing, at both macro and micro level in private and public sectors. Authors found that organizational culture does not support the knowledge creation, transfer and dissemination process which has significant inferences for the competitiveness of any organization.

(Levy et al., 2010) have stated a KM activity analysis method that can be used during audit process by the organizations, prior to any knowledge project to know the cultural related challenges and risk involved in it. Study has analyzed the current KM process and discussed the tacit perception during knowledge audit in software development organization. KM activities involved in organization are creation, sharing, access, usage, maintenance, and infrastructure. Audit also discussed about some cultural aspects such as respect, autonomy, and openness and in the end, Audit examined the usage and satisfaction of KM process with the help of KM infrastructure. It has found that knowledge access was the most emphasized activity. Study suggested that organization should consider its organizational cultural aspects during KM audits. They also suggested a Cultural related tacit knowledge perception model for Auditing. This is based upon the routine business processes embodied in the KM activities. Main barriers were related to KM roles and responsibilities during daily routine.

Rai (2011) stated a conceptual framework for Organizational culture, which affects the KM processes in organizations. Study has explained the theoretical framework for OC and KM, which helps to explain the effect of OC on KM activities in various organizations. Researcher has modified the CVF model of organizational culture by adding another side of moral and trustful culture aspect and integrating this modified model with the SECI model of 'knowledge creation and conversions'. This study is a conceptual framework-based study in which authors found that both the modified CVF model and SECI model have conceptual similarities. They found six concepts related to the organizational propensity of various CVF cultural types to integrate with the four practices of SECI model of knowledge creation and conversions.

Kamasak (2012) stated that, there is very limited literature available about the assessment of KM processes and their impact on organizational strategy development in terms of Turkish business sector. For the assessment of KM dimensions, KM measuring instrument KMS-16 purposed by (Erwee et al., 2007) in University of Southern Queensland has been utilized with little adjustments. Items were divided under three factors such as KM operations, KM culture, and KM technology. Study

stated that IS and technologies are the prime aspects of knowledge management. Most of the times various factors that have impact on efficient KM, are generally ignored. This study proposed that knowledge is a strategic resource and it should not be considered a simple IT or an IS related process.

According to (Asl-Goodarzi et al., 2012) in this era, knowledge has become an analytical variable for the administration of various institutions and their resources. Therefore, this study has focused on to find out the correlation between organizational culture and knowledge management in National Olympic Committee, Iran. To analyze the organizational culture construct Organizational Culture Inventory instrument has been used by the researchers. For measuring knowledge management, researchers' have used the knowledge management Inventory Instrument. This knowledge management instrument has four factors such as compatibility, commitment to collaboration, mission, and adaptation. This study has proved the positive correlation between organizational culture and its various dimensions with the knowledge management processes.

Danish, Munir, & Butt (2012) this research study has attempted to recognize the impact of KM on the organizational effectiveness and analyzing the organizational culture as a moderator on this relationship. Authors have designed the instruments for the data collection and used descriptive statistics and structure equation model of moderating effect analysis to examine the relationships and to know the results of these tests. This study has proposed that Knowledge management is strongly correlated with organizational effectiveness while organizational culture acts as a positive moderator on this relationship in service sector. This study proved that Managers of various service organizations all over the world should put effort to improve their knowledge management processes and also concentrate on the favorable organizational culture as both of these constructs facilitate to improve the organizational effectiveness.

(Sánchez et al., 2013) stated that knowledge creation and knowledge sharing are very important part of KM. A framework was presented in which knowledge generation and exchange processes had been aligned with organizational culture to overcome the cultural as an obstacle in KM activities. They have conducted the

literature review and explained that there are many cultural barriers at personal, group and organizational level, which hinder the creation and transfer processes of KM. Organizations don't follow any framework for knowledge sharing process is the biggest hindrance for the success of KM activities. This study proposed the framework that integrates both the knowledge creation and knowledge sharing processes to avoid the culture barriers. This framework contains various steps such as preparing cycle for knowledge creation and sharing processes; Identification of current capabilities for future modifications; Recognizing tacit knowledge; Examining tacit knowledge; Knowledge generation; Knowledge selection, implementation, and control.

Mageswari, Sivasubramanian, & Dath (2013) stated that in present business environment KM is the only sustainable function to survive in cutthroat competition. Research has been conducted to understand the Knowledge Management processes in manufacturing company, to know the relationship between KM and OC, and relationship between KM and leadership. Authors found that KM practices used by company were K capturing, K creation, K storage, K sharing, and K application. They found the sig relationship exist in KM and OC, KM and leadership.

Mudor (2014) stated that KM is the basis for the organizational effectiveness and organization culture facilitates good KM practices. This paper explains the correlation between OC, organizational effectiveness and KM. On the basis of RBV theory by Bareney (1991) author explained that the conceptual framework based on the principle; 'organization should use its valuable resources to develop competitive advantage that a competitor cannot copy easily.' KM is that valuable resource of organization which organization can use to create competitive advantage. Finally, author concluded that organization should develop such organizational culture, which enhance performance of KM practices and lead to organizational effectiveness in positive way.

(Akhavan et al., 2014) explained the correlation between organizational culture and environmental responsiveness capability (ERC) and explained the meditating role of KM between given relationship in Iran based Industrial Research Organizations. Moreover, relationship between four kinds of OC and ERC and

relationship between KM and ERC has been compared. Study proposed that organizational culture has significant impact on ERC and KM also positively mediate this relationship. Additionally, innovativeness culture type is highly correlated with ERC and KM also positively mediates this relationship. Cooperativeness culture has direct impact on ERC, but consistency and effectiveness culture types are indirectly and positively correlated with ERC through mediator KM.

David, Bhakre, & Dubey (2015) Knowledge is treated as the most critical asset in 21st century. Worldwide Organizations are taking initiatives to capture and retain knowledge in order to deal with the highly changing conditions. Employees of any organizations play most important part in various Knowledge Management processes (knowledge creation, transfer and retention). This study is based on IT sector and manufacturing sector of India. Openness and cohesiveness factors in organizational culture facilitate the effective knowledge sharing process. This paper explains that Organizational culture directly influence the degree to which effective knowledge management is practicable and achievable. This research has measured the impact of organizational culture on KM processes and has also emphasized on gender. The findings can support the organizations to understand the certain factors while developing the knowledge management strategies.

Alkhaldi and Firas (2015) stated that willingness of individuals to transfer the knowledge is influenced by the OC in banking sector of UK. This research has examined the correlation between organizational culture and the knowledge transfer practices, where Knowledge sharing is influenced by the individualistic and cooperative nature of the culture. It has examined the relationship between knowledge-oriented cultures (KOC), socialization culture, and controlled management policy-oriented culture. Author has presented a conceptual model of this relationship. Author has found the direct positive relation between the KOC, socialization culture and management policy-oriented culture.

Bashehab & Buddhapriya (2016) stated the organizational culture as a precondition for Knowledge Management. Organizations should take geographical aspect of culture into account. A current system that is suitable for an organization in abroad may not be suitable for Saudi organizations. There are very less studies on

Knowledge Management present in Saudi Arabia. This research has explained existing Knowledge Management and Organizational Culture in Saudi Arabian banking sector. For assessing organizational culture five factors model has been used. These factors are: Learning, Collaboration, Trust, Autonomy and Formalization. For KM instrument is based on three factors i.e., Knowledge capturing, transferring, and Utilization.

Al-Tit (2016) study has attempted to analyze the effect of HRM activities on organizational performance on the basis survey, which was conducted with valid and reliable measuring tool. Various leaders at various management stages of Jordanian production-based firms have been included in this study. The study also has explained the mediating impact of knowledge management on HRM practices and organizational performance linkage. It also has proposed the moderating impact of organizational culture on the correlation between HRM activities and organizational performance, and HRM activities-knowledge management as well. To measure the HRM practices, 10 HRM activities have been included in this study and 10 variables of organizational performance were also included to measure the organizational performance of organization. Knowledge management instrument for measuring KM processes have included three processes; knowledge creation, transfer and implementation. For measuring organizational culture of organization, instrument has included various cultural profiles such as passive/defensive, aggressive/defensive and constructive cultures. Results show that HRM activities have meaningfully correlated with organizational performance. KM has mediating role in HRM activities-organizational performance. It has proved that OC has moderating impact on the HRM activities and organizational performance and also on HRM activities-knowledge management as well. Constructive cultures positively influence the correlation between HRM activities and organizational performance (OP), while defensive culture has negative influence on HRM practices-knowledge management (KM). There were very less studies in the literature which explains all these variables such as HRM, KM and OP derives altogether, which make this study to be considered as a main contribution to the current literature. This study purposed to the administrators that KM and OC both play mediating and moderating role on the correlation between HRM activities and organizational performance.

Prystupa-Rządca (2017) Organizational culture is a prime variable that has an impact on the KM processes in Polish small business firms. These firms mostly contain less quantity of Human, financial and other resources that could be used to create advanced KM portal. Moreover, researchers have attempted to analyze the effect of characteristics of OC on KM processes with the implementation of a symbolic- interpretive perspective using Hofstede's cultural dimensions.

Mubin & Latief (2019) study has attempted to examine the organizational culture profiles of Indonesia based state-owned construction organizations. It has also analyzed the correlation between OC profiles, KM and quality management systems. Authors have implemented the Organizational Culture Assessment Instrument (OCAI) for measuring OC construct and Knowledge Management Assessment Instrument (KMAI) for measuring KM processes of these organizations. Quality management systems instrument has considered the ISO 9001:2015 quality management principles and companies' performance is measured with the instrument that is based on the balanced scorecard. Authors have purposed that clan and market culture are significantly related to the implementation of KM and quality management system. This study can be considered as a reference for making improvements in the application of KM and quality management strategy with help of improved organizational culture approach.

2.3.2 Studies based on Knowledge Management and Organizational Culture in Higher Education Institutions.

Standing and Benson (2000) stated that organization culture act as main facilitator for KM for Australian universities because it helps in spreading and sharing of knowledge at large scale. Researchers have analyzed the effect of OC and climate in which university is operating on the potential of Knowledge management activities and also discussed about the main facilitator and barriers of KM. In this study, Authors stated that university is working in rationalism (introducing cost cutting strategies), marketization (leads to Commodification which means taking knowledge as commodity to bargain, competition), and corporatization (introduction of management principal like performance appraisal) environment. Due to that there is a lack of trust and competition for their positions between staff that discourage them to

share knowledge and as per the feedback of staff and employees it is very difficult to manage the unselfish sharing of knowledge in such a competitive, lack of trust, less loyalty, and less job security kind of environment. But, authors believe that organization has to put effort in bringing the new techniques such as lessen the work load, encourage informal meetings, team activities, to encourage KM activities rather than altering the OC. Because it takes decades to build a particular culture and not easy to change all of sudden but organizations can try to introduce little improvements to enhance KM activities.

According to Lawson (2003) KM act as a source of creating competitive advantage worldwide and many organizations are adopting KM strategies as a prime policy to improve competitive advantage of their organizations. This study claims that most of the organizations, using knowledge management as their corporate strategy have been failed to not achieve their objectives and getting the feel of disappointment about the practicality of KM processes. Research reflected that organizational culture is a prime factor that acts as a barrier for developing and supporting of knowledge assets. This research has measured the effect of organizational culture on KM. For measuring the Organizational Culture, Competing Values Framework by Quinn and Rohrbaugh (1983), has been utilized. It also explains the overall OC profiles of organizations and this culture has an impact on various KM processes. The inferences of this research paper would help various organizations in the preparation of adopting the knowledge management program. Paper has explained the meaningful correlation between OC and KM processes of higher education institutions. Moreover, Hierarchy culture does not facilitate the successful application of KM. The Market culture has proved a good supporter of knowledge management initiatives. Group and Developmental culture types are also acting as a facilitator of knowledge management. Various organizations can follow this research to examine their Km processes for the successful implementation of KM processes that would ultimately help organizations to increase their competitive advantage based on their existing organizational culture.

Thomas (2004) has discussed the change in the nature of knowledge culture due to internationalization and globalization, challenges faced by the universities to achieve integrative education and to tackle the balance between new knowledge and old knowledge culture. In this, researchers have conducted the literature review and presented the experience of author working in Higher Education institutions in East Asia. They explained that knowledge culture is changing from traditional curricular (know –what) to emerging curricular (Know –how) in which student and teacher give more preference to Know how than Know –what. Third type of knowledge culture is a supra- level curricular (knowing in and with uncertainty). ICT has made it possible for the Higher Education institutions to cope up with the new integrated knowledge culture. Organizations still has to face challenges related to local culture, politics, socio-culture, internationalization, globalization and commoditization of knowledge, partnership of universities with British cultured universities. Organizations have to balance between integration of new knowledge and traditional knowledge. Higher Education institutions have to work on staff skill development program and periodic training so that they can easily adopt and develop a balance between new and traditional knowledge culture.

(Sharimllah et al., 2007) study has analyzed the impact of Organizational Culture on Knowledge Management in HEIs. This empirical study has been conducted in 185 higher education institutions in Malaysia. Results of this study have reflected that KM processes and OC dimensions have been confirming the claim of literature review that OC influence the KM processes of organizations. Researchers found the positive meaningful correlation between KM processes and OC. Paper would help academic managers in developing policies regarding the effective management their KM processes. They can achieve their ultimate goal of creating optimum Organizational culture that will further support to run the KM processes successfully.

Sedziuviene and Vveinhardt (2009) stated that KM concept covers the area of knowledge technology and the formation of innovative organizational culture. Theoretical basis of KM and the development of efficient knowledge mechanism in higher education institution have been discussed. Researchers stated that to create a

new knowledge mechanism for creating, sharing and managing knowledge, high education institutions must evaluate its cultural, economic and technological aspects because KM binds the three aspects of organization in one unity i.e., people, process and technology. Employees of HEIs not only understand the knowledge creation but also know how to use their experiences to make best use of that knowledge.

(Omerzel et al., 2011) has discussed about the concept of KM and OC in higher education institutions. Researchers also throw the light on the correlation between KM and OC in Higher Education institutions. Researchers have conducted empirical quantitative study in two Higher Education institutions to analyze the organizational culture. CVF framework has been used to assess the organizational culture. For assessing the KM, Questionnaire given by (Wilkins et al., 2004) has been used. Researchers explained the positive correlation between market culture and the knowledge storage process. They have also found positive co-relation between market culture and knowledge application for HEI1. But, didn't find any kind of significance correlation in different organizational culture and various KM processes for HEI2. For HEI2, they was no significant relationship found in overall OC and KM as well. They stated that for Higher Education institutions, knowledge is their input and output. In modern environment organizations have to satisfy the academic staff, who is the creator, user, exploiter, bearer of high knowledge and generator of new knowledge and innovations. Main focus of the management should be to develop such an OC for the staff and stakeholder that will help them in KM processes.

Allameh, Zamani, and Davoodi (2011) stated that there is dual role of OC in HEI's. First, it acts as barrier in KM practices and second, it acts as a facilitator for KM practices. This study has assessed the effect of different styles of OC on different KM practices. Researchers have used CVF for measuring of organizational culture. For the measurement of KM, questionnaire purposed by (Lawson, 2003) has been used. Researchers found that there is 99% of meaningful relation between culture styles and six dimensions of KM practices in university of Isfahan, Iran.

(Nezhadgholi et al., 2013) examined whether there is any relationship between the features of OC and KM exist in public department of Golden Province, Iran. In this descriptive type of study, researchers have found that impact of OC is visible on

individual behavior, organizational mission, vision, procedure and policies, job satisfaction, motivations, policies and planning, innovations, commitments, and goals. They found there is meaningful co-relation between the OC and KM processes of HEIs.

Ali, Ghoneim, and Roubaie (2014) stated that universities or HEIs are directly involved into the business of creation and exchange of knowledge. So, it is essential for the universities to create a knowledge sharing culture. This paper has explained about the determinant of knowledge sharing culture, research trend in higher education, theories, and facts about the research in this field. In this study, researchers conducted the literature review of studies based on knowledge sharing in university and found that there are very less researches on KM and KS in Higher Education institutions than commercial sectors. They stated different studies of this field, country in which they have conducted, method they all used for the research and different determinants researched and their findings. They found that most of the studies were using survey-based questionnaire method and they did not differentiate behavioral and cultural based determinants of KS. A few studies in this field have stated different determinant of KS culture in education field such as intension of staff to share, language, communication, departmental culture, national culture, sub-cultures and trust.

Ali, Gohneim, & Roubaie (2014) Knowledge Sharing is treated as a critical practice of KM paradigm and it is a one of the most important success factors for KM system. In a higher education setting, if employees or students are not sharing enough knowledge then it is considered a serious lacking since HEIs observe as the knowledge intensive organizations. Lacking in Knowledge sharing process also has inverse effects on output of investigating activities and teaching activities. Study has attempted to examine the literature to recognize and learn about the various factors related to the knowledge transferring culture, studies, theories, and future suggestions in the field of KM and disseminating process in HEIs. By using the ProQuest database, various research papers, journals, Peer reviewed articles and conference papers are reviewed. Results suggest that there is a very significantly less research studies based on knowledge sharing in HEI, if it is compared with other commercial

sectors. There are no comprehensive studies on the supporting variables of knowledge transferring culture. Studies on dissemination of knowledge in various commercial and academic fields in emergent regions such as the Middle-East America, Africa, and South America were very limited. Future studies should therefore be based on the cultural and behavioral dimensions of knowledge sharing at various levels, i.e., individual, professional groups, and nation level. They should also consider the language and trust factors that also have an impact on knowledge sharing processes among faculty members in various developing economies in higher educational sector.

Abdillah (2014) explained that every employee of the organization have got some kind of knowledge and information stored in form of skills and experience. In this paper author discussed about the Higher education institutions in Indonesia and explained that these institutions have to learn more efficiently to share, disseminate, and manage this information and knowledge with the help of IT. For that literature was studied, observation and focus group discussion was conducted with staff and students to know about the tools of engaging persons of HEI in developing the knowledge sharing culture. Through this article, Author discussed a few tools such as e-learning, classical discussions, documentations, mail, blogs, social networks, and repository software to involve every employee in developing organization's sharing culture. In this study discussion is about the dissemination of knowledge in Higher Education institutions from source to destination, whether it is from internal source or external.

(Chidambaranathan et al., 2015) this empirical study has examined the correlation between OC and KM in higher educational libraries. For measuring the organizational culture competing values framework has been used. Different researchers have proposed that to achieve the organizational effectiveness and strategic success, it is very important for the administrators to understand their organizational culture. This paper reflects that OC profiles have an impact on knowledge management processes and OC profile also has direct impact on the successful knowledge management processes of HEI. This study has suggested that knowledge management processes have no impact of demographic profile of the employees of the organization. Clan, adhocracy, and market culture are significantly

and positively correlated with the KM processes and hierarchy culture is negatively correlated with Knowledge Management. This study also reflects that clan and market culture directly affect the successful knowledge management processes of HEI libraries in Qatar.

(Prado-Gasco et al., 2015) explained that KM is very significant function for every business firm, but still there is no single reliable instrument to analyze the KM practices of organizations. Authors explain that there is no holistic study which is based on KM and Organizational Culture in higher education sector. This study was conducted with the objectives of developing and analyzing the psychometric properties of KM analyzing instrument i.e., KCD (knowledge creation and dissimilation survey) based on Leonard-Barton's 1995 model of knowledge flow, evaluating the KM activities of Spanish technical university. Finally testing the relationship between OC and KM. Researchers found KCD is most suitable instrument and conducted quantitative analysis of psychometric properties of this instrument. For OC measurement, Denison organizational culture Survey (DOCS) and Organizational culture Inventory" (OCI) by Cooke and Lafferty (1987) has been used. Researchers found that result was satisfactory and instrument represents the KM practices very well. They also found the good co-relation between the four dimensions of Leonard –Barton's model of KM flow and the different types of cultures of OCI, and DOCS. But higher value associated with DOCS than OCI. Finally, they stated that there is a high value of KM activities in R & D teams of Spanish technical university with the constructive type culture such as cooperation and support are the features of this type culture which good culture for KM activities.

Adeinat, and Abdulfatah, (2019) has examined the relationship between knowledge management and university culture in Saudi public university. Knowledge management framework includes four processes such as creation, sharing, exchange and implementation. This study has proposed the uni-dimensional model of KM.OCAI has been used to measure the university culture. Structural equation modeling has been applied to explain the relationship between knowledge management process and OC. Results suggest that adhocracy culture do not affect

knowledge management. Other all types of culture and overall organizational culture also have significant relationship with KM in a Saudi public university.

Section 2.3 discusses the studies attempted to find the relationship between OC and KM and studies based on KM and OC in higher education sector as well. As per above section, various studies in literature reflect that researchers consider ‘Organizational Culture’ a major push or pull factor of knowledge management (Pillania, 2006; Lawson, 2003; Hendriks, 2004; Allameh et al., 2011; Bashehab & Buddhapriya, 2016; Prystupa-Rzadca, 2017). Impact of organizational culture on knowledge management process has started receiving some attention in foreign studies. However, literature does not provide a holistic study based on the relationship between knowledge management and organizational culture (Ali, Gohneim, & Roubaie, 2014; Pardo et al., 2015). There is also a discrepancy in the existing literature about the relationship between these two variables as some studies proved significant relation, but others studies were failed to prove the significant relationship between OC and KM (Sharimllah et al., 2007; Omerzel et al., 2011; Lawson, 2003; Akude, 2014; Allameh et al., 2011; Chidambaranathan et al., 2015; Adeinat, & Abdulfatah, 2019). This triggers the need to test the relationship between these two variables. Moreover, there is no detailed study available in literature, which explains the relationship between the OC and KM in Indian Higher Education Sector. Studies reviewed explained the relationship between the OC and KM in Higher education institutions, are based on Western countries, East-Asian and Western-Asian countries (Lawson, 2003; Omerzel et al., 2011; Akude, 2014; Allameh et al., 2011; Chidambaranathan et al., 2015). A very few Indian studies which have attempted to explain the relationship between OC and KM are based on manufacturing, IT, Banking sectors but no study is based on higher education sector (Agrawal, 2001; Rai, 2011; pillania, 2006; Mageswari et al., 2013; David, Bhakre, & Dubey, 2015; Patel, & Patil, 2019). As Present study achieves the objective of explaining the relationship between OC and KM in Indian Higher education institutions through below given hypotheses;

H7: There is no significant relationship between Clan culture and Knowledge management of North Indian Higher Education Institutions.

H8: There is no significant relationship between Adhocracy culture and Knowledge management of North Indian Higher Education Institutions.

H9: There is no significant relationship between Market culture and Knowledge management of North Indian Higher Education Institutions.

H10: There is no significant relationship between Hierarchy culture and Knowledge management of North Indian Higher Education Institutions.

H11: There is no significant relationship between Organizational culture and Knowledge management of North Indian Higher Education Institutions.

Present study significantly contributes towards the Knowledge management literature by explaining the clear picture of relationship between overall OC and KM and various types of OC and KM in Indian higher education sector.

2.4 Knowledge Management (KM), Organizational Culture (OC), and Information and Communication Technology (ICT)

2.4.1 Studies based on ICT and its Frameworks

(Force, U. I. T. 2005) In response to the World Summit on the Information Society in Geneva in December 2003, the importance of measuring progress toward the information society has been described by the world leaders , the key stakeholders such as International Telecommunication Union, Organization for Economic Co-Operation and Development, Eurostat, the United Nations Conference on Trade and Development, the UN ICT Task Force, four UN Regional Commissions (UNECA, UNECLAC, UNESCAP, UNESCO and UNESCWA), Institute for Statistics (UIS) and the World Bank, all participated to create a global Partnership for a project “Measuring ICT for development: global status of ICT indicators.” The main objectives of this project were; to present a set of ICT indicators, that explain the position and importance of ICT and that can be compared at the international level; to develop a global database for core ICT indicators. The report analysis covers the “ICT household indicators” and this section presented the 18 indicators and then under “ICT indicators in business sector” There were another 20 indicators, finally they have also presented the 13 indicators in higher education sector such as Presence of

fixed telephone, Presence of mobile devices, Presence of computers, Presence of Internet access, Efficient method of access/bandwidth for Internet use, Presence of local network, Presence of Website, Recently invested in ICT for up gradation, Have enough services for which the Internet is used , Provide ICT training, Have barriers to PC usage, Have barriers to internet usage, and My institution is near to the geographic location where ICT goods are sold. These indicators have been used to measure the position and importance of ICT in various sectors in 86 countries. Many studies have used these indicators with other ICT measuring scale to understand the position of ICT and to know the importance of these ICT indicators in various organizations before measuring the ICT construct as per their studies (De Opacua et al., 2006; Jamieson-Proctor, 2007; López et al., 2009; Olasina, 2012).

De-Opacua (2006) has proposed an instrument to measure ICT practices in small and medium enterprises. This study has also used the ICT indicators proposed by (Force, U. I. T. 2005) along with the self-developed questionnaire, developed to measure the ICT construct in various organizations. It is based on two sub-constructs, which formatively cause ICT construct i.e. ICT Infrastructure and ICT Responsibilities. ICT Infrastructure has been defined on the basis of 7 items placed reflectively on this sub-construct, which includes problems related to the compatibility of existing employees when updating IT, issues related to data security, new updating in IT improved communication, IT investments, usage of customized software applications, protection of IT infrastructure from imitations, Efficient IT infrastructure for business usage. ICT Responsibilities has been defined on the basis of 18 items placed reflectively on this sub-construct, which includes level of technical expertise of staff, organization motivate staff to learn about new technologies, Staff learns about emerging trends in IT, staff's participation in developing organizational strategy, Staff familiar with firm's processes, employees' participation in the redesign of the business processes, actively communicate information across the firm, staff collaborate with customers & suppliers directly, write documentation regarding IT, team work with other departments, self-directed staff and proactive, Effectively manage communication with IT suppliers, Research IT practices of other firms, well-trained in IT tool usage, efficiently run current IT infrastructure, accept new IT

easily, actively participate in the process of IT adoption, managers are committed to IT. Authors have used this scale to examine the association between knowledge management capabilities, Information and Communication Technologies (ICT), and organizational performance in small and medium enterprises.

(Jamieson-Proctor et al., 2007) has explained the development of ICT Curriculum Integration Performance Measurement Instrument". Extensive review of the contemporary international and Australian research was used to explain the definition and measurement of ICT curriculum integration in classrooms. This study has also used the ICT indicators proposed by (Force, U. I. T. 2005) to understand the position of ICT In education sector. This paper proposed the multi-dimensional 22 items based instrument with two-factors such as "Uses of ICT" and "ICT changes". Confirmatory factor analysis has been applies to test the validity and reliability of scale. 'Uses of ICT' consists of 16 items that include ICT tool uses to develop the ICT-related skills and to enhance the learning process. "ICT changes" consists of 6 items that include ICT based component of reforms that facilitate the change in students' learning process and also facilitate the change in structure and organization of education institution.

(López et al., 2009) has introduced an instrument measure ICT competencies based on three formatively placed dimensions on second order construct. These dimensions are IT knowledge, IT operations, and IT infrastructure. 'IT knowledge' defined as information mixed with experience, context, understandability and reflection. It includes technical knowledge based on principles and techniques that contribute to implement desired change. It includes the items based on knowledge about IT tools such as computer systems, online portal, internet search, and networking and communication devices. 'IT operations' defined as IT-related practices, techniques, processes and strategies needs to create value. IT operations include items related to the usage of IT in problem solving, and decision making. It also includes items to assess the ICT improvements and effectiveness. 'IT infrastructure' defined as an enabler in data distribution, and facilitator in production process. IT infrastructure includes item related to the IT tools and sources that facilitate in creating, processing, storing, transferring and implementing the

information. It includes tools like hardware, software and other IT tools. This study has also used the ICT indicators proposed by (Force, U. I. T. 2005) along with the self-developed questionnaire. Study is based on empirical data to examine the association between the KM and IT competency.

Krishnaveni and Meenakumari (2010) explained that integration of ICT reduces the complexity and improves the overall administration of higher education. Main objective of this study was to identify the various functional areas, in which ICT played important role in higher education institutions and to find the usage of ICT in all these functional areas. For that a theoretical model was developed. Authors have proposed a scale to measure ICT practices based on three formative sub-constructs i.e. General Administration, Student Administration and Staff Administration. Authors have validated this instrument based on reflective–formative model. ‘General Administration’ includes items related to utilization of e-media for preparing timetables, to-do list, scheduling and allocations of rooms for examinations purpose, utilization of e-kiosks for sharing information, utilization of e-media by students for various applications, Usage of e-media by administration for the results and other activities, usage of online portal for fee payments. ‘Student Administration’ includes items related to utilization of electronic media for admissions, online portal for student registration , enrolment, timetable, class schedule, Computer based portal for attendance of students, usage of e-media for sharing details of students with parents. ‘Staff Administration’ includes items related to Computer based systems for recruitment and work allotment to staff, online attendance and leave management system, computer based performance appraisal and communication with staff, utilization of e-kiosks for sharing information with staff. Authors explain that these are the three different areas in which ICT play important role in HEIs. Other studies (Christiana, 2008; Singh, 2008) have also explains that ICT plays a very significant part in facilitating strong-effective management and administrative functions in Higher education field. ICT facilitates the exchange of information and also the access to higher education.

(Allahawiah et al., 2013) provided the conceptual framework for IT competencies for facilitating KM processes. Researchers have proposed the four

formative dimensions to measure second order construct IT competencies such as Devices, Software, Usability and Security. 'Devices' includes five items related to the IT tools available to facilitate KM processes. 'Software' Includes the five items related to the customized software and programs that organization utilize in various KM processes. 'Usability' includes the five items related to the usability of these devices and software to create, store, disseminate, and apply knowledge in organization. It also includes employees' knowledge about the usability of current devices and software. 'Security' includes the five items related to the protection of IT tools and systems to get imitated by other companies and protection against data lose. It also includes the items regarding preparation and up-dation of documentation related to IT systems. This study has explained the effect of IT on KM processes in the Arab Potash Company.

(Chen et al., 2015) explained that Information and Communication Technologies (ICT) affect teaching effectiveness and student learning worldwide. It is important to incorporate ICT into education systems. This study assessed the computer competency in thirteen ICT areas with the help of two samples. By using factor analysis, thirteen areas had been grouped into three categories i.e. "Basic ICT skills"; "Advanced ICT skills;" and "Multimedia skills and Attitudes towards ICT". "Basic ICT skills" include items based on Knowledge of Computer, Operating System, usage of Internet surfing, usage of Communication and Networking sources, knowledge of Word Processing and Spreadsheets. It is found that there are highest scores in basic ICT skills, which include knowledge of computer systems, use of the operating system, search internet and communication and networking. "Advanced ICT skills;" includes items regarding usage of Image Processing system, Database, Technological tools, and Web-based tools. "Multimedia skills and Attitudes towards ICT" includes items based on usage of ICT based Entertainment and Learning sources, Online Procedures, and General Attitudes of employees towards ICT. The multimedia skills and attitudes towards ICT got the second highest scores. Advanced ICT skills that include image processing, use of database, technological platforms, and web tools got the lowest competency scores.

2.4.2 Studies based on Knowledge Management, and Information and Communication Technology

(Davenport et al., 1998) examined the ICT usage for KM projects in organization and concluded that usage of ICT in KM projects is for two purposes, knowledge repositories creations, and knowledge directories creation to develop the network. It makes the knowledge more assessable.

Alavi and Leidner (2001) stated how ICT support the KM except for traditional usage of ICT in KM practices. Study has discussed four different usage of ICT. First, improves the knowledge creation process by introducing the new sources of knowledge. Second, helps in storage and retrieval of knowledge. Third, introduces the various channels of communication, which lead to speed up the knowledge sharing process. Last, creates a knowledge-based infrastructure by embodying the knowledge in routine process of the organization. This way, ICT supports the knowledge management in almost all processes.

De-Opacua (2006) study has examined the association between knowledge management capabilities, Information and Communication Technologies (ICT) capabilities and organizational performance in SMEs. Author explained that KM capabilities and ICT capabilities are very significant for developing competitive advantage, which leads to achieve superior organizational performance. This survey based empirical form of study has explained that knowledge management capabilities are significantly related with innovation, responsiveness and adaptability. Study also explained that human capabilities and technical capabilities with regards to ICT have significant relationship with performance indicators and it also reflects the correlation between KM and ICT capabilities.

Song (2007) on the basis of literature review authors explained that how does ICT enables and supports the KM process. They explained that ICT enable the knowledge creation and conversion processes with the help of SECI model of NONAKA, 1996 and also explained that ICT support knowledge management practices such as creation, codification, dissemination and application.

(López, et al., 2009) study based on empirical data to examine the association between the KM and IT competency. Using survey-based correlation method; authors found the positive effect of IT competencies over KM. So, this paper empirically explained the significant relationship between both the variables and proved that IT competency influences knowledge management and its processes directly and indirectly. It also helps in the development of an organizational structure that leads to knowledge conversion.

(Omona et al., 2010) purposed the conceptual framework for ICT implementation that facilitates Knowledge activities in universities and also explained the different emerging challenges faced by the higher education institutions in using ICT to enhance KM performance. This paper explained the conceptual framework based on Stankosky (2005) KM pillar, which explained the link between the different KM processes and the different type of ICT tools, used to perform the KM processes.

Andreeva and Kianto (2012) examined the relationship between the ICT practices for KM, firm competitiveness and financial performance. Based on survey method, study explained that Human Resource Management and ICT practices for KM have a significant relationship with financial performance and firm competitiveness and ICT practices support economic performance of firm while implementing the ICT for KM and HRM practices together.

Toro and Joshi (2012) have analyzed the past studies worked on improving the KM practices in higher education institutions by using or with the help of ICT. Based on literature authors explained that ICT plays very important function in KM processes such as generation, dissemination and storage of knowledge in higher education institutions.

Hafeez-Baig and Gururajan (2012) have defined the relationship between ICT and enabler of knowledge creation, organizing and sharing process such as cooperation, Mutual Trust, Learning, Leadership, Incentives & Rewards, Formalization and T-shaped Skills. Through empirical analysis they found the meaningful correlation between all KM enabler and ICT except Formalization.

Olasina (2012) explained the different ICT tools used in health sector for KM processes and also highlighted the future need of ICT for knowledge management. This empirical study explained currently available indicators of ICT on the basis of (Force, U. I. T. 2005) that are used for administration and sharing of knowledge amongst employees. In future employees cannot imagine the KM without use of ICT tools, which will lead to the employees heading towards the searching for ideas with the help of internet and other tools, not towards generating the new ideas that is ultimate goal of KM processes.

(Subashini et al., 2012) explained that KM has a prime role to play in the success of every business sector. ICT also support the managers to transfer the knowledge. Therefore, ICT have a very strong role to play in support of KM activities. ICT has made it very easy for managers to implement Knowledge Management projects. Knowledge Management is more valuable, when right type of knowledge is provided to the right type of people at the right time. Thus, ICT facilitates knowledge transfer process very well through computers, telephones, search engines, Internet, databases, virtual-conferencing applications etc. This study has attempted to identify the importance and function of ICT in KM initiatives for organizational effectiveness. Authors have proposed the conceptual framework for ICTs, Knowledge Management processes which linked with the organizational effectiveness and also explained the correlation between ICT and KM processes.

(Allahawiah et al., 2013) main purpose of this paper is to explain the effect of IT on KM processes such as knowledge creation, capturing, organizing, transferring, and implementation in the Arab Potash Company, Author explained the meaningful correlation between KM processes and characteristics of IT such as device, programmers', security and usability. They also provide the conceptual framework for IT competencies for facilitating KM processes.

(Ofori-Dwumfuo et al., 2013) has examined the use of ICT in KM in the Ghana Volta River Authority. In this study by using case study method, author explained that Knowledge Management helps to develop a strategy for capturing, sharing, applying and converging of knowledge at organizational level to improve efficiency and creating competitive advantage. This research uses the SECI model for

knowledge creation and conversion for its framework and found that the concept of ICT in Knowledge Management act as facilitator but in absence of Knowledge Management policy, framework, governance, and strategic planning, it is difficult and challenging to implement the KM for creating competitive advantage.

Vipinkumar, Athira, and Mini (2013) have explained that ICT plays an important role in KM practices. Modern tools of ICT improve the knowledge sharing process and also improve the knowledge storage process so that new employees can take benefit out of that record. Retention of knowledge also became an easy task with the help of ICT. For using the new tools of ICT, it doesn't even require any type of specialization training. Although ICT system is an expensive system but it is very significant in modern and competitive environment.

Dewah (2014) defined that at what extent employees of organization have access to various ICT tools for the Knowledge Management practices i.e., knowledge dissemination, and knowledge retention and what type of technology used for different KM processes. Researchers found that all offices are not computerized, all employees have not got access to the internet at work, and telephones are widely used for knowledge sharing process. To improve the use of ICTs for knowledge capture and retention, the organizations need to work on making available various ICTs to all organization.

Sharma and Parasar (2014) conducted the survey-based study with the objective of explaining the use of ICT in library for KM and its impact on users.' They explained that ICT in the library and Information Centers have improved the management of knowledge in libraries and provided technological solutions, like knowledge creation and communication with the help of video conferencing, satellite applications, internet etc. It has also brought change in life style of users. It made KM processes faster, easier and clear.

Akude (2014) based on review of the literature from 1990 to 2010, this study is dealing with knowledge for development and its management. In this paper author criticized the mono-culturality of production of global development knowledge and explained the inadequacy of current utilization of ICT. It argues that the opportunities

of joint knowledge generation and dissemination with the help of ICTs are not being utilized properly.

Soualhia & Mejbri (2014) conceptual study has attempted to explain the ability of ICT to improve the transferability of knowledge in organizations and differentiate between the types of knowledge, providing insights to knowledge sharing process. It also explains the impact of ICTs on knowledge sharing, codifying and reduction of data. Study explained the conceptual correlation between KM and Information technology and communication.

Shah and Mahmood (2015) explain the knowledge management in academics and other business processes of Pakistan. Knowledge management is still a very new concept in Pakistani environment. Knowledge management related literature was searched through various websites, research journal, libraries, and business catalogues. This research has attempted to act as a guide for the KM processes in Pakistan. Based on literature review they have included many studies based on trends and issues of ICT for the KM processes and explained that in modern world ICT act as facilitator of KM processes in academic and other organizational units.

Delak (2016) conducted study with the main objective to present approach for assessment of KM maturity with information system maturity level and. Literature review of various case studies was used for this research. Nowadays, many institutions are facing the challenges related to ICT practices and problems associated with KM. The organizations put efforts for the assessment of these practices and to know the present state of their ICT and KM processes. As it is a well-known fact that KM is a very important factor for the organizational growth. KM acts as an instrument that leads to innovations. Study attempted to affirm the theory, that should be applied for Information System maturity assessment and that should be make available rapidly and remotely. Author explained that organization, which have gained the maturity level of ICT assessment, have also gained maturity level in KM assessment.

Sefollahi, (2018) has defined Knowledge management as a process that converts individual-knowledge into firms' knowledge. Information and communication technology defined as technologies that provide facility to the

management to disseminate knowledge. Therefore, ICT plays a very prime role on knowledge management processes. Importance and role of ICT in knowledge management processes has been examined through literature review. Study concludes that primary literature of KM shows the prominent role of ICT in KM. Moreover, Literature also proves that ICT has a prime role to play in early phase of KM initiatives as in knowledge generation and Knowledge sharing processes. If socio-culture environment of organizations has been ignored during implementation of KM, It may lead to failure of use of ICT in KM.

Funda (2019) explains that ICT requires a huge amount of financial investment and typically organizations implement it to gain its positive impact on knowledge management and employees' work performance. It further helps organizations to generate their strategic competitive advantage. ICT has a prime role to play in implementing the knowledge management process. However, ineffective utilization of ICT may act as a barrier in the performance of KM like bad knowledge coordination, poor exchange of knowledge and systems of unreliability. This study explains how ICT has an impact on KM in South African HEIs. Study has proposed the guidelines for the utilization of ICT for the effective implementation of knowledge management to develop the competitive advantage of HEIs. Results reflect that Users of ICT have different levels of abilities for ICT use in HEIs.

Agrawal, Kumar, & Mukti (2020) explained that in this techno-economic environment, it has become very important for the organizations to embrace advanced technologies such as knowledge management to improve their efficiency. This Case study attempted to explain the relationship between ICT and knowledge management in Bhilai Steel Plant. A theoretical framework has been presented that explains the effective utilization of KM with ICT integration. Results prove a strong positive effect of ICT on KM success. Through this study a conceptual framework has been proposed with identified ICT Success factors integrated with KM.

Vyas, Bhalla, and Najneen (2021) have empirically examined the impact of ICT on KM in Indian higher education Institutions. Smart PLS-SEM method has been used to test this relationship. Results show that ICT is positively correlated with KM. Author has presented ICT instrument with two sub-constructs such as ICT

infrastructure and ICT human skills. It has been concluded that both the sub-constructs have positive impact on KM but ICT infrastructure show better effect on the KM than ICT human skills. Impact of overall ICT also shows a very strong effect on KM.

(Ferrero-de-Lucas et al., 2021) explain that utilization of ICT to enhance the Knowledge Management process led to develop the new tools and techniques for KM framework. Ultimately these new methods help in developing effective knowledge management for improved service quality in higher education sector. Study has used (Stankosky, 2005) KM pillar as KM instrument and (Goodhue and Thompson, 1995) theory to measure the technology. Study presents a conceptual framework for utilizing ICT to improve KM in higher education.

2.4.3 Studies based on Information and Communication Technology, and Organizational Culture

Romi-Ismail (2011) stated that Organizational culture is a very significant determinant for the effective information systems and researchers did not deeply discuss about this factor. Author has introduced a comprehensive model in which effect of OC on dimensions of information system success has been discussed. But this model did not test empirically. This study has explained the association between various types of organizational culture (clan, adhocracy, hierarchy, market) and information systems variables such as information quality, system quality, service quality, usability, user satisfaction, and net benefits.

2.4.4 Studies based on Knowledge Management, Organizational Culture, and Information and Communication Technology.

Lee and Chiu (2008) explained the enablers of KM such as strategy and leadership, organizational culture, human resources, IT are associated with the performance of SMEs in Taiwan. Researchers used the survey method and concluded that the three KM enablers i.e., strategy and leadership, organizational culture and employees have significantly positive association with non-financial performance in terms of learning and growth perspective, internal perspective and buyer's

perspective. They recommended that SMEs should prepare the infrastructure for KM to enhance the performance in the non-financial perspective.

Aurum, Daneshgar, & Ward (2008) study enquires current processes of KM in Software Engineering (SE) activities in two Australia based firms and analyses the enablers of KM processes such as leadership, technology, culture, process and measurement. Researchers found that software developers know the benefits of knowledge dissemination, but unable to make use of a part of KM systems. Researchers found that leadership is the most significant KM enabler. Technology has also an obvious mechanism for KM. Culture also encourages participants to distribute their knowledge with team mates.

(Lopez-Nicolas et al., 2009) Main objective of this paper is to examine the impact of OC on the implementation of ICT for strategic KM. Based on literature review conceptual model has been introduced and examined by taking sample of 300 firms in Spain. This study has also used the ICT indicators proposed by (Force, U. I. T. 2005) along with the self-developed questionnaire to measure ICT practices in organizations. This study has concluded that corporate cultures based on hierarchy culture and market culture is not associated with ICT for KM, however, clan culture have impact on the use of ICT for KM and adhocracy culture has impact on ICT for personalization and codification.

(Tong et al., 2015) study has attempted to assess the influence of knowledge distribution on the association between OC and job satisfaction of ICT practitioner. It is a Hong Kong based study. Research concluded that OC significantly has an effect on knowledge distribution and job satisfaction of ICT practitioners and knowledge distribution act as a mediating factor between OC and job satisfaction.

Suri (2015) examined the need, benefits and drivers of e- learning and a conceptual model is developed, which explain the association between OC, individuals' behavior, and satisfaction. With the help of this model it is explained that the different features of the teaching-learning processes require practitioner's attention to decide when to implement ICT and OC affects the implementation of new technologies.

(Mohsin et al., 2015) assess the mediating impact of the KM process among organizational culture, IT support and innovations in Textile sector of Faisalabad, Pakistan. Authors have concluded that organizational culture and IT support have positive relation with the Knowledge Management process, which in turn has positive relation with innovations. KM process weakens the relationship between OC and IT. Finally, results explained that OC, IT support and KM process are very important to achieve a favorable level of innovations.

Supriya (2020) explains that there are very less studies in literature, which shows the prominent use of ICT in knowledge management and knowledge transfer processes in the organizations. Study has attempted to examine the impact of ICT on knowledge transfer process and management of employees qualitatively as well as quantitatively. The study revealed that ICT helps in growing the working efficiencies of the human assets and also act as a facilitator to organizational culture and competitiveness. Lack of literature regarding the impact of ICT makes it very challenging for the employees to implement ICT in KM. This study has proposed a framework to examine the impact of ICT on knowledge transferring process among employees. This study also explains that organizational culture act as a barrier in implementing ICT in knowledge sharing process.

Various social sciences-based studies focused on educational field have used ICT as a moderator on the various relationships such as HRM and educational success or learning expectation and outcomes or information literacy and digital skills. ICT also act as moderator on the various relationships between different variables based on different sector other than education sector such as ICT as moderator on the relationship between KM and organizational performance (Islam, & Islam, 2017; Pavel, 2018). ICT as moderator between OC and KM relationship has not been explored yet in any sector.

Section 2.4 explains the studies based on ICT, KM and OC. This section made it very clear that ICT plays a very significant part in facilitating strong-effective management and administrative functions in higher education field. ICT facilitates the exchange of information and also the access to higher education (Krishnaveni & Meenakumari 2010; Christiana, 2008). (Vyas et al., 2021; Agrawal et al., 2020;

Soualhia & Mejbri, 2014; Funda, 2019) explain that ICT has significant impact on the Knowledge Management. Various studies explain that ICT infrastructure supports KM process in organizations. Some studies explain ICT-based KM in which they discuss only about ICT infrastructure that act as a push or pull factor for the KM process (Kumar & Kumar, 2006; García, 2009). Suri, (2005) and Lam et al., (2009) explain that ICT practice is not only about the infrastructure but, human skills also have a major role to play in ICT. Empirical study that focuses on the human aspect of ICT practices along with infrastructure have been absent in existing literature (Deopacu, 2006; Krishnaveni and Meenakumari, 2010; Allahawiah et al., 2017). This triggers the need of a study, which explains both the aspect of ICT practices as ICT infrastructure and ICT human-skills and also discusses about how it affects the KM process in the higher education sector.

Furthermore, various social sciences-based studies focused on educational field have used ICT as a moderator on the various relationships. ICT act as moderator on the various relationships between different variables based on different sectors other than education sector as well (Islam, & Islam, 2017; Pavel, 2018). Previous studies restricted to the KM sector for testing relationship between ICT and KM, using ICT as independent variable (Aurum et al., 2008; Omona et al., 2010; Andreeva and Kianto, 2012; Allahawiah et al., 2013; Vyas et al., 2021; Agrawal et al., 2020; Soualhia & Mejbri, 2014; Funda, 2019). Study that explains ICT as moderator between the relationship of OC and KM have been absent in existing literature. It requires explaining the role of ICT as moderator on the relationship between OC and KM. Present study achieves the objective of explaining the moderating impact of ICT on relationship between OC and KM through below given hypothesis;

H12: There is no significant moderating effect of ICT on the relationship between Organizational culture and Knowledge management in North Indian Higher Education Institutions.

Therefore, Present study is the first study who has presented an ICT practices measurement tool for higher education institutions, which consider ICT infrastructure and ICT human skills aspect of ICT practices altogether. Moreover, present study is also the first study, which explains moderating impact of ICT (which is taken as a

significant part of KM infrastructure in literature) on relationship between Organizational culture and Knowledge management.

2.5 Research Gap

There are past studies reviewed and have contributed in this field but basic limitations and gap are discussed below.

- 1) Literature review explained that organizational culture is a prime factor for the failure and success of KM and ICT is a significant part of as KM infrastructure. Some studies reviewed were able to explain the significant relationship between the OC and KM or ICT and KM. However, there are some studies conducted in this field, which have not found any significant relationship between OC and KM and ICT and KM. So, there is a discrepancy in the existing literature about the relationship between these variables. This demands the further investigation about relationship between these variables.
- 2) There are some studies in literature, which explain positive relationship between KM process and a particular type of organizational culture such as Clan culture and KM or market culture and KM, using CVF framework. Moreover, some studies also explained that KM process does not reflect any relationship with other types of organizational culture such as no association between Hierarchy culture and KM or Adhocracy Culture and KM. This stimulates the need to know which type of culture is favorable or unfavorable for KM process.
- 3) Studies reviewed explained the relationship between the OC and KM in Higher education sector, are from western countries, East-Asian countries and western-Asian countries. A very few Indian studies, which have attempted to explain the relationship between OC and KM are based on manufacturing, IT, Banking sectors. That triggers the need to examine this relationship in Indian higher education sector. Therefore, there is need to conduct the detailed study, which explains the relationship between the OC and KM in Indian Higher Education Sector.
- 4) There are different processes under KM such as knowledge creation, transfer, storage, application but more no. of studies found in KM area focused on

knowledge transfer as compare to others. Most of the studies based on KM and OC or KM and ICT have explained that OC and ICT Infrastructure as facilitator or barrier in knowledge sharing process, KM is very vast field; it's not only about knowledge sharing. So, further detailed research is required to explore the impact of OC on overall KM process and this relationship in higher education institutions in India.

- 5) Literature reveals various instruments that attempt to measure ICT practices of different organizations. All the ICT instruments mainly focus on ICT Infrastructure of organizations. Literature also reflects a few studies that explain ICT-based KM that discuss only about ICT infrastructure, which act as a push or pull factor for the KM process. However, some theoretical studies explained that KM processes not only depend upon the ICT infrastructure, but attitude and skills of human, have a major role to play in ICT practices. In the context of higher educational sector, literature does not present any empirical study, which focuses on Human aspect of ICT practice along with Infrastructure that facilitates KM process in higher education sector. It demands to develop the instrument that has ability to measure human aspect along with infrastructural aspect of ICT in higher education institutions. Therefore, there is a need of study which explains both the aspect of ICT practices as ICT infrastructure and ICT human skills and also explains how it affects the KM process in the higher education sector.
- 6) There are some studies which do not differentiate between the ICT and KM and do not consider them two different variables but, they consider ICT as a KM infrastructure or as a KM Tool or some studies also consider KM as advanced form of ICT. There is a need of detailed study which explains ICT and KM as two different variables.
- 7) Various social sciences-based studies focused on educational field has used ICT as a moderator on the various relationships such as HRM and educational success or learning expectation and outcomes or information literacy and digital skills. ICT also act as moderator on the various relationships between different variables based on different sector other than education sector such as ICT as moderator on the relationship between KM and organizational performance or relationship

between resource transformation capabilities and quality management. It requires explaining the role of ICT as moderator on the relationship between OC and KM.

- 8) It is clear that study which explains the moderating role of ICT on the relationship between knowledge management and organizational culture is absent in existing literature. Some of studies from other countries are focusing only on relationship between “KM and OC”. Some studies explain that ICT infrastructure facilitate knowledge management process. There is a need to conduct the detailed study, which explains the impact of ICT on relationship between KM and OC in Indian higher education institutions.

In Lit review, various theoretical studies explain that OC and ICT influence the knowledge management process of organization but existing studies still lack the detailed explanation of the relationship between organizational culture and KM with moderating effect of ICT in Indian higher education sector. So, there is a need of further study to explain the relationship between the KM process and different types of OC, and the impact of ICT as moderator on this relationship in Indian higher education field.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter discussed the research methodology embraced for the conduct of present study. Section 3.1 throws the light on research design and explains about the research topic, research questions, objectives, hypotheses, scope of study, sample profile, and research setting. Section 3.2 describes the procedure of designing the research instrument. Section 3.3 explains the construct specifications that include the operational definitions of the constructs. Section 3.4 throws the light on content validity and pilot testing of constructs. Section 3.5 describes the tools and techniques for data analysis. Section 3.6 explains the Research Process and Section 3.7 provides information regarding limitations of the study.

3.1 Research Design

For the conduct of present study, a descriptive form of cross-sectional research design has been adopted. As per Kothari (2004) “The main objective of descriptive research is to reflect the description of the state of affairs as it exists at present.”

3.1.1 Research Topic

“A study of Knowledge management and Organizational culture: Enabling role of ICT in North Indian Higher Education Institutions”.

3.1.2 Research Questions

During literature review, research gap reflects that there is a reasonable discrepancy in the reported relationship between knowledge management and organizational culture, so the main objective of this study is explaining the nature of relationship between Knowledge management and organizational culture in higher education institutions by providing the explanation for the following research questions:

- Is there any significant correlation between Knowledge management and Organizational culture?
- Does information and communication technology (ICT) moderate the relationship between the Knowledge management and organizational culture?

- Is the impact of organizational culture on knowledge management more pronounced in the presence of information and communication technology (ICT) in North Indian higher education institution?

3.1.3 Objectives of the Study

1. To identify current knowledge management processes adopted by the North Indian higher education institutions.
2. To compare knowledge management processes of the North Indian higher education institutions.
3. To analyze the organizational culture adopted by selected universities.
4. To study the relationship between organizational culture and knowledge management process in North Indian higher education institutions.
5. To explore the moderating effect of ICT on the relationship between organizational culture and knowledge management process in North Indian higher education institutions.

3.1.4 Hypotheses

H1: There is no significant difference in knowledge creation process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H2: There is no significant difference in knowledge organization process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H3: There is no significant difference in knowledge storage process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H4: There is no significant difference in knowledge dissemination process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H5: There is no significant difference in knowledge application process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H6: There is no significant difference in knowledge effectiveness process among Central universities, State public, State private universities, Deemed universities and National importance institutions.

H7: There is no significant relationship between Clan culture and Knowledge management of North Indian Higher Education Institutions.

H8: There is no significant relationship between Adhocracy culture and Knowledge management of North Indian Higher Education Institutions.

H9: There is no significant relationship between Market culture and Knowledge management of North Indian Higher Education Institutions.

H10: There is no significant relationship between Hierarchy culture and Knowledge management of North Indian Higher Education Institutions.

H11: There is no significant relationship between Organizational culture and Knowledge management of North Indian Higher Education Institutions.

H12: There is no significant moderating effect of ICT on the relationship between Organizational culture and Knowledge management in North Indian Higher Education Institutions.

3.1.5 Scope of the Study

The scope of the present study has been restricted to North Indian higher education Institutions (Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Uttarakhand, Uttar Pradesh, Chandigarh, and Delhi). Because, as per Bala (2016) North Indian states are clearly ahead of other regions in terms of two parameters given in “All India Survey on Higher Education” (AISHE); First, “Total area served by universities”- As per AISHE and five year plans documents, national average for area served by universities is 2 universities / 10000 square kilometer. There are total 10 states, which have more number of universities per 10000 sq. km than national average. Out of these 10 states, there are 5 North Indian states, which have more number of

universities than national average **i.e.** Haryana, Punjab, Himachal Pradesh, Uttarakhand and Uttar Pradesh. If it is compared with the Southern region, only three states have more number of universities than national average i.e Kerala, Tamil Nadu and Karnataka. Rest 2 universities belong to Eastern region i.e. Bihar and West Bengal. Second parameter is “Total Population served by universities”- As per AISHE and five year plans documents, national average for population served by universities is 5 universities /10 lakh population. There are total 11 states in whole country, which have more number of universities than national average. Out of these 11 states, there are 5 North Indian states, **i.e.** Haryana, Punjab, Himachal Pradesh, Uttarakhand and Jammu & Kashmir. There are 3 states from Southern region i.e. Tamil Nadu, Karnataka and Andhra Pradesh. 2 states belong to Western region and 1 state from Central region. North Indian states are clearly ahead in number of universities as per both the parameters. Therefore, present study has focused on North Indian higher educational institutions. As per Ministry of Human Resource Development (MHRD), there are total 773 Higher Education Institutions/Universities including National Importance Institutions and others in India (NII & others =96). Out of 773, there are total 197 HEI’s in North India. As per Ministry of Human Resource Development (MHRD) in India, universities/institutions are categorized as Central Universities, State Private Universities, Deemed Universities, State Public Universities, and National Importance Institutions and Others.

3.1.6 Research Setting and Sample

There are total 197 HEIs in North India out of total 773 Institutions. Based on literature review, it is assumed that institution with high number of enrolments actively participate in research and other knowledge related activities whereas institutions with low number of enrolments will be busy in solving the under-enrolment problem and other financial problems (Biloslavo et al., 2007 & Omerzel et al., 2011). Multi-stage sampling has been used in this study. Under first stage, taking all the categories of Institutions as five different sub-groups, 170 Institutions have been chosen out of 197 north Indian HEI’s under all categories of Institutions such as central universities 13/16, deemed universities 23/31, state public universities 76/78, state private universities 40/43, and National Importance institutions& others 18/29.

These 170 institutions out of 197 have been selected based on criteria of high number of enrolment of students. As per Kothari, (2004) if purpose happens to be to compare the differences among the sub-groups, then equal sample selection from each Sub-group would be more efficient even if the groups differ in sizes. Therefore in next stage, 5 universities /institutions per sub-group have been chosen by using systematic random sampling method. List of respondent universities have been attached in Appendix-V. Present study has taken professors, associate professors and assistant professors, IT staff, administrative staff and research staff of HEIs as respondents. Literature review has made it clear that educational teaching staff directly participate in KM process. As they involve in knowledge creation through research and also involve in dissemination process through lectures and counseling sessions. IT staff and administrative staff also participate in KM process and ICT related practices. As they participate in knowledge storage and dissemination through keeping records and decision making related to organizational processes. Table 3.1 presents the sample profile.

Table 3.1: Sample Profile

Sub-group	Total (197)	High Enrollments (170)	Random sample	Sample size (500)
DU	31	23	5	100
CU	16	13	5	100
S Priv. U	43	40	5	100
S Pub. U	78	76	5	100
NII& Others	29	18	5	100

Based on UGC report 2016-17

Out of total target population 61266 i.e., total faculties of 170 universities and institutions, sample size of 500 respondents has been selected which means 100 respondents from each sub-group have been selected. As per common rule of Sample size (Bajpai, 2011; Field, 2013), there should be 10-15 subjects per variable or 10 times as many subjects as variable. If choosing more than 300 subjects, no need to see subject –variable ratio. 300-sample size is good but 1000 is excellent.

3.2 Research Instrument

Questionnaire has been used as a research instrument to measure the variables given in the conceptualized model (Figure 3.1). Questions has been placed using five-point likert scale (1-strongly disagree to 5-strongly Agree) for assessing the Organizational Culture (OC), Knowledge Management process (KM), Information and Communication Technology (ICT). The dependent variable 'Knowledge Management' process has been measured by analyzing the six different dimensions of KM such as Knowledge creation, Knowledge organizing, Knowledge storing, Knowledge disseminating, Knowledge application, and Knowledge effectiveness. The Organizational culture assessment Instrument (OCAI) by the Cameron and Quinn (2006), has been adopted to measure the Organizational culture (OC), an Independent variable in present study. It divides the overall organizational culture profile into four different cultures such as Clan culture, Adhocracy culture, Hierarchy culture and Market culture. Each culture is differentiated based on six different characteristics such as Dominating organizational attributes, Leadership style, Management style, Organizational Glue, Strategic emphasis, and Success criteria, which makes this scale 24 items based five-point scale. ICT, a moderating variable includes two dimensions such as ICT infrastructure, and ICT human skills. These dimensions have been measured using 14 items on five-point likert scale. Last part of instrument contains the questions related to the demographic details of the respondents like Age, Sex, Academic status or Designation, length of Job and type of employment.

To develop this measuring instrument, a systematic process has been followed as per (Hinkin, 1998; Nunnally & Bernstein, 1994). First, detailed literature review has been conducted to specify the different constructs of interest such as Knowledge management, Organizational culture and Information and communication technology. Literature review has made it clear that there are various KM instruments available but no instrument has included the recent ways of knowledge dissemination such as use of social media. Most of the KM instruments have ignored the knowledge effectiveness dimension, which is a very significant part of KM process as per (Chin-Loy, 2003 & Downs, 2014). However, there is no KM instrument proposed to measure KM process in university setting, which have included this dimension in their scale. KM instrument, particularly designed by considering the environment of

Indian higher education sector was absent in existing literature. This study has developed the KM instrument by considering the various Knowledge related activities and environment of Indian higher education sector based on literature review (Lawson, 2003; Downes, 2014; Edler, 2003; Wilkens et al., 2004; Chin-Loy, 2003). Present study has adapted the standardized scale 'Organizational Culture Assessment Instrument' (OCAI) by the Cameron and Quinn (2006) to measure the Organizational Culture (OC), an Independent variable. Reasons for using this scale to measure the OC have been discussed later in this chapter. Moreover, literature also revealed that all the ICT instruments available focus only on ICT Infrastructure aspect of organizations. Suri, (2005) and Lam et al., (2009) explain that ICT is not only about the infrastructure but, human skills are also have major role to play in ICT. Empirical study that focuses on the human aspect of ICT practices along with infrastructure, have been absent in existing literature (De-opacu, 2006; Krishnaveni and Meenakumari, 2010; Allahawiah et al., 2017). In the context of higher educational sector, literature does not present any empirical study, which focuses on Human aspect of ICT practice along with Infrastructure that facilitates KM process in higher education sector. It demands to develop the instrument that has ability to measure human aspect along with infrastructural aspect of ICT in Higher education institutions. Therefore, this study has developed the ICT instrument based on existing literature (DeOpacua et al., 2006; Jamieson-Proctor, 2007; López et al., 2009; Omerzel et al., 2011; Krishnaveni & Meenakumari, (2010) and Allahawiah et al., 2013).

Under second step, item pool has been developed and analyzed for KM and ICT variables to extract the relevant items for survey. Under this step, various items generated through detailed literature review have been discussed with the employees of higher education institutions, who are directly, involved in KM processes and ICT related activities. Finally, the Expert review method has been used to check the content validity and to improve the comprehensibility of the developed survey instrument. Under this step, questionnaire items have been reviewed by the experts who have already conducted so much research in the field of KM.

Final Scales used for analyzing the constructs have been validated as per process suggested by Churchill (1979), before using it for final survey.

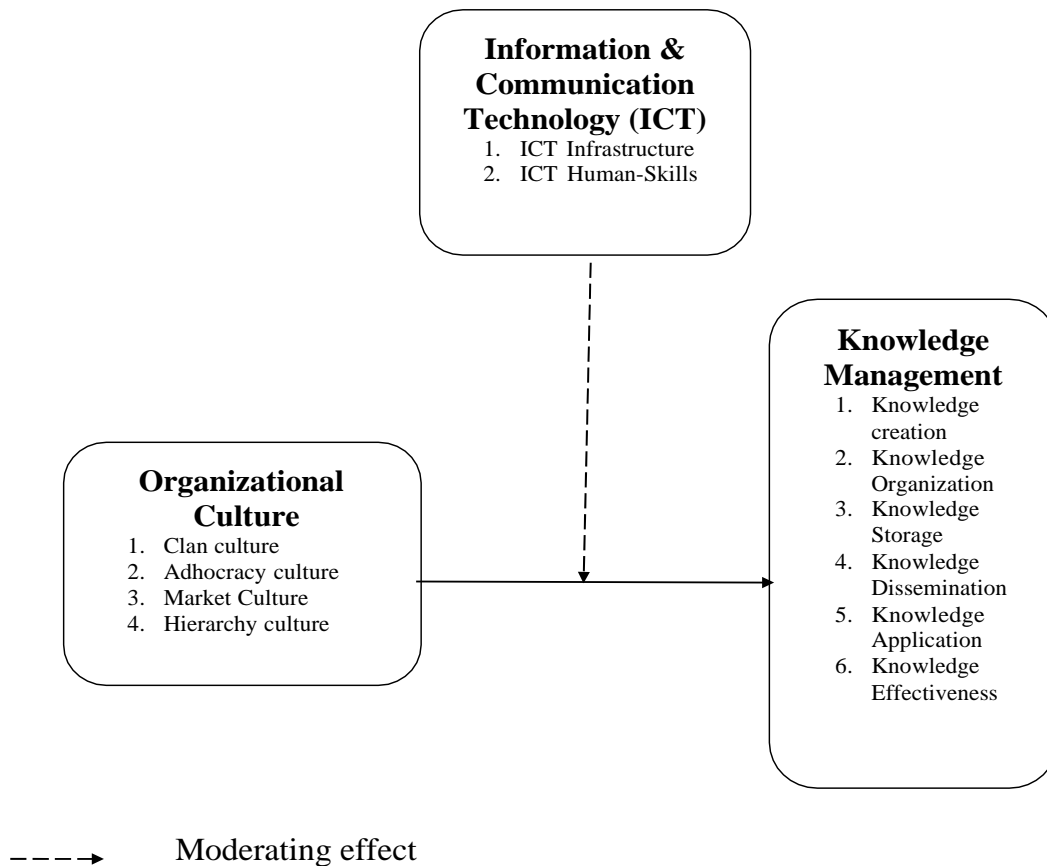


Figure 3.1: Suggested Conceptual Frameworks

Based on the concept, suggested framework of KM construct includes Knowledge creation, Knowledge organization, Knowledge storage, Knowledge dissemination, Knowledge application, and Knowledge effectiveness. Organizational culture (OC) construct has been measured on the basis of its four sub-cultures such as clan culture, adhocracy culture, market culture and hierarchy culture. ICT has been measured in terms of ICT infrastructure and ICT human skills.

3.3 Construct Specification

Construct specification is required as a precondition of scale development (Churchill, 1979; Haladyna, 2012). To draw the meaningful inferences and to strengthen the generalizations of research findings, it is essential to provide a precise definition of construct, which includes the details about what is to be included or excluded, and what is the context, in which it has been implemented. Main purpose of construct specification is providing operational definitions of various constructs used in a given study. To fulfill this main purpose of construct specification, operational definitions of various constructs of present study have been discussed in the below- given sub-sections:

3.3.1 Knowledge Management (KM)

Knowledge Management is defined as a cycle of sequential and overlapping processes such as Knowledge Creation, Knowledge Organization, Knowledge Storage, Knowledge Dissemination, Knowledge Application, and Knowledge Effectiveness, conducted by the organizations to create competitive advantages and new opportunities.

Knowledge Creation is the process of searching and generating current knowledge from various internal and external sources. It also includes capturing new knowledge through the conversion of explicit and tacit knowledge from one form to another form.

Knowledge Organization is the process of organizing existing knowledge or segregating the new knowledge by understanding the relationship of acquired knowledge with various services/ products. It includes keeping the records of subject experts and their good work practices, keeping knowledge base updated, matching the sources of knowledge with the existing problems and challenges.

Knowledge Storage is the process of storing the new knowledge by making use of database, information technology, repositories and other applications to make it accessible to the people in organizations as and when required.

Knowledge Dissemination is the process of disseminating the right kind of knowledge at right time to the right users to satisfy their specific needs. This process includes providing timely reports that carry appropriate information to various

departments, staff, and other relevant institutions through various sources like social networks, meetings, presentations, lectures, conferences, trainings, courses, centrally stored knowledge system, libraries, knowledge forums and recourse centers to display knowledge.

Knowledge Application is the process of implementing new knowledge to find a solution for a particular problem or to form a new product/service, or to generate new strategies and policies for organization.

Knowledge Effectiveness is the process of realizing the result or performance of implementation of knowledge in the form of improved services, knowledge capacity, employees' skills; and improved growth in its organizational memory; copyright and patents; and dissemination and usage of knowledge.

3.3.2 Organizational Culture (OC)

Organizational Culture is defined as norms, practices, beliefs, and value system that is shared by all the members of an organization and differentiate or build the behavior and structure of an organization. Every Organizational culture profile is a mixture of four types of culture such as Clan Culture, adhocracy Culture, Market Culture, and Hierarchy Culture.

Clan Culture reflects the family culture like an extended family. Valuable characteristics of this culture are loyalty, teamwork, mutual trust, participation and extension of the personal. Organization put a stress on developing a human resource, building high trust, openness and employee commitments.

Adhocracy Culture reflects the dynamic and entrepreneurial environment in an organization. Valuable characteristics of this culture are innovation, entrepreneurship, risk taking, innovativeness, liberty, and uniqueness. It focuses on obtaining new resources, generating new opportunities and introducing the innovative products.

Hierarchy Culture reflects controlled, organized, coordinated, and structured organizational environment. Valuable characteristics of this culture are job security, foreseen, stable relationships, formal rules and regulations. It emphasizes on efficiency, smooth-scheduling and low-cost manufacturing.

Market Culture reflects Aggressive, Results oriented and achievement-oriented environment. Valuable characteristics of this culture are achievement, competition and market leadership. It emphasizes on taking competitive actions, goal accomplishment and achievements.

3.3.3 Information and Communication Technology (ICT)

Human skills around information and communications devices or equipment like radio, DVD, television, video players, telephone, satellite systems, computer network, hardware and software, and services integrated with these technologies, used to generate, share, store and manage information. It includes ICT Infrastructure and ICT Human skills, require making use of this ICT infrastructure.

ICT infrastructure reflects the management and development of ICT related devices and equipment which support various organizational processes. It includes the ICT tools or infrastructure, which are used to upload, search and retrieve, share, segregate and implement knowledge.

ICT related human-skills reflects the employees' attitude and ability to adopt the emerging trends in ICT and their skills to make full utilization of the current ICT infrastructure in developing and supporting the organizational strategies. It also includes maintaining record of useful documentation related to ICT based systems.

3.3.4 Operationalization of Knowledge Management (KM) Construct

Based on the review of literature, Knowledge Management measurement instruments have been categorized as Infrastructure-based instruments and Process-based Instruments. Infrastructure based Instruments include various facilitators of Knowledge Management as its dimensions or sub-constructs such as people, knowledge processes, Organizational strategies, rewards, technology, and culture (Abdullah et al., 2005; Stankowsky, 2005; Alavi et al., 2005; Karadsheh et al., 2009; Nassuora, 2011; Attallah et al., 2015; Pawlowski and Bick, 2015; Masa'deh et al., 2019). Most of these KM measuring instruments using infrastructure-based instruments have conceptualized these scales as multidimensional scales. On the other hand, Process-based Instruments includes sequential and overlapping cycle of processes or practices (conduct to manage the organizational knowledge) as its dimensions such as knowledge Creation, Collection, Filtration, Organization, Storage,

Transfer, Application, and Effectiveness (Wiig, 1993; Meyer and Zack, 1996; McElroy, 1999; Parikh, 2001; Horwitch and Armacost, 2002; Lawson, 2003; Edler, 2003; Chin-Loy, 2003; Wilkens et al., 2004; Baastrup and Stromness, 2003; Akhavan et al., 2014; Downes, 2014; Aziz et al., 2018; Hussain et al., 2019). There are a very few studies based on process-based instruments, who are using multi-dimensional view to measure the KM construct to gain the detailed insights of various processes of KM of an organization based on the objectives of their studies. However, some studies using process-based instruments have measured KM construct with uni-dimensional view based on the objective of their study. They are explaining that KM process is a continuous cycle of these sequential and overlapping processes and its dimensions (processes) are highly correlated with each other (Chin-loy, 2003; Akhavan et al., 2014; Hussain et al., 2019). (wilken et al., 2004) and (Lawson, 2003) have presented multidimensional process-based Instruments. However, various studies have adopted (wilken et al., 2004) and (Lawson, 2003) instruments to measure the KM process in various sectors with uni-dimensional view as well as multi-dimensional view (Pawlowsky, 2001; Biloslavo & Trnavčević, 2007; Nezhadgholi and Aghaei, 2013; Al-Bastaki, 2013; Pawlowski & Bick, 2015; Mubin & Latief, 2019)

Indicators of KM construct have been finalized for present study, based on the literature review such as (Lawson, 2003; Downes, 2014; Edler, 2003; Wilkens et al., 2004; Chin-Loy, 2003). Lawson (2003) has proposed instrument by adapting and adjusting the dimensions of three instruments such as Wiig (1993); Parikh (2001); Horwitch and Armacost (2002). It has presented the KM instruments with 24 items which measures the six dimensions/processes of KM. This scale has ignored the 'knowledge effectiveness' dimension of KM process and does not reflect the knowledge activities of higher education institutions. Edler (2003) has presented 22 items to measure the KM construct on the basis of four processes. This instrument has presented various dimensions and activities of knowledge management process of German organizations, but this also lacks in presenting knowledge effectiveness process in detail. Both Lawson (2003) and Edler (2003) have presented a few items that represent knowledge effectiveness process under "knowledge application process" (Chin-Loy, 2003). Meyer and Zack (1996) and Chin-loy (2003) have explained that knowledge effectiveness is a very significant part of knowledge management cycle. (Chin-Loy, 2003) has updated the (Lawson, 2003) instrument by

introducing 8 items-based scale to measure Knowledge effectiveness process of KM. It has proposed and discussed 'knowledge effectiveness' dimension in detail. (Wilkens et al., 2004) has given 30 indicators under four sub-constructs of KM, based on Pawlowsky (2001) study. This instrument has ignored the knowledge organization" and "knowledge effectiveness" processes of KM. Moreover, all these instruments lacks in reflecting knowledge activities and processes of higher education sector. (Omerzel et al., 2011) has proposed an instrument based on (Wilkens et al., 2004) that reflects some knowledge activities of Slovenia based universities. Though, it has also ignored "knowledge organization" and "knowledge effectiveness" processes of university sector. Downes (2014) has attempted to measure the KM process of Australian community service organizations with 38 Items representing seven dimensions/processes, which is based on the McElroy (1999); Lawson (2003) & Chin-loy (2003). This instrument has included knowledge effectiveness dimension but does not reflect the knowledge activities of higher education institutions. All these instruments do not consider the recent ways of knowledge dissemination such as use of social media channels. Present study has attempted to overcome these limitations of existing scales. It has proposed the instrument to measure the KM processes of universities by developing the statements and dimensions as per environment and activities of higher education sector.

Under present study, Knowledge Management (KM) construct has been operationalized through 35 items on a five-point likert scale. KM constructs attempt to measure various KM processes of North Indian HEIs are shown in Appendix IV. First six items related to Knowledge Creation process. Next five items related to Knowledge Organization process. Then, next six items focus on measuring Knowledge Storage process and next eight items measure Knowledge Dissemination process. Then next four items attempt to explain knowledge Application process, and finally, last six items focus on assessing Knowledge effectiveness process. Present study has attempted to measure KM construct based on these six sequential and overlapping processes with second order scale.

3.3.5 Operationalization of Organizational Culture (OC) Construct

Review of literature reflects that Organizational culture measurement tools embrace either 'a typological approach', or 'dimensional approach'. Under 'Typological

approach', researchers have proposed three to four types of cultures as dimensions of organizational culture, in which measurement of organization profile results in mixture of three or more "types" of organizational culture such as Harrison (1972); Quinn and Rohrbaugh (1981); Handy (1985); Trompenaars (1993); Schneider (1994); Cameron and Quinn (2006) instruments. Under 'Dimensional approach', researchers have proposed various characteristics or dimensions of organizational culture, which explain an organizational culture on the basis of its position on continuous variables.

Under present study, 'Organizational Culture Assessment Instrument' (OCAI) by the Cameron and Quinn (2006), has been adapted to measure the Organizational culture (OC), an Independent variable. It is an extension of CVF framework given by Quinn and Rohrbaugh (1981) and revision of their own CVF framework presented in Cameron and Quinn (1999). OCAI scale explains the overall organizational culture of any organization/ community/ or industry that consists of mix of four different cultures such as Clan culture, Adhocracy culture, Hierarchy culture and Market culture. Each culture is differentiated based on six different characteristics such as Dominating organizational attributes, Leadership style, Management style, Organizational Glue, Strategic emphasis, and Success criteria, which makes this scale 24 items based five-point likert scale as shown in Appendix IV. Researchers have explained that each organization/community/industry reflects its own mixture of these four types of Organizational Culture. This mixture of culture is explored by the researchers, through the short survey. Researcher asks respondents to rate six descriptions based on six characteristics that belong to the four culture types, as per the present organization. Researchers get the blend of the four types of culture by adding up the OCAI scores. This scale also illustrates the dominating type of culture and strength of this dominating culture out of the four culture types. During literature review, different empirical studies based on the assessment of OC in HEIs and other sector has used the Cameron and Quinn (2006) instrument. It is the most widely used instrument to measure the organizational culture in various sectors. Various studies like (Chin-loy, 2003; Mubin & Latief, 2019; Allameh et al., 2011; Beytekin et al., 2010; Chidambaranathan et al., 2015; Imam et al., 2013; James-Nganga, 2012; Lawson, 2003; Omerzel et al., 2011; Rai, 2011; Román, Ribiere & Stankosky, 2004; Sharimllah et al., 2007) have used this instrument to know their organizational culture profile i.e. mixture of four types of culture and also examined the relationship of

overall organizational culture and also its various types of organizational culture with Knowledge Management and Organizational performance. Various studies like (Kalliath, Bluedorn, & Gillespie, 1999; Helfrich et al., 2007; Choi et al., 2010; Heritage, Pollock, & Roberts, 2014) have examined the dimensionality of OCAI scale. All these studies have conducted the confirmatory factor analysis and have validated the dimensionality of model based on four sub-cultures. These studies have validated this instrument as multidimensional scale. Present study has attempted to measure the impact of overall organizational culture and its various types of cultures on KM. Researchers explain that OCAI and its dimensions provide a valid matrix for assessing overall organizational culture. This instrument reflects good face as well as empirical validity, and includes diverse no. of the dimensions of Organization culture (OC) presented by different researchers in various organizational instruments. This instrument is very comprehensible and simple to understand by the respondents.

Other reasons for adopting this framework: This instrument significantly different from many of other instruments for measuring the OC as it gives the descriptions or affirmations in form of statements to the respondents instead of raising some direct questions for assessing their organization. Respondent has to assess the extent to which their OC corresponds to the given description or statement. This instrument ensures that answers given by respondents reflect their personal attitude to a smaller extent. This tool has capability to analyze OC of Higher Education institutions proved by many Research studies because this reflects the number of dimensions of OC, which covers the scope of various other instruments of OC.

3.3.6 Operationalization of Information and Communication Technology (ICT) Construct

Information and communication technology (ICT) has been measured in two parts. First part contains the list of ICT indicators, which given an idea of presence of various ICT related technologies or indicators in various institutions such as computers, telephone, internet and many more given in Table 3.2. Respondents have to answer whether their institutions have these technologies or not if yes, then they have to rate their importance by highlighting appropriate number on likert scale i.e., from (1) Highly unimportant to (5) Highly important. This core list on ICT related indicators had been introduced by the international community and UN Statistical

Commission in (Force, 2005) to understand the position and importance of ICT indicators in higher education sector. It is very helpful to measure the presence and importance of various technologies and ICT indicators in education sector. This list of indicators has been adopted by various studies such as (DeOpacua et al., 2006); Jamieson-Proctor, 2007; López et al., 2009; Olasina, 2012). Second part of questionnaire contains the items related to Information and Communication Technology (ICT) Construct to measure the ICT practices of HEIs. The reason for using (Force, 2005) based ICT indicators along with self-developed ICT practices-measuring instrument is; as there are many studies explained the significance of understanding the position and importance of ICT indicators in the institutions, on which research study has been based (DeOpacua et al., 2006; Jamieson-Proctor, 2007; López et al., 2009; and Omerzel et al., 2011).

During detailed Literature review, various instruments has been analyzed, attempted to measure ICT practices. (DeOpacua et al., 2006) have presented instrument to measure ICT based on 25 items to measure two dimensions i.e “IT infrastructure with 7 items and IT Responsibilities with 18 items.” This instrument is also conceptualized as reflective-formative higher-order scale. Jamieson-Proctor, (2007) has also proposed a multidimensional 22 items-scale to measure ICT practices based on two dimensions; “Usage of ICT with 16 items, and ICT changes with 6 items.” Krishnaveni & Meenakumari (2010) have explained the 18 items to measure three ICT dimensions such as “student administration with 7 items, staff administration with 6 items and General administration with 5 items” and they have validated this scale as formative scale. (López et al., 2009) have introduced an instrument based on 11 items to measure the three dimensions of ICT i.e. 4 items under ICT Infrastructure, three items under ICT Knowledge, and four items under ICT Operations, which they have measured as reflective-formative second-order scale. (Allahawiah et al., 2013) have presented 20 items-based ICT scale to measure four dimensions of ICT such as “Device, Programs, Security, and Usability”. All the four dimensions contain 5-5 items. This scale is also validated as higher-order reflective-formative scale. (Chen et al., 2015) have presented 54 items to measure the three dimensions of ICT i.e. “Basic ICT skills with 33 items, Advance ICT skills with 21 items, and Multimedia and Attitude towards ICT with 6 items.” In the context of higher educational sector, literature does not present any empirical study, which focuses on Human aspect of

ICT practice along with Infrastructure that facilitates KM process in higher education sector. It demands to develop the instrument that has ability to measure human aspect along with infrastructural aspect of ICT in Higher education institutions.

Based on these studies, instrument to measure the ICT practices have been developed (See Appendix IV). Under present study, ICT construct has been measured with 14 items on a five-point Likert scale, 8 items assess ICT Infrastructure and 6 items measure ICT Human-skills. ICT has been measured as second-order Reflective-Formative scale. As per (Hair et al., 2017), Formative measures are also known as ‘Mode B’ measurement in PLS-SEM. Under formative measures indicators cause constructs. On the other hand, Reflective measures are also known as ‘Mode A’ measurement in PLS-SEM. Under reflective measures construct reflect all the indicators. Based on literature review, the statements of questionnaire have been selected to measure the information and Communication Technology in Higher Education Institutions.

Table 3.2: List of Information and Communication Technology (ICT) Indicators

Sr. no.	ICT Indicators	Source(s)
1)	Presence of fixed telephone	(Force, U. I. T. 2005)
2)	Presence of mobile devices	
3)	Presence of computers	
4)	Presence of Internet access	
5)	Efficient method of access/bandwidth for Internet use	
6)	Presence of local network	
7)	Presence of Website	
8)	Recently invested in ICT for upgradation	
9)	Have enough services for which the Internet is used	
10)	Provide ICT training	
11)	Have barriers to PC usage	
12)	Have barriers to internet usage	
13)	My institution is near to the geographic location where ICT goods are sold	

3.4 Content Validity and Pilot Testing

Content validity is a very significant aspect of scale development. It is conscientious and analytical assessment of the indicators, which are selected to be included in an instrument. These items are to be assessed in terms of vagueness, clarity, redundancy, fairness and importance. Acceptance among subject matter experts confirms that instrument is adequate for the specific research domain and items are clearly, appropriately and adequately representing the underlying construct (Lance et al., 2006; Wynd et al., 2003; Hinkin, 1998). Content validity assesses the extent to which all possible aspects of a concept are considered. It is difficult to set out all the dimensions of a concept, there are explained procedures which helps to identify the critical dimensions such as literature review for the identification of all the possible items to be included in the measure. Other procedure is getting expert opinion on the items to be included or omitted. It includes the subjective analysis of content by the subject matter experts in term of comprehensiveness, understandability and representativeness (Ferketich, 1991; Rico et al., 2012; Downes, 2014). Another procedure is conducting pilot testing by group of respondents which are similar to the population researchers are going to study and researchers have to incorporate suggestions and criticisms received from experts to the questionnaire (Davis et al., 2000; Downes, 2014). In this research, each of these procedures has been followed. First, content validity of all the instruments of this study have been assessed by expert opinion method. Under this method, five academic experts 'opinion from different universities has been seek. Academic experts have the experience of working on the subject of knowledge management and Information and communication technology and all were from the field of research and management Subjects. All the experts have been approached personally and ask for: (i) the critical assessment of items (ii) suggest modification if required. Experts have been provided with the brief explanation of the construct with the operationalized definitions. Experts have checked appropriateness, readability and comprehensiveness of questions given in questionnaire. Though no negative remark has been received on questionnaire but, their suggestions mainly related to correction of wording have been incorporated into a revised questionnaire.

To gain the clarity regarding the potential problems in the items of various instruments under investigation, pilot study has been conducted on 110 respondents from two higher education institutions. As per (Cooper et al., 2003) pilot testing can be conducted with 25-100 respondents and according to (Srivastava et al., 2012) sample for pilot study in survey research should be 20% of the larger sample of parent study. It helps in understanding the problems with response format, questions format and also helps in improving the comprehensibility of measuring Instrument. Reliability of questionnaire has been examined by calculating the Cronbach's Alpha and validity by so-called item-to-total correlation method (Omerzel et al., 2011; Lawson, 2003; Litwin, 1995) Statistical package for social sciences (SPSS) software has been used to conduct these tests. However, the pretesting has been conducted with a small sample, considered with a great caution and the findings have not been generalized outside this sample. Here, main concern is to check the Reliability and validity of instruments, but nothing else. Result of pre-testing have been shown in Annexure II, which reflects that Cronbach alpha values for all the sub-constructs of measuring instruments such as Organizational culture Assessment instrument, knowledge management process, and ICT Practices are above the threshold value 0.7 (Nunnaly & Bernstein 1994; Lance et al., 2006; Hair et al., 2017; Ramayah et al., 2011). It also explains that KM process have been initially measured with 35 variables; 3 variables Kcrt5, kdis6 and Kdis7 have been eliminated for further analysis because value of the item-to-total correlation of these items (Kcrt5, Kdis6 and Kdis7) have been very low. After eliminating these items, Cronbach's alpha value has been also improved. So, final questionnaire considers 32 variables of KM instrument. No item was deleted from Organizational culture and ICT instruments. Respondents did not find any difficulty in responding and understanding the question items. The final questionnaire used for survey has been presented in Annexure I.

3.5 Data Analysis

Various univariate, bivariate and multivariate techniques has been applied to analyze the collected data. To analyze the basic nature of data, descriptive Statistics have been used such as mean, median, mode and standard deviation. To know the center of frequency distribution of data, three measures such as mean, median and mode are to

be used. These are also called measures of central tendency. Standard deviation is a measure of dispersion around the mean. To check the multivariate normality skewness, kurtosis and Mahalanobis D2 index have been examined. Distribution of dataset can deviate from its normal in two ways i.e. 'no symmetric' (skewness) and 'pointiness' (kurtosis). Mahalanobis distance explains the distance of observations from the mean scores of the predictor variables. Observations with highest values need to be checked. In case of large sample size (500), values greater than 25 are problematic. For smaller sample size (100), values greater than 15 are problematic (Field, 2013). Finally, To compare knowledge management processes of various categories of North Indian Higher education institutions One- way Anova has been used. One-way Anova test compare the mean scores of various groups and explains whether there is a sig. difference in mean score(s) of independent and unrelated groups. In this test, value of F-ratio explains if the difference among various groups' sample mean(s) is significant or it is due to sampling fluctuations. Table (3.7) shows all the data analysis methods and their mathematical expressions. Confirmatory Factor Analysis has been conducted using Smart PLS-3 for the validation of various Instruments. To study the relationship between Organizational culture and knowledge management process and the relationship between various types of organizational culture and knowledge management process in North Indian Higher Education institutions, Structural Equation Modeling has been applied. Moderation Analysis has been conducted to explore the moderating effect of ICT on the relationship between organizational culture and current knowledge management process in North Indian Higher Education institutions. Various software such Microsoft Excel, SPSS (Statistical Package for the Social Sciences) and Smart PLS3 have been used for data analysis. Smart-PLS has been introduced by Herman Wold in 1982, as an alternative approach to covariance based Structure equation modeling. It is considered as second generation multivariate technique. "It is composite-based approach to SEM, uses proxies to represent the constructs of interest, which are weighted composites of indicator variables for a particular construct" (Hair et al., 2017).

Structure equation model comprises of two steps. The structural model explains the structural path between the endogenous and exogenous constructs; however, the measurement model explains the relationships between every construct and the

variables associated with it. In PLS-SEM, structural model is referred as inner model and measurement model is referred as outer model. PLS-SEM consists of three-stage approach, which is based on least squares algorithms. Figure 3.2 illustrates the PLS-SEM approach in mathematical expression, presented by Lohmöller, 1989 (Sarstedt, Ringle & Hair, 2017). The mathematic expression of algorithm begins with the initialization stage in which preliminary scores of latent variable has been established. Unit weights (i.e., 1) have been used to compute these scores for all the items in the measurement models (Hair et al. 2017). Under Stage I, PLS-SEM iteratively explains the inner weights and latent variable scores with the help of four-step process. Under measurement model, Inner weights are path coefficients; however, outer weights and outer loadings are indicator weights and loadings. Step-1 utilizes the scores of initial latent variable to compute the inner weights (b_{ji}) between the adjacent dependent variable (Y_j) and independent variable (Y_i) in the structural model. There are three ways to explain the inner weights centroid scheme, factor weighting scheme, path weighting scheme. Path weighting scheme is preferred as it maximizes the R^2 value (Hair et al., 2017). Step-2 is ‘inside approximation’. Under this step, proxies for every latent variables ($Y_{\sim j}$) have been computed by applying the weighted sum of scores of adjacent latent variables (Y_i). Under Step-3 new outer weights representing the relationship between every latent variable ($Y_{\sim j}$) and its indicators has been computed for measurement model. Two estimation modes have been used in PLS-SEM for this step; Mode A uses correlation weights, correlation among every indicator and the construct explains the outer weights. On the other hand, Mode B uses regression weights in which indicator weights have been computed by using regression on every construct with its own indicators. Mode A is used to measure reflective constructs, whereas Mode B is used for formative constructs. Figure 3.2 explains the mathematical expressions of these two modes, x_{kjn} represents raw data for variable; k ($k = 1, \dots, K$), j ($j = 1, \dots, J$) and n ($n = 1, \dots, n$) $Y_{\sim jn}$ represent the scores of latent variable under step -2; w_{kj} represents the outer weights under Step-3; d_{jn} represents error term in bivariate regression; ek_{jn} represents error term in multiple regression; Under Step-3 ($w_{\sim kj}$) are updated weights and (x_{kjn}) are indicators, these are linearly associated to update (Y_{jn}) scores of latent variable of Step-4; Hereafter, a new iteration begins; the algorithm ends with the weights computed from Step-3 modify

from one iteration to the other (1×10^{-7}), or maximum number of iterations is accomplished 300 (Henseler, 2009; Sarstedt, Ringle & Hair, 2017). Stages 2 and 3 utilize the scores of final latent variable computed in Stage-1 as input for the further least square regressions. These regressions compute the final outer loadings, weights, and path coefficients, R2 values of the endogenous variables (Sarstedt, Ringle & Hair, 2017).

Initialization	
Stage 1: Iterative estimation of weights and latent variable scores	
Starting at step #4, repeat steps #1 to #4 until convergence is obtained.	
#1	Inner weights (here obtained by using the path weighting scheme) $v_{ji} = \begin{cases} \text{cov}(Y_j; Y_i) & \text{if } Y_j \text{ and } Y_i \text{ are adjacent} \\ 0 & \text{otherwise} \end{cases}$
#2	Inside approximation $\tilde{Y}_j := \sum_i b_{ji} Y_i$
#3	Outer weights; solve for $\tilde{Y}_{jn} = \sum_{i_j} \tilde{w}_{k_j} x_{k_j n} + d_{jn} \quad \text{in a Mode A block}$ $x_{k_j n} = \tilde{w}_{k_j} \tilde{Y}_{jn} + e_{k_j n} \quad \text{in a Mode B block}$
#4	Outside approximation $Y_{jn} := \sum_{k_j} \tilde{w}_{k_j} x_{k_j n}$
Stage 2: Estimation of outer weights, outer loadings, and path coefficients	
Stage 3: Estimation of location parameters	

Adopted from (Sarstedt, Ringle & Hair, 2017, p.9)

Figure 3.2: PLS-SEM Approach in Mathematical Expression

Why Smart PLS: As per (Hair et al., 2017) PLS-SEM has greater statistical power than Co-variance-based SEM (CB-SEM). Researchers find the higher efficiency of PLS-SEM in the estimation of parameters. Both formative as well as reflective scales are easily incorporated with PLS-SEM, while CB-SEM typically allows the use of reflective scale only. Other properties of PLS-SEM are; it has no assumption regarding data distribution and easily accommodates the small sample of data. It is very good for predictive purpose which is the primary objective of structure equation modeling. It means PLS-SEM performs better in predicting and explaining the target constructs than that of CB-SEM. As PLS SEM maximize the R2 value of endogenous

variables and reduces the amount of unexplained variance (Sarstedt, Hair & Ringle, 2019; Hair et al., 2019; Sarstedt, Ringle & Hair, 2017).

Table 3.3: Data Analysis Methods

Data Analysis Method	Explanation	Mathematical Expression
Descriptive statistics;	-	-
Mean	“Mean is simply the average score of data” Field, (2013).	$\bar{x} = \frac{\sum xi}{n}$ <p>where, \bar{x} = mean $\sum xi$= sum of observations n= Total number of observation</p>
Median	“Median is the middle score of data set, when score are given in order of magnitude” Field, (2013).	<p>If n is odd,</p> $\text{Median (Md)} = \frac{n+1}{2}$ <p>If n is even,</p> $\text{Md} = \frac{\left(\frac{n}{2}\right) + \left(\frac{n}{2} + 1\right)}{2}$ <p>Where, n = Total number of observations</p>
Mode	“Most frequently occurred score in data set is called Mode” Field, (2013).	<p>Mode (Mo) =</p> $L + h \frac{(fm - f1)}{(fm - f1) + (fm - f2)}$ <p>Where, L =lower limit of the modal class</p>

		<p>h = size of the class interval</p> <p>f_m = frequency of the modal class.</p> <p>f_1 = frequency of the class preceding the modal class.</p> <p>f_2 = frequency of the class succeeding the modal class</p>
Standard Deviation	<p>“Square root of the variance is called standard deviation, where variance is average error between data set and mean” Field, (2013).</p>	<p>Standard deviation (s)</p> $\sqrt{\frac{\sum_{i=1}^N (x_i - \bar{x})^2}{N - 1}}$ <p>Where,</p> <p>x_i= ith observation</p> <p>\bar{x}= Population mean</p> <p>N= Total number of observations</p>
Multivariate Normality tests (Test for deviation from normal distribution)	-	-
Skewness	<p>“Skewness means lack of symmetry” Field, (2013).</p>	<p>Skewness (Sk) = $3 * (\bar{x} - Md)/s$</p> <p>Where,</p> <p>\bar{x}= Population mean</p> <p>Md= Median</p> <p>s=standard deviation</p>
Kurtosis	<p>“Kurtosis means pointiness of distribution” Field, (2013).</p>	<p>Kurtosis=</p> $n \frac{\sum_{i=1}^n (x_i - \bar{x})^4}{\sum_{i=1}^n (x_i - \bar{x})^2}$ <p>Where,</p> <p>x_i= ith observation</p>

		\bar{x} = Population mean n= Total number of observations
Mahalanobis D2 Index	“Mahalanobis distance explains the distance of observations from the mean value(s) of the predictor variable(s)” Field, (2013).	$D^2 = (x - m)^T \cdot C^{-1} \cdot (x - m)$ Where, D^2 = square of Mahalanobis distance x =row of datasheet m= mean of each column C=inverse covariance matrix of independent variables
Methods to test the Hypotheses	-	-
One-Way Anova	“‘This test explains whether there is a sig. difference in mean score(s) of three or more independent groups.’”	F ratio= $\frac{MS\ between}{MS\ within}$ Where, MS between= mean square between the sample MS within= mean square within the sample [MS is calculated as Sum of Squares(SS) divided by degree of freedom (d/f)]
PLS-Structural Equation Modelling	“A composite-based approach to SEM uses proxies to represent the constructs of interest, which are weighted composites of indicator variables for a particular construct” (Hair et al., 2017).	(See Figure: 3.2)

Source(s): (Kothari, 2004; Field, 2013 & Hair et al., 2017)

3.6 Research Process

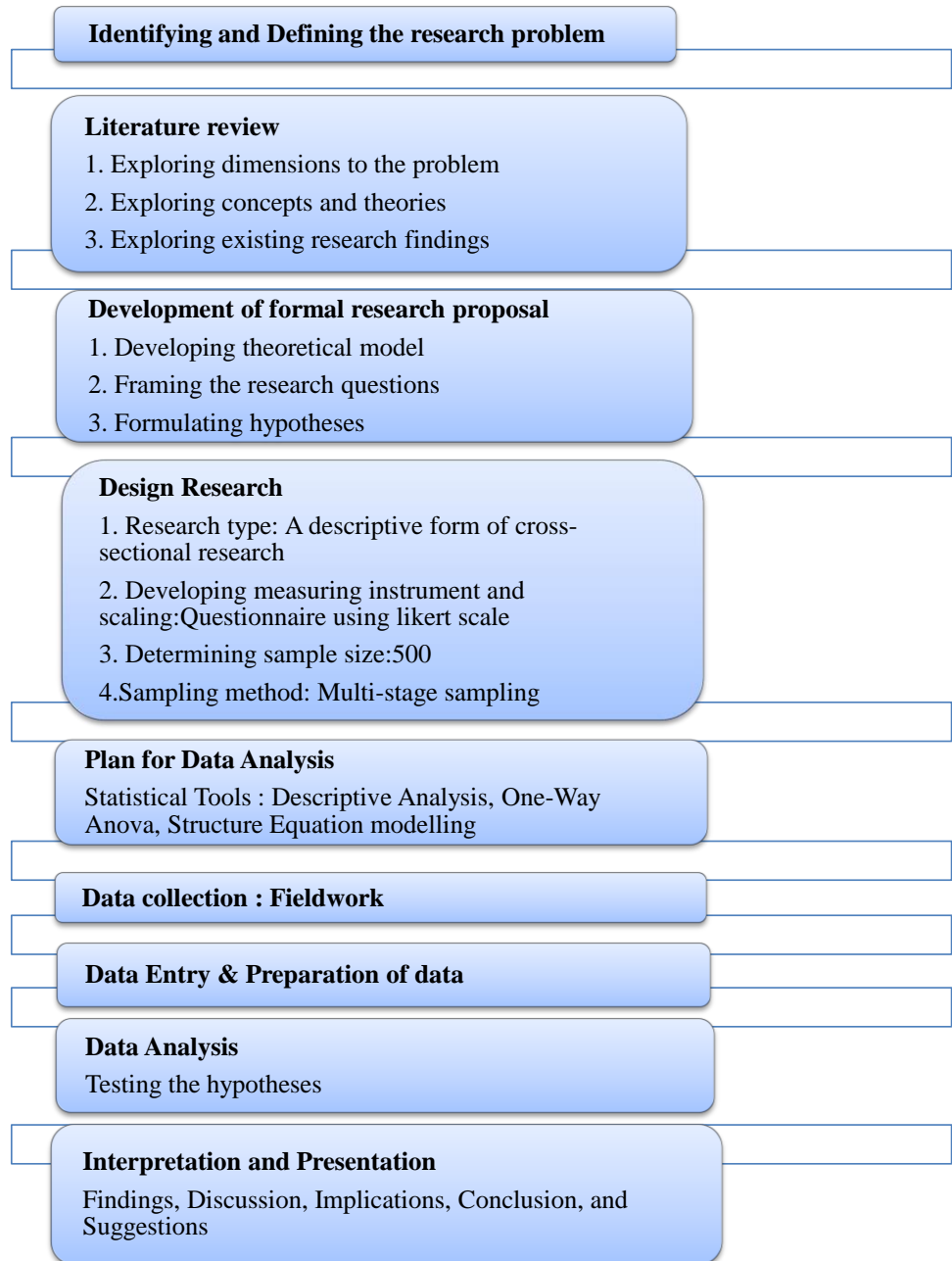


Figure 3.3: Research Process

3.7 Limitations of the Study

1. Under this study, cross-sectional data has been used which reflects a static image of relationship variables. The study may not prove the given relationships if longitudinal data has been used.
2. Results of this study are based on North Indian higher education institutions. Findings may be different if sample is drawn from the different industry.
3. As the findings of this study is restricted to North Indian Higher Education Institutions. There may be difference in Organizational culture, ICT practices, and knowledge management process with the change in geographical region.
4. This study has only taken Administrative, research, IT staff and faculty into account as knowledge workers. It has not included students and research scholars in this research. Study may have included students in research as user of knowledge.

CHAPTER 4

MEASUREMENT AND VALIDITY

This chapter presents the practice of validating and measuring the various constructs analyzed in this study. Section 4.1 presents the descriptive statistics of collected sample data. Section 4.2 deals with the reliability of various constructs given in this study. Section 4.3 explains about the validity of various scales. Section 4.4 deals with the validation and measurement of Organizational culture (OC) scale i.e. (OCAI). Section 4.5 throws the light on validation of Knowledge management (KM) scale. Section 4.6 explains about the validation of Information and Communication Technology (ICT) scale.

For the measurement and validation of all the constructs such as Knowledge Management (KM); Organizational Culture (OC); Information and Communication Technology (ICT), Smart PLS 3 (partial least square) has been used. Statistical Package for Social Sciences 2.2 (SPSS) has been used to conduct the test for explaining the differences among various variables.

4.1 Descriptive Statistics

The descriptive analysis gives an idea about the basic characteristics of the data in the present study. Descriptive statistics describe the correctness of the data entry practice and explain the nature of distribution of scores. Descriptive statistics also support in interpretation of research findings. In the present study, the descriptive statistics explain the mean, median, mode, skewness, kurtosis and standard deviation for all the constructs, presented in Table 4.1.

Table 4.1: Descriptive Statistics

Sr. No	Construct	Item Code	N	Mean	Median	Mode	Std. Deviation	Skewness	Kurtosis	Std. Error of Mean
1	CLAN CULTURE	ClanDC1a	500	2.97	3.00	3	1.165	-0.037	-0.854	0.052
2		ClanOL2a	500	3.44	4.00	4	1.049	-0.839	0.104	0.047
3		ClanME3a	500	3.46	4.00	4	1.038	-0.745	0.05	0.046
4		ClanOG4a	500	3.46	4.00	4	1.009	-0.711	-0.018	0.045
5		ClanSE5a	500	3.42	4.00	4	1.094	-0.867	-0.026	0.049
6		ClanCS6a	500	3.45	4.00	4	1.082	-0.844	0.104	0.048
7	ADHOCRACY CULTURE	AdhDC1b	500	3.29	3.00	4	1.025	-0.591	-0.075	0.046
8		AdhOL2b	500	3.36	4.00	4	1.083	-0.587	-0.333	0.048
9		AdhME3b	500	3.45	4.00	4	1.036	-0.767	0.079	0.046
10		AdhOG4b	500	3.33	4.00	4	1.069	-0.723	-0.17	0.048
11		AdhSE5b	500	3.37	4.00	4	1.082	-0.662	-0.207	0.048
12		AdhCS6b	500	3.42	4.00	4	1.122	-0.625	-0.338	0.050
13	MARKET CULTURE	MktDC1c	500	3.36	4.00	4	1.096	-0.553	-0.403	0.049
14		MktOL2c	500	3.35	4.00	4	1.141	-0.692	-0.385	0.051
15		MktME3c	500	3.42	4.00	4	1.059	-0.734	-0.074	0.047
16		MktOG4c	500	3.48	4.00	4	1.062	-0.769	-0.135	0.047

17		MktSE5c	500	3.52	4.00	4	1.018	-0.873	0.284	0.046
18		MktCS6c	500	3.51	4.00	4	1.064	-0.827	0.081	0.048
19	HIERARCHY CULTURE	HchDC1d	500	3.57	4.00	4	1.079	-0.657	-0.184	0.048
20		HchOL2d	500	3.59	4.00	4	1.101	-0.696	-0.217	0.049
21		HchME3d	500	3.51	4.00	4	1.149	-0.766	-0.073	0.051
22		HchOG4d	500	3.55	4.00	4	1.089	-0.69	-0.098	0.049
23		HchSE5d	500	3.56	4.00	4	1.056	-0.778	0.1	0.047
24		HchCS6d	500	3.5	4.00	4	1.105	-0.681	-0.119	0.049
25		KNOWLEDGE CREATION	Kcrt1	500	3.06	3.00	4	1.054	-0.479	-0.586
26	Kcrt2		500	3.33	4.00	4	1.138	-0.624	-0.307	0.051
27	Kcrt3		500	3.43	4.00	4	1.168	-0.694	-0.349	0.052
28	Kcrt4		500	3.48	4.00	4	1.124	-0.62	-0.266	0.050
29	Kcrt5		500	3.39	4.00	4	1.072	-0.811	0.081	0.048
30	KNOWLEDGE ORGANIZATION	Korg1	500	3.43	4.00	4	1.095	-0.781	-0.006	0.049
31		Korg2	500	3.47	4.00	4	1.104	-0.812	0	0.049
32		Korg3	500	3.44	4.00	4	1.092	-0.587	-0.277	0.049
33		Korg4	500	3.41	4.00	4	1.064	-0.746	-0.105	0.048
34		Korg5	500	3.45	4.00	4	1.059	-0.732	0.057	0.047
35		Kstr1	500	3.5	4.00	4	1.101	-0.837	0.078	0.049

36	KNOWLEDGE STORAGE	Kstr2	500	3.51	4.00	4	1.103	-0.736	-0.052	0.049
37		Kstr3	500	3.47	4.00	4	1.045	-0.699	-0.123	0.047
38		Kstr4	500	3.44	4.00	4	1.074	-0.707	-0.147	0.048
39		Kstr5	500	3.42	4.00	4	1.129	-0.758	-0.236	0.050
40		Kstr6	500	3.46	4.00	4	1.124	-0.673	-0.289	0.050
41	KNOWLEDGE DISSEMINATION	Kdis1	500	3.42	4.00	4	1.07	-0.77	-0.126	0.048
42		Kdis2	500	3.48	4.00	4	1.075	-0.75	-0.106	0.048
43		Kdis3	500	3.53	4.00	4	1.067	-0.799	0.132	0.048
44		Kdis4	500	3.51	4.00	4	1.105	-0.662	-0.216	0.049
45		Kdis5	500	3.53	4.00	4	1.077	-0.847	0.208	0.048
46		Kdis6	500	3.41	4.00	4	1.101	-0.561	-0.409	0.049
47	KNOWLEDGE APPLICATION	Kapp1	500	3.54	4.00	4	1.073	-0.896	0.269	0.048
48		Kapp2	500	3.5	4.00	4	1.075	-0.739	-0.08	0.048
49		Kapp3	500	3.45	4.00	4	1.1	-0.706	-0.101	0.049
50		Kapp4	500	3.48	4.00	4	1.051	-0.738	0.061	0.047
51		Keff1	500	3.46	4.00	4	1.111	-0.819	0.007	0.050
52		Keff2	500	3.42	4.00	4	1.107	-0.749	-0.078	0.050

53	KNOWLEDG EFFECTIVE NESS	Keff3	500	3.41	4.00	4	1.126	-0.716	-0.248	0.050
54		Keff4	500	3.42	4.00	4	1.084	-0.647	-0.21	0.048
55		Keff5	500	3.36	4.00	4	1.114	-0.514	-0.35	0.050
56		Keff6	500	3.43	4.00	4	1.103	-0.686	-0.131	0.049
57	ICT INFRASTRUCTURE	ICTinfra1	500	3.29	3.00	4	0.985	-0.623	-0.073	0.044
58		ICTinfra2	500	3.2	3.00	4	1.078	-0.25	-0.627	0.048
59		ICTinfra3	500	3.32	4.00	4	1.083	-0.472	-0.487	0.048
60		ICTinfra4	500	3.46	4.00	4	1.073	-0.629	-0.132	0.048
61		ICTinfra5	500	3.43	4.00	4	1.029	-0.674	-0.12	0.046
62		ICTinfra6	500	3.52	4.00	4	0.927	-0.822	0.55	0.041
63		ICTinfra7	500	3.59	4.00	4	1.004	-0.613	-0.119	0.045
64		ICTinfra8	500	3.51	4.00	4	1.066	-0.684	-0.109	0.048
65	ICT HUMAN SKILL	ICThs1	500	3.39	4.00	4	1.029	-0.683	-0.012	0.046
66		ICThs2	500	3.42	4.00	4	1.028	-0.789	0.062	0.046
67		ICThs3	500	3.45	4.00	4	1.098	-0.711	-0.151	0.049
68		ICThs4	500	3.44	4.00	4	1.094	-0.571	-0.242	0.049
69		ICThs5	500	3.43	4.00	4	1.02	-0.703	0.079	0.046
70		ICThs6	500	3.46	4.00	4	1.069	-0.572	-0.214	0.048

The evaluation of descriptive statistics (Table 4.1) explains that all the items come within the predetermined maximum and minimum range with no missing figure. Standard deviation ranges from 0.92 to 1.16, which is reasonable and explains that the deviation of the data from its mean is low. Standard error ranges from .04 to .05 and low indices of standard error explain the correctness of measurement process in catching the true score of population. The mean values of almost all the statements are above 3 which means respondents agree with all the statements related to various constructs given in the research instrument, measured on 5-point Likert scale. The constructs have been tested through the value of Skewness and Kurtosis to determine the nature of distribution of data score. In statistics, Skewness assesses the asymmetry of the data. Desired range of skewness value is between -1 to +1. However, Kurtosis explains the peakedness of the data and desired value of kurtosis is between -3 to +3. Since the values of skewness and kurtosis fall under acceptable limits, and this study has also used substantially large sample size, which explain that data is correct for further analysis (Field, 2009; Goparaju, 2019; Allahawiah et al., 2013). However, Multivariate normality of the data has been also checked by calculating Mahalanobis D2 index, which did not indicate any problem with the data.

4.2 Reliability

Reliability is considered as a capability of any instrument to bring out the consistent result, over and over again under same prevailing conditions. As per Nargundkar (2008), “reliability is a feature by which consistent results are produced when measurement of something is being repeated.” Churchill (1979) and (Hair et al., 2010) has defined reliability as “an extent to which any measuring tool is without random error and evaluate the given variable with appropriate accuracy repeatedly.” A questionnaire used to collect data from same population that gives consistently similar results can be treated as reliable.

As per (Hair et al., 2010) Cronbach’s alpha is the most extensively practiced method to assess the reliability. Alpha value ranges from 0-1. It has ability to measure the reliability of Likert scale. Internal consistency is a significant property of reliability. It explains the extent of correlation among different indicators of a same construct. It also declares that variance explained by the instrument is reasonably

greater than the random error (i.e., error variances). Random error can be measured by subtracting the square of inter-item correlation from 1.00. Increase in reliability lead to decrease the random error and vice-versa. Cronbach's alpha value close to 1 explains the high degree of internal consistency. Generally, alpha value less than 0.70 means amount of random error is relatively greater than the observed variance. Reliability of a scale can be increased by deleting the items whose inter-item correlation is less than the threshold value 0.7. Item purification is one of the most significant approaches to increase the estimate of reliability of a construct. In this study, Reliability of the different constructs has been attempted to measure, using Cronbach's alpha. Results explain that Cronbach's alpha value is higher than the desired value 0.70 for each construct. The results have been reflected in Table 4.2.

Table 4.2: Reliability Statistics of Reflective Scales

Sr No	Construct	Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
1	CLAN CULTURE	ClanDC1a	0.65	0.86	0.875
		ClanOL2a	0.69	0.85	
		ClanME3a	0.68	0.85	
		ClanOG4a	0.69	0.85	
		ClanSE5a	0.69	0.85	
		ClanCS6a	0.67	0.85	
2	ADHOCRACY CULTURE	AdhDC1b	0.63	0.85	0.869
		AdhOL2b	0.65	0.85	
		AdhME3b	0.66	0.85	
		AdhOG4b	0.71	0.84	
		AdhSE5b	0.69	0.84	
		AdhCS6b	0.67	0.85	
3	MARKET CULTURE	MktDC1c	0.65	0.84	0.863
		MktOL2c	0.68	0.84	
		MktME3c	0.68	0.83	
		MktOG4c	0.67	0.84	
		MktSE5c	0.63	0.84	
		MktCS6c	0.62	0.85	
4	HIERARCHY CULTURE	HchDC1d	0.62	0.83	0.855
		HchOL2d	0.59	0.84	

		HchME3d	0.68	0.82	
		HchOG4d	0.64	0.83	
		HchSE5d	0.66	0.83	
		HchCS6d	0.65	0.83	
5	KNOWLEDGE CREATION	Kcrt1	0.64	0.84	0.859
		Kcrt2	0.66	0.83	
		Kcrt3	0.70	0.82	
		Kcrt4	0.69	0.83	
		Kcrt5	0.69	0.83	
6	KNOWLEDGE ORGANIZATION	Korg1	0.67	0.81	0.848
		Korg2	0.69	0.81	
		Korg3	0.63	0.82	
		Korg4	0.67	0.81	
		Korg5	0.63	0.83	
7	KNOWLEDGE STORAGE	Kstr1	0.60	0.86	0.871
		Kstr2	0.67	0.85	
		Kstr3	0.65	0.85	
		Kstr4	0.64	0.85	
		Kstr5	0.71	0.84	
		Kstr6	0.74	0.84	
8	KNOWLEDGE DISSEMINATION	Kdis1	0.66	0.82	0.849
		Kdis2	0.63	0.83	
		Kdis3	0.66	0.82	
		Kdis4	0.62	0.83	
		Kdis5	0.63	0.83	
		Kdis6	0.60	0.83	
9	KNOWLEDGE APPLICATION	Kapp1	0.61	0.78	0.814
		Kapp2	0.62	0.77	
		Kapp3	0.67	0.75	
		Kapp4	0.64	0.77	
10	KNOWLEDGE EFFECTIVENESS	Keff1	0.71	0.85	0.876
		Keff2	0.69	0.85	
		Keff3	0.65	0.86	
		Keff4	0.68	0.85	
		Keff5	0.69	0.85	
		Keff6	0.67	0.86	

Though the high degree of internal consistency of constructs affirms the claim of inert-relatedness of items of any scale, but it does not support the accuracy of measurement. Reliability explains the degree to which a measuring instrument reflects no random error. It does not explain the accuracy of a measure i.e., the degree of systematic error. It can be seen that any scale provides consistent results over and over again but those results may not be accurate. A measure is accurate or not is to be explained with the estimate of validity (Nunnally & Bernstein, 1994)

4.3 Validity

Validation is defined as “a process designed to examine the extent to which any measuring tool has ability to measure what it supposed to measure” (Campbell and Fiske, 1959; Schriesheim et al., 1991). Validity of the all the constructs has been analyzed by adopting the Campbell and Fiske criteria of validity in this study. This criterion has suggested explaining two types of construct validity: convergent and discriminant validity (Campbell and Fiske, 1959; Henseler et al., 2009). Construct validity applies to measures with multiple dimensions, that address the level of consistency to operate the various dimensions (Davis et al., 2000; Downes, 2014). Convergent validity applies for the multiple measurements refers to “the degree to which indicators of underlying construct are theoretically related, are actually related to each other (Davis et al., 2000; Henseler et al. 2009).” Although, discriminant validity refers to “the degree to which the set of indicators related to a particular construct are negatively-related with another set of indicators related to some other different construct.” It actually differentiates the one construct from another (Bagozzi et al., 1991).

To examine the convergent validity, Factor loadings, Average variance extracted (AVE) and Composite reliability (CR) parameters have been used (Sarstedt et al., 2019; Fornell and Larcker, 1981). Factor loading explain “the variance explained by the item in conformity with its particular construct (Hair et al., 2010).” Factor loading value .5 or more affirms the claim of the convergence validity of indicator, which means specific item, is strongly associated to its particular construct (Bagozzi et al., 1991; Hair et al., 2010). AVE reflects the average variance captured by the underlying construct through all the indicators and explains the average communality (Fornell and Larcker, 1981). If AVE value is lower than .5, it means there is more

systematic error captured by the latent variables during measurement than variance captured (Hair et al., 2010). However, value of AVE greater than .5 confirms that latent variables are explaining sufficient amount of variance. Composite Reliability explains the internal reliability between different items of a scale. CR equal to or above .7 reflects the high level of internal consistency between various items of any instrument. Since minimum desirable value of CR is 0.7. In case of exploratory study, 0.6 can be acceptable limit (Bagozzi & Yi, 1988; Henseler et al., 2009). Cronbach's Alpha may not give accurate estimation of internal consistency; Composite Reliability gives better results than Cronbach's alpha (Henseler et al., 2009). On the other side, Discriminant validity explains that the constructs, which are presumed to be not related to each-other, are actually, not related. Discriminant validity is to be assessed, using (Henseler et al., 2015)'s "Heterotrait- Monotrait ratio of correlation criterion" (HTMT) in present study. It is defined by (Sarstedt et al., 2019) as "An average item correlations across constructs (which is also called heterotrait-heteromethod correlations) relative the geometric mean value of the average correlations among items measuring similar construct (which is also called monotrait- heteromethod correlations)." The logic behind these criteria is that if the various constructs are measuring different and unique concepts, then there should not be high correlation among those constructs. Average variance between a specific construct and its measuring indicators should be more than the variance across various constructs in the study (Bagozzi et al., 1991). (Sarstedt, Ringle, & Hair, 2017) and (Sarstedt et al., 2019) has provided the detail explanation of how reflective and formative measurement models should be measured in context of their validity and reliability. Based on these studies before conducting the final data analysis, reliability and validity of measurement scales have been performed. Confirmatory Factor Analysis (CFA) has been implemented to explain the accuracy of measurement model (Hair et al., 2010). Results are given in Table 4.3.

4.4 Validation and Measurement of Organizational Culture (OC) Scale

Organizational Culture scale is based on reflective measurement model. For the evaluation of this measurement model, PLS-SEM results have been analyzed. Results and evaluation criteria outcomes have been given in a Table 4.3 and Table 4.4. In order to validate the reflective-reflective second-order construct of organizational

culture, repeated indicators approach has been used. The sub- constructs Clan culture, Adhocracy culture, Hierarchy culture, and Market culture present the lower-order constructs of the higher-order main construct Organizational culture (OC). All lower order constructs are assessed with the six-six items. Six indicators of Clan culture are ClanDC1a, ClanOL2a, ClanME3a, ClanOG4a, ClanSE5a, and ClanCS6a. Six indicators of Adhocracy culture are AdhDC1b, AdhOL2b, AdhME3b, AdhOG4b, AdhSE5b, and AdhCS6b. Six indicators of Market culture are MktDC1c, MktOL2c, MktME3c, MktOG4c, MktSE5c, and MktCS6c. Six indicators of Hierarchy culture are HchDC1d, HchOL2d, HchME3d, HchOG4d, HchSE5d, and HchCS6d. All the items of lower-order sub-constructs are simultaneously allocated to higher-order construct OC using repeated indicator approach while assessing measurement model of Organizational culture as shown in Figure 4.1.

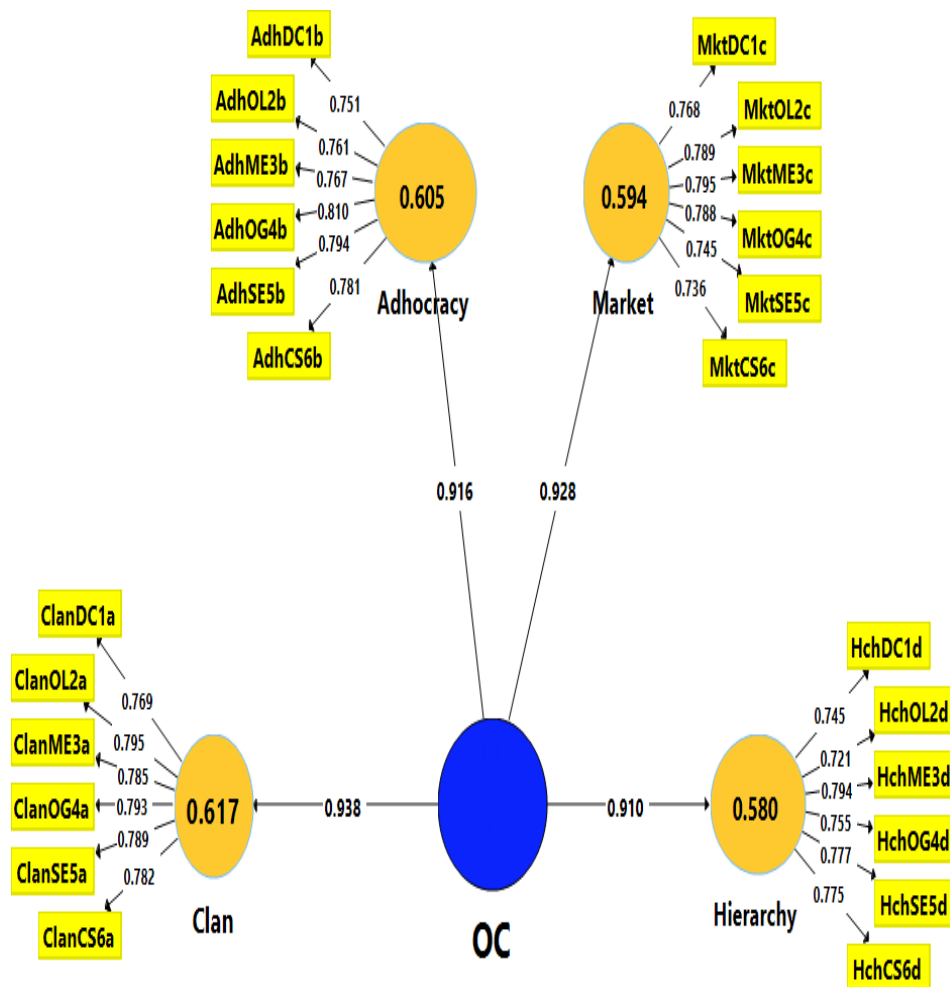


Figure 4.1: Reflective-Reflective Measurement Model of Organizational Culture (OC) Scale

Table 4.3: PLS-SEM Assessment Results of Reflective-Reflective Model of Organizational Culture

Sr No	Variable	Construct	Item	Convergent validity			Internal consistency reliability	
				Outer Loadings (more than 0.70)	Indicator Reliability (more than 0.5)	AVE (more than 0.5)	Composite Reliability (more than 0.7)	Cronbach's alpha (0.7)
1	ORGANIZATION CULTURE	CLAN CULTURE	ClanDC1a	0.769	.591	0.617	0.906	0.876
			ClanOL2a	0.795	.632			
			ClanME3a	0.785	.616			
			ClanOG4a	0.793	.628			
			ClanSE5a	0.789	.622			
			ClanCS6a	0.782	.611			
2		ADHOCRACY CULTURE	AdhDC1b	0.751	.564	0.605	0.902	0.869
			AdhOL2b	0.761	.579			
			AdhME3b	0.767	.588			
			AdhOG4b	0.810	.656			
			AdhSE5b	0.794	.630			
			AdhCS6b	0.781	.609			

3		MARKET CULTURE	MktDC1c	0.768	.589	0.594	0.897	0.863
			MktOL2c	0.789	.622			
			MktME3c	0.795	.632			
4			MktOG4c	0.788	.620	0.58	0.892	0.855
			MktSE5c	0.745	.555			
			MktCS6c	0.736	.541			
		HIERARCHY CULTURE	HchDC1d	0.745	.555			
			HchOL2d	0.721	.519			
			HchME3d	0.794	.630			
			HchOG4d	0.755	.570			
HchSE5d	0.777	.603						
HchCS6d	0.775	.600						
5.		ORGANIZATIONAL CULTURE	OC*			.852	.958	.942

As per (Sarstedt et al., 2017) & (Sarstedt et al., 2019), a well-designed reliability and validity criteria have been adopted for assessing the lower-order constructs of this measurement model. First, internal consistency has been tested through Cronbach's alpha and CR scores. Second, convergent validity is being evaluated through AVE, factor loadings and composite reliability scores. Finally, discriminant validity is being tested through HTMT test.

Table 4.3 reflect that value of outer loadings for all the items of lower order constructs are more than 0.70, explaining that all items of sub-dimensions have desired value of reliability (i.e., >0.50).

The convergent validity of Clan culture has been adequately established. As value of average variance extracted (AVE) is 0.617, value of composite reliability (ρ_c) is 0.906 and Cronbach's alpha value is 0.876, which explain the internal consistency reliability; Similarly, the measures of Adhocracy culture possess good convergent validity in terms of (AVE = 0.605) and Composite Reliability (ρ_c) = 0.902; Cronbach's alpha = 0.869 which also explain internal consistency reliability.

Measures of Market culture also show good convergent validity as (AVE = 0.594) and internal consistency reliability in terms of composite reliability (ρ_c) = 0.897; Cronbach's alpha = 0.863, which is more than desired value. Finally, the measures of Hierarchy culture also have satisfactory levels of convergent validity as (AVE = 0.580), internal consistency reliability in terms of Composite Reliability (ρ_c) = 0.892; Cronbach's alpha = 0.855.

Reliability and validity of OC (a higher order construct) has been examined on the basis of correlation between OC and its lower-order constructs. The constructs Clan culture, Adhocracy culture, Market culture, and Hierarchy culture are precisely interpreted in terms of indicators of the OC construct. However, the reflective-relationships between Organizational Culture (OC) construct and its sub-constructs are considered as its loadings although, these loadings are actually the path coefficients. Path model analysis reflects the loadings (path coefficients) of (.938) for Clan culture; (0.916) for Adhocracy culture; (.928) for Market culture, and (.910) for hierarchy culture as shown in figure 4.1, thereby accommodate support for indicator reliability i.e., square of loadings shows the Indicator Reliability. To validate and measure the higher order construct OC, given indicator loadings and relationship between the constructs have been taken as the input, required to calculate the statistics. The AVE is calculated as the mean of squared loadings of higher-order

construct for the relationships between the lower-order constructs and the higher-order construct. In context of present study, the AVE is $(0.938^2 + 0.916^2 + .928^2 + .910^2)/4 = (.852)$ which is clearly higher than 0.5 threshold value, therefore reflecting Convergent validity for Organizational Culture (OC) construct (Sarstedt et al., 2017). Similarly values of other criteria for assessing the reliability and validity of higher order construct such as Cronbach's alpha (.942), Composite Reliability (.958) have been estimated as per (Sarstedt, et al., 2017) and (Sarstedt et al., 2019). It is found that higher order organizational culture construct meets all the required assessment criteria. More specifically, AVE values are above 0.50, which explains that measure have convergent validity. Composite reliability is also clearly more than the expected minimum level of 0.70. Moreover, the Cronbach's alpha value is also more than the threshold value 0.7. These results suggest that measures of Organizational culture, Clan culture, Adhocracy culture, Market culture and Hierarchy culture possess sufficient levels of internal consistency reliability and convergent validity. It is very clear that indicator reliability value for every indicator is more than the minimum acceptable value 0.4 and even larger than the preferred value 0.7.

In the next step, Lower-order components' Discriminant validity has been also proved, as all HTMT values are less than the desired level of 0.85 (Franke & Sarstedt, 2019; Henseler et al., 2015). Results are given in (Table 4.4). However, Discriminant validity between Clan culture, Adhocracy culture, Market culture, Hierarchy culture, and their higher-order component Organizational culture (OC) have not been considered. A breach of discriminant validity between these constructs is likely to happen, because higher-order construct contains all the repeated items of its lower-order constructs in path model. Although, the repeated items allocated to organizational culture construct are just for recognition and- by design-don't caused by uni-dimensional area. It means interpreting the discriminant validity of sub-constructs with its underlying construct is not applicable. It also explains that all other criteria to prove the reliability and validity of higher order construct organizational culture on the basis of all 24 items, are meaningless. Hereafter, higher-order construct's discriminant validity has been assessed by using (Henseler et al., 2015)'s HTMT criterion, Table 4.4 shows the HTMT values of various constructs in present study. All the values are clearly less than the threshold value 0.85 thereby affirming the claim of discriminant validity of the higher-order construct. Thus, it is concluded that validity and reliability of OC have been established.

Table 4.4: HTMT Criteria Values

Construct	Sub-construct	Organization Culture				OC	Knowledge Management						
		Clan	Adhocracy	Market	Hierarchy		Kert	Korg	Kstr	Kdis	Kapp	Keff	KM
ORGANIZATION CULTURE	CLAN		0.939565	0.940739	0.94044	1.410	0.70	0.707	0.661	0.656	0.635	0.686	0.697
	ADHOCRACY			0.926585	0.873776	1.424	0.698	0.675	0.633	0.637	0.622	0.671	0.687
	MARKET				0.931656	1.448	0.737	0.763	0.684	0.685	0.682	0.733	0.706
	HIERARCHY					1.443	0.702	0.686	0.651	0.646	0.641	0.704	0.718
	OC						0.698	0.680	0.724	0.685	0.694	0.694	0.718
KNOWLEDGE MANAGEMENT	Kert							1.002	0.959	0.967	0.943	0.947	1.375
	Korg								0.981	0.963	0.954	0.933	1.373
	Kstr									0.998	0.944	0.948	1.475
	Kdis										1.012	0.951	1.386
	Kapp											0.986	1.397
	Keff												1.416
	KM												

4.5 Validation and Measurement of Knowledge Management (KM) Scale

Knowledge Management scale is based on reflective measurement model. For the evaluation of this reflective measurement model, PLS–SEM results have been analyzed. Results and evaluation criteria outcomes have been given in a Table 4.4 and

44. In order to validate the reflective-reflective second-order construct of Knowledge Management, repeated indicators approach has been used. The sub-constructs Knowledge creation, Knowledge organization, Knowledge storage, Knowledge dissemination, Knowledge application, and Knowledge effectiveness present the lower-order constructs of the Knowledge Management (KM). All lower order constructs are assessed through different numbers of items such as five indicators of Knowledge creation are Kcrt1, Kcrt2, Kcrt3, Kcrt4, and Kcrt6; five indicators of Knowledge organization are Korg1, Korg2, Korg3, Korg4, and Korg5; six indicators of Knowledge storage are Kstr1, Kstr2, Kstr3, Kstr4, Kstr5, and Kstr6. Six indicators of Knowledge dissemination are Kdis1, Kdis2, Kdis3, Kdis4, Kdis5, and Kdis8; four indicators of Knowledge application are Kapp1, Kapp2, Kapp3, and Kapp4; six indicators of Knowledge effectiveness are Keff1, Keff2, Keff3, Keff4, Keff5 and Keff6. All the items of lower-order sub-constructs are simultaneously allocated to higher-order construct KM using repeated indicator approach while assessing measurement model of KM as shown in Figure 4.2.

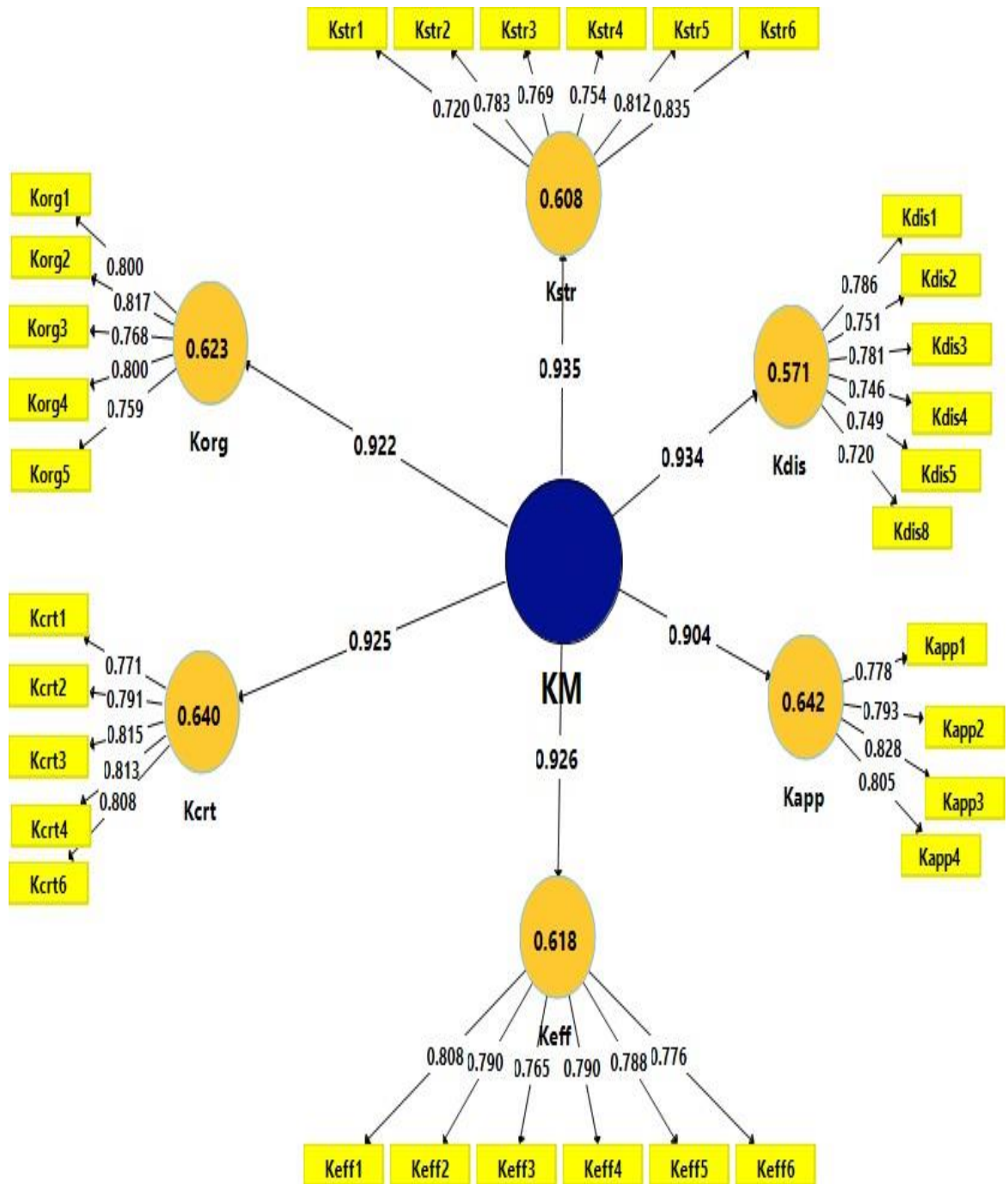


Figure 4.2: Reflective- Reflective Measurement Model of Knowledge Management (KM) Scale

Table 4.5: PLS-SEM Assessment Results of Reflective-Reflective Model of Knowledge Management

Sr No	Variable	Construct	Item	Convergent validity			Internal consistency reliability	
				Outer Loadings (more than 0.5)	Indicator reliability (more than 0.5)	AVE (more than 0.5)	Composite reliability (more than 0.7)	Cronbach's alpha (0.7)
1	KNOWLEDGE MANAGEMENT	KNOWLEDGE CREATION	Kcrt1	0.771	.594	0.64	0.899	0.859
			Kcrt2	0.791	.625			
			Kcrt3	0.815	.664			
			Kcrt4	0.813	.660			
			Kcrt6	0.808	.652			
2		KNOWLEDGE ORGANIZATION	Korg1	0.800	.640	0.623	0.892	0.848
			Korg2	0.817	.667			
			Korg3	0.768	.589			
			Korg4	0.800	.640			
			Korg5	0.759	.576			
3		KNOWLEDGE STORAGE	Kstr1	0.720	.518	0.608	0.903	0.871
			Kstr2	0.783	.613			
			Kstr3	0.769	.591			
			Kstr4	0.754	.568			
			Kstr5	0.812	.659			

			Kstr6	0.835	.697			
4	KNOWLEDGE DISSEMINATION	Kdis1	0.786	.617	0.571	0.889	0.85	
		Kdis2	0.751	.564				
		Kdis3	0.781	.609				
		Kdis4	0.746	.556				
		Kdis5	0.749	.561				
		Kdis8	0.720	.518				
5	KNOWLEDGE APPLICATION	Kapp1	0.778	.608	0.642	0.878	0.814	
		Kapp2	0.793	.628				
		Kapp3	0.828	.685				
		Kapp4	0.805	.648				
6	KNOWLEDGE EFFECTIVENESS	Keff1	0.808	.652	0.618	0.907	0.876	
		Keff2	0.790	.624				
		Keff3	0.765	.585				
		Keff4	0.790	.624				
		Keff5	0.788	.620				
		Keff6	0.76	.577				
7.	KNOWLEDGE MANAGEMENT	KM*			.854	.972	.96	

Table 4.5 reflect that value of outer loadings for all the items of lower order constructs are more than 0.70, explaining that all items of sub-dimensions have desired value of reliability (i.e.,>0.50) as shown in Figure 4.2. The convergent validity of knowledge creation has been adequately established. As value of average variance extracted (AVE) is 0.64, value of composite reliability (ρ_c) is 0.899 and Cronbach's alpha value is 0.85, which explain the internal consistency reliability; similarly, the measures of Knowledge organization possess good convergent validity as AVE value is 0.623 and value of composite reliability (ρ_c) is 0.892; value of Cronbach's alpha is 0.848. The convergent validity of Knowledge storage has been adequately established as AVE (0.608) is more than the threshold value and composite reliability (0.903), Cronbach's alpha value (0.871), are more than desired value. Knowledge dissemination also has satisfactory levels of convergent validity in terms of (AVE

=0.571), composite reliability (ρ_c) =0.889; Cronbach's alpha =0.85. Measures of Knowledge application also have established a good level of convergent validity (AVE =0.642), composite reliability (ρ_c) =0.878; Cronbach's alpha =0.814. Finally, Measures of Knowledge effectiveness also show level of convergent validity as (AVE =0.618 composite reliability (ρ_c) =0.907; Cronbach's alpha =0.876.

Reliability and validity of KM (a higher order construct) has been examined on the basis of correlation between KM and its lower-order constructs. The constructs Knowledge creation, Knowledge organization, Knowledge storage, Knowledge dissemination, Knowledge application, and Knowledge effectiveness are treated as the items the KM construct. However, the path coefficient value between Knowledge management (KM) construct and its sub-constructs are considered as its loadings. Path model analysis reflects the loadings (path coefficients) of (0.925) for Knowledge creation; (0.922) for Knowledge organization; (0.935) for Knowledge storage ; (0.933) for Knowledge dissemination; (0.904) for Knowledge application, and (0.926) for Knowledge effectiveness as shown in Figure 4.2, thereby accommodate support for indicator reliability i.e. square of loadings shows the indicator reliability. These loadings and the correlation value between these constructs have been used as input to calculate the required statistics for validating and measuring the KM construct. "The AVE is calculated as the mean of squared loadings of higher-order construct for the

relationships between the lower-order constructs and the higher-order construct (Sarstedt et al., 2019). In context of present study, the AVE is $(0.925^2 + 0.922^2 + .935^2 + .933^2 + .904^2 + .926^2)/6 = (.854)$ which is higher than 0.5 desired value, therefore reflecting convergent validity for Knowledge management (KM) construct (Sarstedt et al., 2017). Similarly, the values of other statistics for establishing the reliability and validity of higher order construct KM such as Cronbach's alpha (.96), Composite reliability (.972) has been estimated as per (Sarstedt et al., 2017) & (Sarstedt et al., 2019). It is found that higher order Knowledge management construct meet all the required assessment criteria. More specifically, AVE value is above 0.50, which explains that measure have convergent validity. Composite reliability is also clearly more than the expected minimum level of 0.70. Moreover, the Cronbach's alpha value is also more than the threshold value 0.7. These results suggest that measures of Knowledge management i.e., Knowledge creation, Knowledge organization, Knowledge storage, Knowledge dissemination, Knowledge application, and Knowledge effectiveness possess desired level of internal consistency reliability and convergent validity. It is very clear that indicator reliability value for every indicator is more than the minimum acceptable value 0.4 and even larger than the preferred value 0.7.

In the next step, Lower-order components' discriminant validity have been also proved, as all HTMT values are less than the desired level of 0.85 (Franke & Sarstedt, 2019; Henseler et al., 2015) given in (Table 4.4). However, Discriminant validity between Knowledge creation, Knowledge organization, Knowledge storage, Knowledge dissemination, Knowledge application, Knowledge effectiveness and their higher-order component Knowledge management (KM) have not been considered. A breach of discriminant validity between these constructs is likely to happen, because higher-order construct contains all the repeated items of its lower-order constructs in path model. Although, the repeated items allocated to KM construct are just for recognition and- by design-don't cause by uni-dimensional area. It means interpreting the discriminant validity of sub-constructs with its underlying construct is not applicable. It also explains that all other criteria to prove the reliability and validity of higher order construct KM on the basis of all 32 items, are meaningless. Hereafter, higher-order construct's discriminant validity has been assessed by using (Henseler et

al., 2015)’s HTMT criterion. Table 4.4 shows the HTMT values of various constructs in present study. All the values are clearly less than the threshold value 0.85 thereby affirming the claim of discriminant validity. Thus, it can be concluded that reliability and validity of KM construct have been established.

4.6 Validation and Measurement of Information and Communication Technology (ICT) Scale

ICT scale is based on reflective-formative measurement model. For the evaluation of this model, PLS–SEM results have been analyzed. Results and evaluation criteria outcomes have been given in a Table 4.6 and 4.7. For the validation of second-order construct of ICT, repeated indicators approach has been used. The sub-constructs ICT infrastructure and ICT human-skills present the lower- order constructs of the higher-order construct ICT. All lower order constructs are assessed with the different numbers of items such as eight indicators of ICT infrastructure are ICTinfra1, ICTinfra2, ICTinfra3, ICTinfra4, ICTinfra5, ICTinfra6, ICTinfra7 and ICTinfra8; and six indicators of ICT Human-skills are ICThs1, ICThs2, ICThs3, ICThs4, ICThs5 and ICThs6. All the items of the reflective sub-constructs are simultaneously allocated to the formatively measured higher-order construct ICT as shown in Figure 4.3. Mode B has been used to estimate ICT scale (Sarstedt et al., 2019).

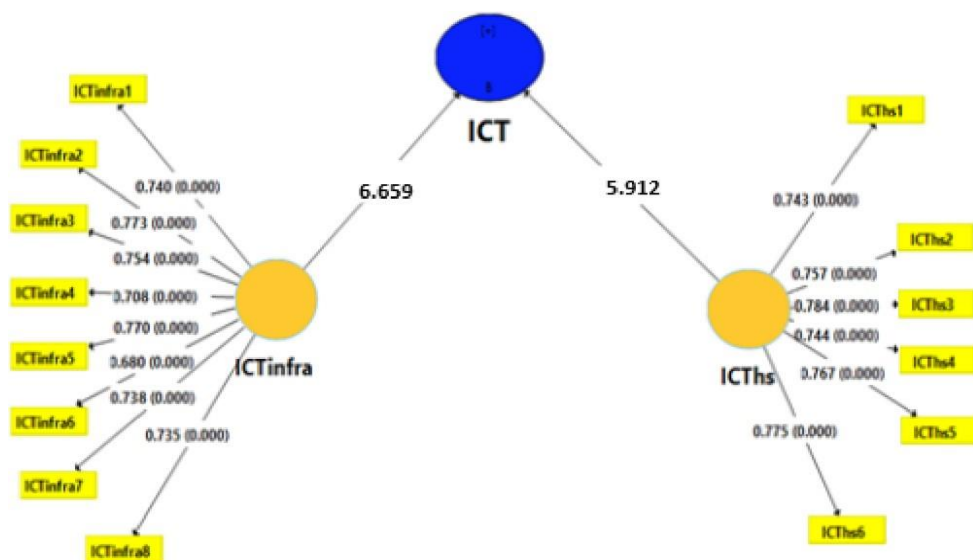


Figure 4.3: Reflective-Formative Measurement Model of ICT Scale

Table 4.6: PLS-SEM Assessment Results of Reflective-Formative Model of ICT (Lower Order Constructs)

Sr No	CONSTRUCT	Sub-Construct	Indicators	Outer weights (Outer loadings)	Collinearity (VIF) <5	T-value >1.96	Significant weight (p <0.05)?
1	INFORMATION COMMUNICATION TECHNOLOGY	ICT INFRASTRUCTURE	ICTinfra1	.170(.740)	1.756	27.703	0.000(Yes)
			ICTinfra2	.172(.773)	1.974	31.141	0.051(No)
			ICTinfra3	.177(.754)	1.826	30.288	0.000(Yes)
			ICTinfra4	.163(.708)	1.636	23.657	0.000(Yes)
			ICTinfra5	.180(.770)	1.876	29.320	0.000(Yes)
			ICTinfra6	.157(.680)	1.55	23.987	0.000(Yes)
			ICTinfra7	.170(.738)	1.744	26.368	0.000(Yes)
			ICTinfra8	.166(.735)	1.773	25.393	0.000(Yes)
2		ICT HUMAN SKILL	ICThs1	.201(.743)	1.677	25.162	0.000(Yes)
			ICThs2	.220(.757)	1.712	27.756	0.000(Yes)
			ICThs3	.228(.784)	1.82	30.429	0.000(Yes)
			ICThs4	.218(.744)	1.639	30.202	0.000(Yes)
			ICThs5	.220(.767)	1.75	31.461	0.000(Yes)
			ICThs6	.224(.775)	1.802	32.235	0.000(Yes)

Table 4.7: PLS-SEM Assessment Results of Reflective-Formative Model of ICT (Higher Order Constructs)

Sr. No	Construct	Sub-constructs	Outer Weights/ Path Coefficient	Collinearity (VIF)<5	T-value > 1.96	Significant weight (p <0.05) ?
1.	ICT	ICT INFRASTRUCTURE	.546	1.42	6.659	0.00(yes)
2.		ICT HUMAN SKILL	.490	1.31	5.912	0.00(yes)

For the validation of this higher-order Information and communication (ICT) construct, two-step procedure outlined in (Hair et al., 2017) has been followed. Under first step the possible collinearity issues with the sub-constructs of ICT (i.e., lower-order constructs) have been examined. Fig. 4.3 and table 4.7 present the VIF values of (1.42) for ICT infrastructure and (1.31) for ICT human-skills, which are clearly less than 3 i.e., threshold value (Hair et al., 2019). On the other hand, Table 4.6 shows that VIF values of all the indicators of lower order constructs and all the value are lower than the threshold value 3. It shows that there is no collinearity issue has been found. In the second step, bootstrapping with 5000 sub-samples has been run to examine the significance of the co-relations between the two lower-order sub-constructs and their higher-order ICT construct. Results given in Table 4.6 shows that all the indicators' weights are significant except ICTinfra2's weight under ICT infrastructure lower order construct. Its p-value is 0.051 which is a little greater than 0.05 threshold value. Moreover, the bivariate correlations i.e., loadings of all the indicators of ICT infrastructure and ICT human skills are more than 0.5 (Hair et al., 2017a), all the items should be retained in ICT's measurement model. In the path model, relationships between ICT higher-order construct and its sub-constructs are considered as its weights although these weights are actually the path coefficients. It is found that ICT infrastructure's outer weight value is (0.546), ICT human-skills' outer weight value is (0.489) and both the weights are significant ($p < 0.05$). These results support the claim of validity of ICT construct.

CHAPTER 5

ANALYSIS OF CURRENT KNOWLEDGE MANAGEMENT PROCESSES AND ORGANIZATIONAL CULTURE

This chapter describes the identification of the current Knowledge Management processes and the current organizational culture of North Indian Higher Education Institutions (HEIs). Section 5.1 presents the results regarding the current knowledge management processes adopted by the North Indian Higher education institution, which is the first objective of the present study. Section 5.2 explains the results of data analysis regarding comparison of knowledge management processes of the North Indian higher education institutions, which is the second objective of present study. Section 5.3 presents the organizational culture adopted by selected institutions, which is third objective of present study.

5.1 Current Knowledge Management Processes Adopted by the North Indian Higher Education Institutions

To identify the current knowledge management processes adopted by various category of North Indian HEIs (Central universities, Deemed universities, State private universities, State Public universities, and National importance Institutions (NII) & others), descriptive analysis such as mean score and frequencies has been used. Comparison of mean scores of various current knowledge management processes (Knowledge Creation, Knowledge Organization, Knowledge Storage, Knowledge Dissemination, Knowledge Application, and Knowledge effectiveness) adopted by North Indian Higher education institutions (HEIs) has been explained. Result of following Objective of present study has been showed with the help of following Table 5.1 and Fig 5.1.

Objective: To identify the current knowledge management processes adopted by the North Indian higher education institutions.

Table 5.1: Total Mean Scores of Various Current Knowledge Management Processes

Categories of HEI	KM Processes					
	kckt	korg	kstr	kdis	kapp	Keff
Central University	2.9	3.3	3.2	3.3	3.7	3.3
Deemed University	2.8	3.3	3.7	3.2	3.4	3.3
State Private University	3.2	3.6	3.5	3.8	3.8	3.2
State Public University	3.6	3.3	3.7	3.7	3.6	3.6
NII & Others	3.3	3.6	3.6	3.6	3.9	3.3

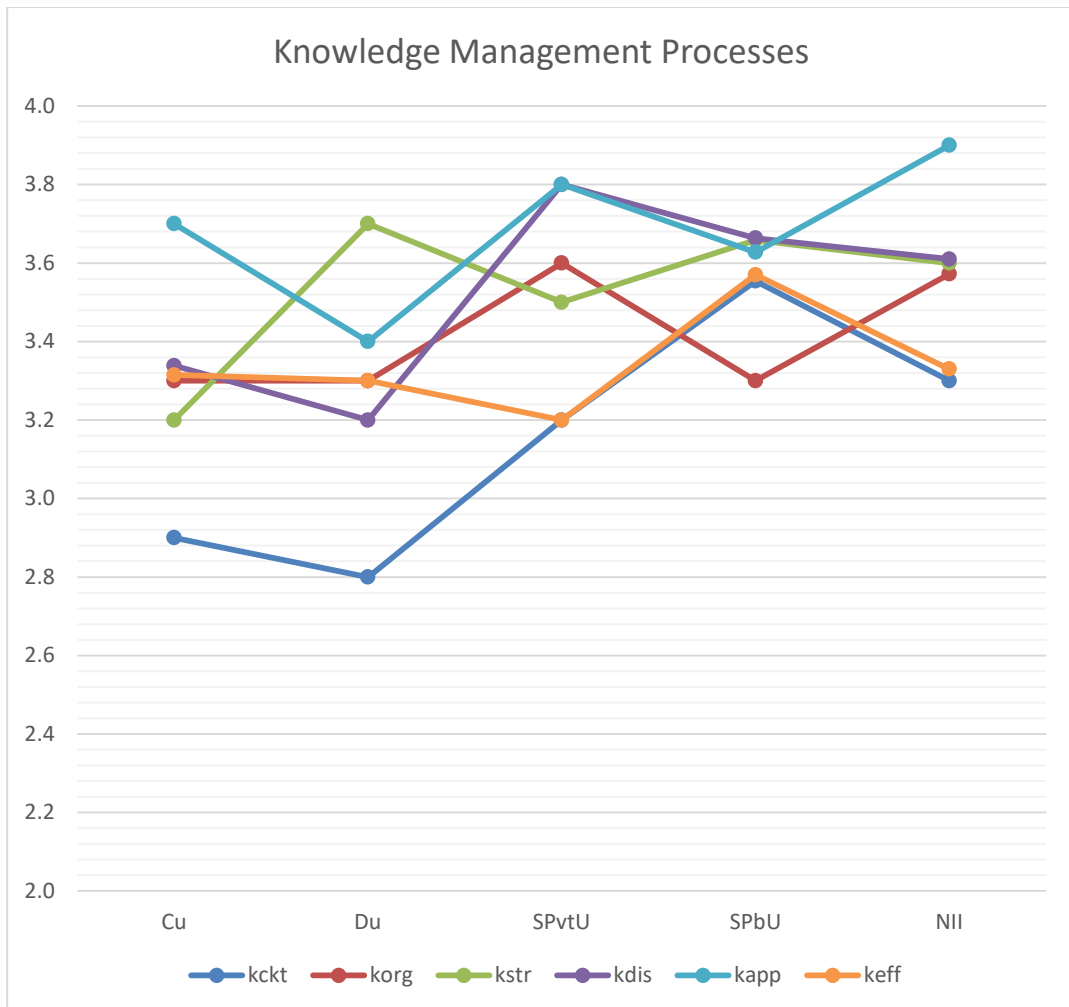


Figure 5.1: Various KM Processes

Table 5.1 helps to identify the KM processes in all the five categories of North Indian HEIs institutions. As per the measurement scale, it can be explained that any process gains below 3 indicate poor mark and that gains over 3 indicate good mark. In central universities, Knowledge application process is well-regulated as highest mean scores given by the respondents to this process. knowledge effectiveness, dissemination and organization has got similar mean scores i.e., 3.3, which is more than 3, shows that all the three processes are well maintained in central universities. Here after these HEIs pay more attention towards knowledge storage than knowledge creation. knowledge creation has got least mean score than any other process but it means that central universities are not putting much attention towards creation process as it has got mean score less than 3, which means not very poor also. Deemed universities put most of their efforts in Knowledge storage process followed by Knowledge application, knowledge effectiveness and Knowledge organization. Similarly, like central universities, deemed universities also do not put much attention towards knowledge creation process as it has also got mean score less than 3. Employees of State Private Universities pay more attention towards knowledge dissemination and knowledge application processes as compare to the other processes. Knowledge organization and Knowledge storage have received better scores than Knowledge creation and Knowledge effectiveness, it does not mean that these are not putting much attention towards creation and effectiveness processes as these processes also have got mean score equal to 3, which means good. Employees of State Public Universities pay almost equal attention towards knowledge storage as well as Knowledge dissemination process, which means the knowledge HEIs store, efficiently distribute among their employees. Hereafter, these HEIs put more attention towards Knowledge effectiveness, Knowledge application and Knowledge creation than Knowledge organization process. They put equal attention towards these three processes. It means these categories of HEI's pay least attention towards knowledge organization process. NII and other institutions pay highest attention towards knowledge application. Hereafter, these institutions pay almost equal attention towards knowledge storage, knowledge organize as well as Knowledge dissemination processes, which means the knowledge universities store and organize, efficiently distribute among their employees. Hereafter, these HEIs put least attention towards knowledge

effectiveness and Knowledge creation process. Knowledge effectiveness and creation have received almost equal scores. These institutions are putting most of their efforts in application of knowledge.

Table 5.1 also shows that mean score of State public universities in knowledge creation process is highest (Mean score=3.6) than other categories of institutions, which shows state public is most efficiently creating knowledge in their institutions. Mean score of State private universities and NII and others institutions is highest (Mean score= 3.6) in knowledge organization process than other categories of institutions, which shows these institutions are most efficiently handling knowledge organization process in their institutions. Deemed universities and state public universities are ahead of other categories of institutions in Knowledge storage process. These universities have got highest mean score=3.7 in Knowledge storage process. State private universities have received highest mean score (3.8) in knowledge dissemination process, which proves that they are handling knowledge dissemination process very well. NII and others category of institutions have got highest mean score (3.9) in knowledge application process. State public are also ahead of other categories of institutions in Knowledge effectiveness. On the other side, it is also clear that state public universities are ahead of other universities in practicing three KM processes i.e., knowledge creation process, knowledge storage process and knowledge effectiveness. Private universities are ahead of other universities in knowledge organization and knowledge dissemination. NII and others institutions are ahead of other categories of institutions in knowledge organization and knowledge application process.

From fig 5.1 it can be concluded that all the categories of north Indian higher education institutions putting more efforts towards Knowledge application process. North Indian HEIs pay least attention towards the knowledge creation process, which means employees of higher education institutions are efficiently storing the knowledge and do not even hesitate to share it with one-another. Moreover, most of the processes have got mean score more than 3 which means employees are well maintaining the all the KM processes in their institutions. Institutions are also realizing the effectiveness of Knowledge, they implement but, these HEIs are not

paying much attention to develop new knowledge as Knowledge creation has got least scores in most of the categories of HEIs. On the other side, it is also clear that state public universities are ahead of other universities in practicing three KM processes i.e., knowledge creation process, knowledge storage process and knowledge effectiveness. It means these universities are handling knowledge management processes most efficiently as compare to other categories of institutions.

5.2 Comparison of Knowledge Management Processes of the North Indian Higher Education Institutions

To compare the knowledge management processes of the North Indian higher education institutions, one way ANOVA test has been applied, which assesses the difference in knowledge management processes among central universities, state public universities, state private universities, Deemed Universities, and National Importance institutions and others (Field, 2013). One Way ANOVA test has been applied to test following hypotheses:

H1: There is no significant difference in knowledge creation process among central universities, state public, state private universities, deemed universities, and national importance institutions and others.

H2: There is no significant difference in knowledge organization process among central universities, state public universities, state private universities, deemed universities, and national importance institutions and others.

H3: There is no significant difference in knowledge storage process among central universities, state public universities, state private universities, deemed universities, and national importance institutions and others.

H4: There is no significant difference in knowledge dissemination process among central universities, state public universities, state private universities, deemed universities, and national importance institutions and others.

H5: There is no significant difference in knowledge application process among central universities, state public universities, state private universities, deemed Universities, and national importance institutions and others.

H6: There is no significant difference in knowledge effectiveness process among central universities, state public universities, state private universities, deemed universities, and national importance institutions and others.

Homogeneity of variance (assumption of Anova test) has been tested using Levene's test. Homogeneity of variance explains whether variances between the various groups are equal. If the significance level (p-value) is $\leq .050$, it means assumption of equal variance is violated and there is a difference in the variances of various groups. Table 5.2 shows the results of test of homogeneity of variances. As the sig. value for all the KM processes is less than 0.05, it means variances are not equal between the groups. Table 5.2 shows the violation of equal variance assumption.

Table 5.2: Results of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
TKMckt	5.434	4	495	.000
TKMorg	6.056	4	495	.000
TKMstr	7.687	4	495	.000
TKMdis	4.610	4	495	.001
TKMapp	4.153	4	495	.003
TKMeff	6.007	4	495	.000

As per (Field, 2013), when the sample size of various groups are equal and assumption of homogeneity of variance is violated, then also the result of Anova test is fairly robust. However, if the sample size is not equal then welch's F or Brown-Forsythe *F* has to be performed to confirm the robustness of Anova-test. Under present study, equal sample size has been used to perform the Anova-test. So, there is no doubt on the robustness of Anova-test, even if the assumption of Homogeneity of variance is violated.

Table 5.3: One-Way ANOVA Results

One-Way ANOVA						
KM Processes	Various categories of HEIs	Sum of Squares	df	Mean Square	F	Sig.
Knowledge Creation	Between Groups	315.268	4	78.817	4.086	.003
	Within Groups	9549.300	495	19.292		
	Total	9864.568	499			
Knowledge Organization	Between Groups	162.188	4	40.547	2.243	.063
	Within Groups	8949.210	495	18.079		
	Total	9111.398	499			
Knowledge Storage	Between Groups	369.792	4	92.448	3.591	.007
	Within Groups	12743.400	495	25.744		
	Total	13113.192	499			
Knowledge Dissemination	Between Groups	378.492	4	94.623	4.025	.003
	Within Groups	11636.010	495	23.507		
	Total	12014.502	499			
Knowledge Application	Between Groups	130.852	4	32.713	2.798	.026
	Within Groups	5787.570	495	11.692		
	Total	5918.422	499			
Knowledge Effectiveness	Between Groups	215.532	4	53.883	1.991	.095
	Within Groups	13395.460	495	27.062		
	Total	13610.992	499			

The results of ONE-WAY ANOVA test regarding Knowledge Creation process presented in table 5.3. From the above table, it is inferred that there is a statistically significant difference in Knowledge creation process among various categories of HEIs such as central universities, state public universities, state private universities, Deemed Universities and National Importance institutions and others, as demonstrated by one-way ANOVA ($F = 4.086$ with 4 degree of freedom, p value = (.003) at 5 percent level of significance. It reflects that H1 i.e., There is a no significant difference in knowledge creation process among central universities, state public, state private universities, Deemed Universities and National Importance institutions and others, is not accepted.

The results of ONE-WAY ANOVA test regarding Knowledge Organization process reflects that there is a no statistically significant difference in Knowledge organization process among various categories of HEIs such as central universities, state public universities, state private universities, Deemed Universities and National Importance institutions and others, as demonstrated by one-way ANOVA ($F = 2.243$ with 4 degree of freedom, p value = (.063) at 5 percent level of significance. It reflects that H2 i.e., There is a no significant difference in knowledge organization process among central universities, state public, state private universities, Deemed Universities and National Importance Institutions and others, is accepted.

The results of ONE-WAY ANOVA test regarding Knowledge Storage process reveals that there is a statistically significant difference in Knowledge Storage process among various categories of HEIs such as central universities, state public universities, state private universities, Deemed Universities and National Importance institutions and others, as demonstrated by one-way ANOVA ($F = 3.591$ with 4 degree of freedom, p value = (.007) at 5 percent level of significance. It reflects that H3 i.e., There is no significant difference in knowledge storage process among central universities, state public, state private universities, Deemed Universities and National Importance institutions and others, is not accepted.

The results of ONE-WAY ANOVA test regarding Knowledge Dissemination process exhibits that there is a statistically significant difference in Knowledge dissemination process among various categories of HEIs such as central universities, state public universities, state private universities, Deemed Universities and National Importance institutions and others, as demonstrated by one-way ANOVA ($F = 4.025$ with 4 degree of freedom, p value = (.003) at 5 percent level of significance. It reflects that H4 i.e., There is no significant difference in knowledge dissemination process among central universities, state public, state private universities, Deemed Universities and National Importance institutions and others, is not accepted.

The results of ONE-WAY ANOVA test regarding Knowledge Application process reflects that there is a statistically significant difference in Knowledge application process among various categories of HEIs such as central universities, state public universities, state private universities, Deemed Universities and National Importance institutions and others, as demonstrated by one-way ANOVA ($F = 2.798$ with 4 degree of freedom, p value = (.026) at 5 percent level of significance. It reflects that H5 i.e., There is a significant no difference in knowledge application process among central universities, state public, state private universities, Deemed Universities and National Importance institutions and others, is not accepted.

The results of ONE-WAY ANOVA test regarding Knowledge Effectiveness process reflects that there is no statistically significant difference in Knowledge effectiveness process among various categories of HEIs such as central universities, state public universities, state private universities, Deemed Universities and National Importance institutions and others, as demonstrated by one-way ANOVA ($F = 1.991$ with 4 degree of freedom, p value = (.095) at 5 percent level of significance. It reflects that H6 i.e., There is no significant difference in knowledge effectiveness process among central universities, state public, state private universities, Deemed Universities and National Importance institutions and others, is accepted.

5.3 Organizational Culture Adopted by the Selected Higher Education Institutions

To analyze the Organizational culture adopted by selected universities under various category of North Indian HEIs, descriptive analysis such as total scores and ranking has been used as suggested by the developers of this scale (Cameron and Quinn, 2006), This scale splits the overall organizational culture profile into four different cultures such as Clan culture, adhocracy culture, hierarchy culture and market culture. Developers of this scale have explained that organizations have their own mixture of these four kinds of organizational culture types. This scale also illustrates the dominating type of culture and its strength out of these four culture types. Comparison of total scores gained by various types of cultures adopted by various categories of North Indian Higher education institutions (HEIs) have been explained in following Table 5.4 and Fig 5.2. It also ranked the different kinds of culture based on the total scores obtained by each of the culture. It shows the result of following Objective of present study:

Objective: To analyze the Organizational Culture Adopted by Selected Universities

Table 5.4: Total Scores (Rank) of Different Types of Organizational Culture

Type of University	Clan (Rank)		Adhocracy (Rank)		Market (Rank)		Hierarchy (Rank)	
Central Universities	1910	3	1892	4	1961	2	2002	1
Deemed Universities	1959	2	1924	4	1934	3	2084	1
State Private Universities	2021	4	2049	3	2081	2	2086	1
State Public Universities	2163	3	2115	4	2198	2	2265	1
NII & Others	2052	4	2130	3	2145	2	2202	1

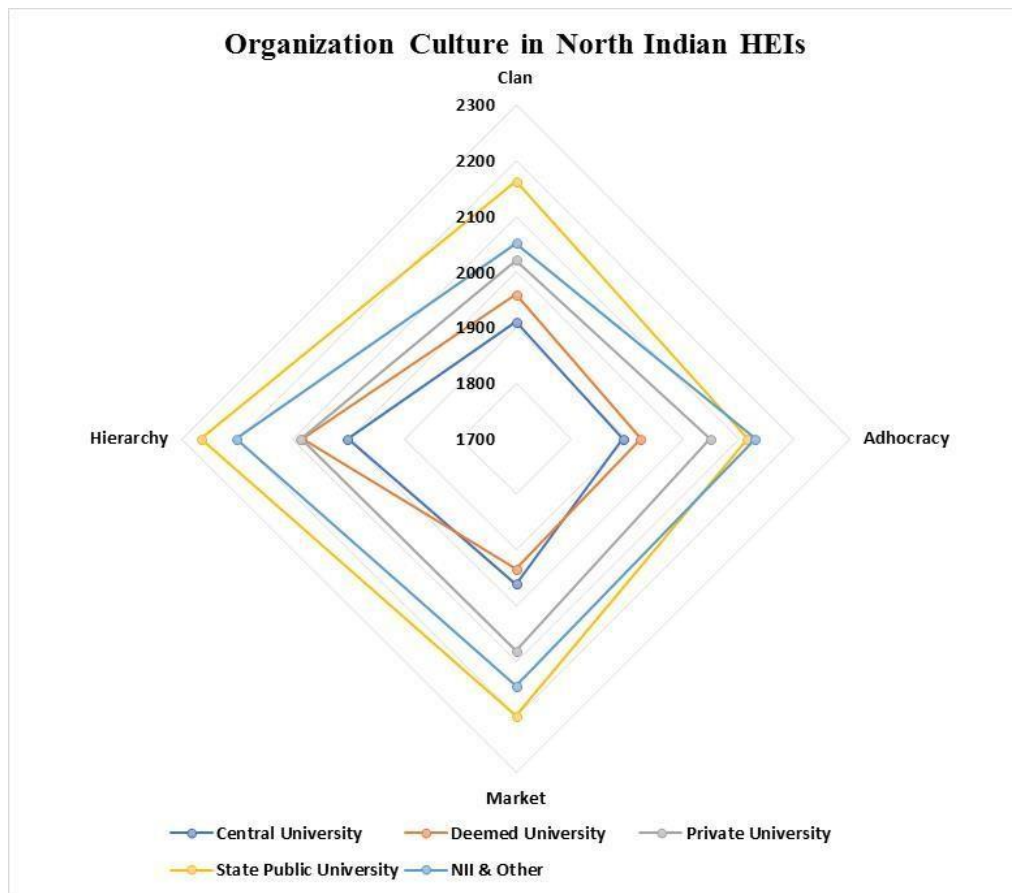


Figure 5.2: Organizational Culture Profile

Central universities are dominated by the Hierarchy culture, with the mixture of other three types of culture. Market culture is behind the Hierarchy culture. The Adhocracy culture has got least scores and fourth rank. Otherwise, the difference between the Adhocracy culture and Clan culture is very small. Dominating culture in Deemed universities is hierarchy culture and has got first rank, followed by the Clan culture. Deemed universities are the least dominated by the Adhocracy culture and it has got slightly better scores than the Market culture. Dominating culture in State private universities is again hierarchy culture and characteristics of other three types of cultures are also being reflected. Market culture is very close to Hierarchy culture. Hereafter these two types of culture, respondents have placed adhocracy culture. Clan culture has got least scores. Similarly, dominating culture in State Public universities is Hierarchy culture. It also reflects the characteristics of market culture at second place, which is followed by Clan culture. Adhocracy culture is in least extent. Finally, NII and other institutions have dominated in Hierarchy culture, which is followed by

market culture. Adhocracy is not very far behind the Market culture. Clan culture has got least scores in these institutions. Table 5.4 has clearly showed that hierarchy culture has got dominantly best scores in every category of HEI's.

As per the consequence of the fact, there is no surprise that North Indian higher education institutions have rigid system. These institutions reflect inward-orientation. These institutions focus on stable environment and control. These institutions work as per the structured procedures and strategies, which also provide direction to their employees regarding their day-to-day work processes. Leaders of these institutions have quality of coordinating and organizing their employees. Employees of these institutions also relate with the characteristics of Market culture. As market culture is the second most strongly present culture types out of the four culture types in these HEIs, which is most likely a consequence of the fact that environment of North Indian HEIs must be very competitive. Their ultimate objective of such institution is to differentiate oneself from others. These institutions are result-oriented. Their main focus is to improve the quality of work performance. Employees of these institutions are competitive and result-oriented. Heads are very strict, and demanding. Team leaders and employees' commonly focus on reputation and performance. Their strategic goals are achieving measurable results.

These results are consistent with the studies (Omerzel et al., 2011) and Kwan and Walker (2004). Kwan and Walker (2004) study was carried out in Hong Kong's higher education institutions and (Omerzel et al., 2011) study was carried out in higher education institution of Slovenia whose findings also show that most of the institutions are dominated by hierarchy culture and market culture.

CHAPTER 6

ORGANIZATIONAL CULTURE: KNOWLEDGE MANAGEMENT RELATIONSHIP

This chapter presents the assessment of the impact of Organizational culture on Knowledge management. Section 6.1 presents the procedure used to measure Organizational culture- knowledge management relationship. Section 6.2 reflects the proposed model of Organizational culture- knowledge management relationship.

6.1 Organizational Culture and Knowledge Management Relationship

To measure the Organizational culture and Knowledge management relationship, two-step procedure has been used. Firstly, a measurement model has been measured and then the structural model has been assessed. Measurement model assesses that how effectively observed variables represent the underlying constructs - described in measurement model and Structure Model explains that how reasonably various latent constructs are related to each other (Joreskog and Sorbom, 1993). In measurement model, for all the exogenous and endogenous constructs 'reliability and validity has been already proved in previous chapter under the validation and assessment of measurement models. Here all the exogenous variables are connected with endogenous variable with arrow heading towards endogenous variable. All the manifest variables have been loaded on their prescribed construct. To validate the reflective-reflective second-order construct repeated indicators approach has been used. On the other hand, Structural model assesses the causal relationship between various constructs under study (Joreskog and Sorbom, 1993; Tabachnick et al., 2007). It assesses the extent of dependency that endogenous variable has on the exogenous variables and examine the significance of different hypothesized casual relationships (i.e., path estimates). Any path coefficient with t-value more than 1.96 at (.05) level of significance, explains the significance of causal relationship which means causal relationship between hypothesized constructs significantly different from value zero. A positive value of path coefficient reflects the positive correlation between exogenous and endogenous variables, whereas negative index of path coefficient explains the negative correlation between exogenous and endogenous variables. Though regression analysis can be used to assess the correlations between exogenous

and endogenous variables but, SEM is considered to be a superior method in the comparison of regression analysis for path analysis. As Regression analysis takes both variables and constructs identically and does not consider any of the measurement properties that comply with the formation of multiple-item construct. Whereas, SEM considers all the properties of measurement model while measuring the causal relationship between various constructs (Hair et al., 2010).

6.2 Model of Organizational Culture – Knowledge Management Relationship

To measure the effect of organizational culture on knowledge management, Structural model based on second order constructs organizational culture and Knowledge management have been conceptualized and analyzed by using bootstrapping with 5,000 subsamples. Hereafter, significance of structural model has been estimated. This study presents the multi-dimensional view of Organizational Culture, where the impact of each type of culture such as Clan culture, Adhocracy culture, Market culture, and Hierarchy culture, has been also measured independently on Knowledge management process of North Indian higher education Institutions. Proponents of multi-dimensional model of organizational culture (e.g., Helfrich et al., 2007; Heritage et al., 2014, Hsieh et al., 2018) propose that the various sub-dimensions of organizational culture can have its distinctive contribution toward knowledge management, which means four types of culture that makes the overall organizational culture of any organization can have their unique impact on the Knowledge management of that organization. Impact of aggregated measures of organizational culture may hide the true direction of the correlation between various sub-constructs of organizational culture and knowledge Management. It makes the deconstruction of organizational culture construct necessary. Therefore, Structural model based on four different types of organizational culture and their correlation with knowledge management has been also measured under present study. The structural model has been used to explain how Clan culture, Adhocracy culture, Market culture, and Hierarchy culture, which represent the four dimensions of Organizational culture (OC), has an impact on Knowledge Management (KM).

(Sarstedt et al., 2019) and (Wong, 2013) have explained that sub-construct of higher order construct can be used as distinct constructs with the help of an example

of Schwaiger (2004)'s measurement approach. On the basis of this notion and literature review of OCAI, Organizational culture has been conceptualized as a higher-order construct, involving four types of organizational culture (Clan culture, Adhocracy culture, Market culture, and Hierarchy culture) as lower order components. From a prospective of measurement theory Clan culture, Adhocracy culture, Market culture, and Hierarchy culture have been treated as a reflection of organizational culture (e.g., Harorimana, 2009; Hsieh et al., 2018), there by suggesting the usage of a reflective-reflective higher-order construct. However, all the lower-order constructs have been assessed reflectively.

Both measurement model and structural model have been measured through the criteria explained by (Hair et al., 2010; Sarstedt et al., 2017 & Sarstedt et al., 2019). These studies have suggested a well-designed criterion for analyzing the reliability and validity of reflective measurement models. First, internal consistency has been tested through Cronbach's alpha and composite reliability scores. Second, convergent validity is being evaluated through AVE, factor loadings and composite reliability scores. Finally, discriminant validity is being tested through HTMT test. It has been explained that desirable value of AVE should be 0.5 or more; Cronbach alpha and Composite reliability (CR) should be equal to or more than 0.7; and HTMT should be below 0.85 (Henseler et al., 2015).

6.2.1 Measurement Model of Knowledge Management as an Endogenous Variable and Clan Culture, Adhocracy Culture, Market Culture, and Hierarchy Culture as Exogenous Variables

To measure the correlation between Clan culture, Adhocracy culture, Market culture, and Hierarchy culture as exogenous constructs and Knowledge management as an endogenous variable, firstly measurement model has been examined for measurement accuracy. The measurement model reveals that outer loadings of all the items of various exogenous constructs are greater than 0.70, explaining that all items of constructs possess a desired level of reliability (i.e., >0.50) as shown in figure 6.1.

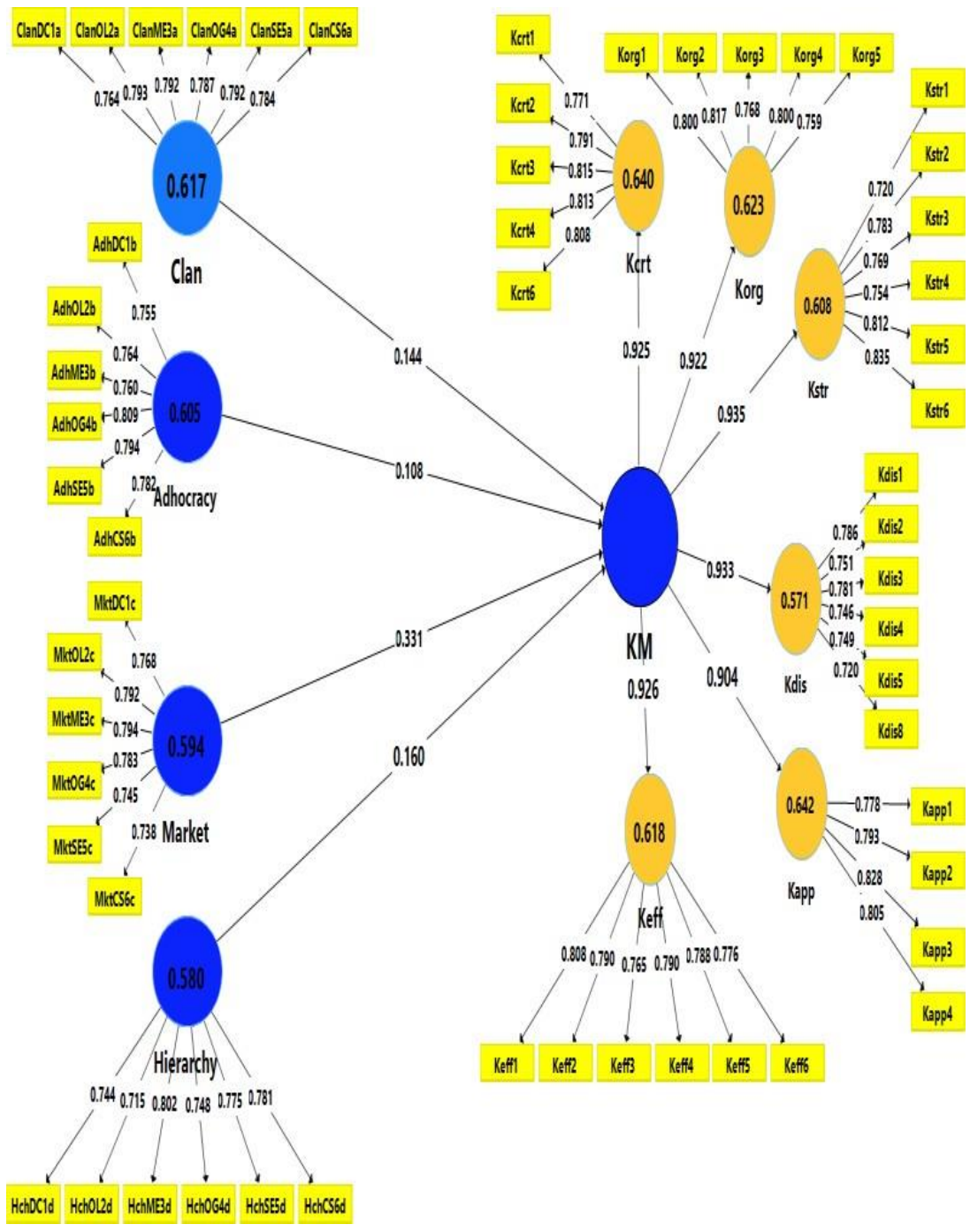


Figure 6.1: Measurement Model of Various Types of OC and KM

Convergent validity of measures of Clan culture have been established as value of average variance extracted (AVE) is 0.617, value of composite reliability (ρ_c) is 0.906 and value of Cronbach's alpha is 0.876 which also proves its internal consistency. Similarly, the measures of Adhocracy culture possess good convergent validity as AVE value is 0.605, composite reliability (ρ_c) is 0.902; Cronbach's alpha value is 0.869. Measures of Market culture also reflect good convergent validity in terms of AVE value (0.594) and composite reliability (0.897); Cronbach's alpha value (0.863), which also proves its internal consistency reliability. Finally, the measures of hierarchy culture also have a good level of convergent validity as AVE value is 0.580, composite reliability is 0.892; Cronbach's alpha value is 0.855. All the values reflect a good level of validity and reliability of all the four exogenous constructs.

On the other hand, for second order endogenous construct KM, value of outer loadings for all the items of lower order constructs are more than 0.70, explaining that all items of sub-dimensions have desired value of reliability (i.e., >0.50) as shown in Figure 6.1. The convergent validity of knowledge creation has been adequately established. As value of average variance extracted (AVE) is 0.64, value of composite reliability (ρ_c) is 0.899 and Cronbach's alpha value is 0.85, which explain the internal consistency reliability; similarly, the measures of Knowledge organization possess good convergent validity as AVE value is 0.623 and value of composite reliability (ρ_c) is 0.892; value of Cronbach's alpha is 0.848. The convergent validity of Knowledge storage has been adequately established as AVE (0.608) is more than the threshold value and composite reliability (0.903), Cronbach's alpha value (0.871), are more than desired value. Knowledge dissemination also have satisfactory levels of convergent validity in terms of (AVE =0.571), composite reliability (ρ_c) =0.889; Cronbach's alpha =0.85. Measures of Knowledge application also have established a good level of convergent validity (AVE =0.642), composite reliability (ρ_c) =0.878; Cronbach's alpha =0.814. Finally, Measures of Knowledge effectiveness also show level of convergent validity as (AVE =0.618 composite reliability (ρ_c) =0.907; Cronbach's alpha =0.876.

Reliability and validity of KM (a higher order construct) has been examined on the basis of correlation between KM and its lower-order constructs. The constructs

Knowledge creation, Knowledge organization, Knowledge storage, Knowledge dissemination, Knowledge application, and Knowledge effectiveness are treated as the items the KM construct. However, the path coefficient value between Knowledge management (KM) construct and its sub-constructs are considered as its loadings. Path model analysis reflects the loadings (path coefficients) of (0.925) for Knowledge creation; (0.922) for Knowledge organization; (0.935) for Knowledge storage; (0.933) for Knowledge dissemination; (0.904) for Knowledge application, and (0.926) for Knowledge effectiveness as shown in Figure 6.1, thereby accommodate support for indicator reliability i.e., square of loadings shows the indicator reliability. In context of present study, the AVE of KM is $(0.925^2 + 0.922^2 + .935^2 + .933^2 + .904^2 + .926^2)/6 = (.854)$ which is clearly higher than 0.5 threshold value, therefore reflecting convergent validity for Knowledge management (KM) construct (Sarstedt et al., 2017). Similarly values of other statistics for establishing the reliability and validity of higher order construct KM such as Cronbach's alpha (.96), Composite reliability (.972) are more than threshold values. It is very clear that indicator reliability value for every indicator is greater than the minimum desired value 0.4 and even larger than the preferred value 0.7. In the next step, Exogeneous variables and Lower-order components' discriminant validity have been also proved, as all HTMT values are less than the desired level of 0.85 (Franke & Sarstedt, 2019; Henseler et al., 2015). Hereafter, higher-order construct's discriminant validity has been assessed by using (Henseler et al., 2015)'s HTMT criterion. All the values are clearly less than the threshold value (0.85), thereby affirming the claim discriminant validity as shown in Table 6.2. Thus, it can be concluded that reliability and validity of the KM construct have been established.

Table 6.1: PLS-Measurement Model Results of KM and Various Dimensions of OC

Sr No	Construct	Variable	Item	Convergent validity			Internal consistency reliability	
				Outer Loadings (more than 0.70)	Indicator Reliability (more than 0.5)	AVE (more than 0.5)	Composite Reliability (more than 0.7)	Cronbach's alpha (0.7)
1	ORGANIZATION CULTURE	CLAN CULTURE	ClanDC1a	0.764	0.583	0.617	0.906	0.876
			ClanOL2a	0.793	0.628			
			ClanME3a	0.792	0.627			
			ClanOG4a	0.787	0.619			
			ClanSE5a	0.792	0.627			
			ClanCS6a	0.784	0.614			
2		ADHOCRACY CULTURE	AdhDC1b	0.755	0.570	0.605	0.902	0.869
			AdhOL2b	0.764	0.583			
			AdhME3b	0.760	0.577			
			AdhOG4b	0.809	0.720			
			AdhSE5b	0.794	0.730			
			AdhCS6b	0.782	0.611			
3		MARKET CULTURE	MktDC1c	0.768	0.589	0.594	0.897	0.863
			MktOL2c	0.792	0.627			
			MktME3c	0.794	0.630			
			MktOG4c	0.783	0.613			

			MktSE5c	0.745	0.555				
			MktCS6c	0.738	0.544				
4		HIERARCHY CULTURE	HchDC1d	0.744	0.553	0.580	0.892	0.855	
			HchOL2d	0.715	0.511				
			HchME3d	0.802	0.643				
			HchOG4d	0.748	0.559				
			HchSE5d	0.775	0.600				
			HchCS6d	0.781	0.586				
5	KNOWLEDGE MANAGEMENT	KNOWLEDGE CREATION	Kert1	0.771	0.594	0.640	0.899	0.859	
				Kert2	0.791				0.625
				Kert3	0.815				0.664
				Kert4	0.813				0.660
				Kert6	0.808				0.527
6			KNOWLEDGE ORGANIZATION	Korg1	0.800	0.640	0.623	0.892	0.848
				Korg2	0.817	0.667			
				Korg3	0.768	0.589			
				Korg4	0.800	0.860			
				Korg5	0.759	0.576			
7			KNOWLEDGE STORAGE	Kstr1	0.720	0.518	0.608	0.903	0.871
				Kstr2	0.783	0.613			
				Kstr3	0.769	0.591			

			Kstr4	0.754	0.568			
			Kstr5	0.812	0.659			
			Kstr6	0.835	0.697			
8		KNOWLEDGE DISSEMINATION	Kdis1	0.786	0.617	0.571	0.889	0.850
			Kdis2	0.751	0.564			
			Kdis3	0.781	0.609			
			Kdis4	0.746	0.556			
			Kdis5	0.749	0.561			
			Kdis8	0.720	0.518			
9		KNOWLEDGE APPLICATION	Kapp1	0.778	0.605	0.642	0.878	0.814
			Kapp2	0.793	0.628			
			Kapp3	0.828	0.685			
			Kapp4	0.805	0.648			
10		KNOWLEDGE EFFECTIVENESS	Keff1	0.808	0.652	0.618	0.907	0.876
			Keff2	0.790	0.624			
			Keff3	0.765	0.585			
			Keff4	0.790	0.624			
			Keff5	0.788	0.620			
			Keff6	0.776	0.602			
11		KNOWLEDGE MANAGEMENT	KM*			.854	.972	.96

Table 6.2: HTMT Values KM and Various Dimensions of OC

Construct	Sub-construct	Knowledge Management						
		Kert	Korg	Kstr	Kdis	Kapp	Keff	KM
ORGANIZATION CULTURE	CLAN CULTURE	0.707	0.707	0.661	0.656	0.635	0.686	0.697
	ADHOCRACY CULTURE	0.698	0.675	0.633	0.637	0.622	0.671	0.687
	MARKET CULTURE	0.737	0.763	0.684	0.685	0.682	0.733	0.706
	HIERARCHY CULTURE	0.702	0.686	0.651	0.646	0.641	0.704	0.718

6.2.2 Structural Model of Knowledge Management as an Endogenous Variable and Clan Culture, Adhocracy Culture, Market Culture, and Hierarchy Culture as Exogenous Variables.

After measurement model, structural model has been measured for the dependency relationship. Following Hypotheses have been studied using structural equation modeling.

H7: There is no significant positive relationship between Clan culture and Knowledge management of North Indian Higher Education Institutions.

H8: There is no significant positive relationship between Adhocracy culture and Knowledge management of North Indian Higher Education Institutions.

H9: There is no significant positive relationship between Market culture and Knowledge management of North Indian Higher Education Institutions.

H10: There is no significant positive relationship between Hierarchy culture and Knowledge management of North Indian Higher Education Institutions.

Figure 6.2 reflects that in the structural model, the constructs Clan culture, Adhocracy culture, Market culture, and Hierarchy culture, have been considered as exogenous variables, whereas Knowledge management has been taken as endogenous variable. The correlation between the exogenous and endogenous variables has been assessed through path diagram.

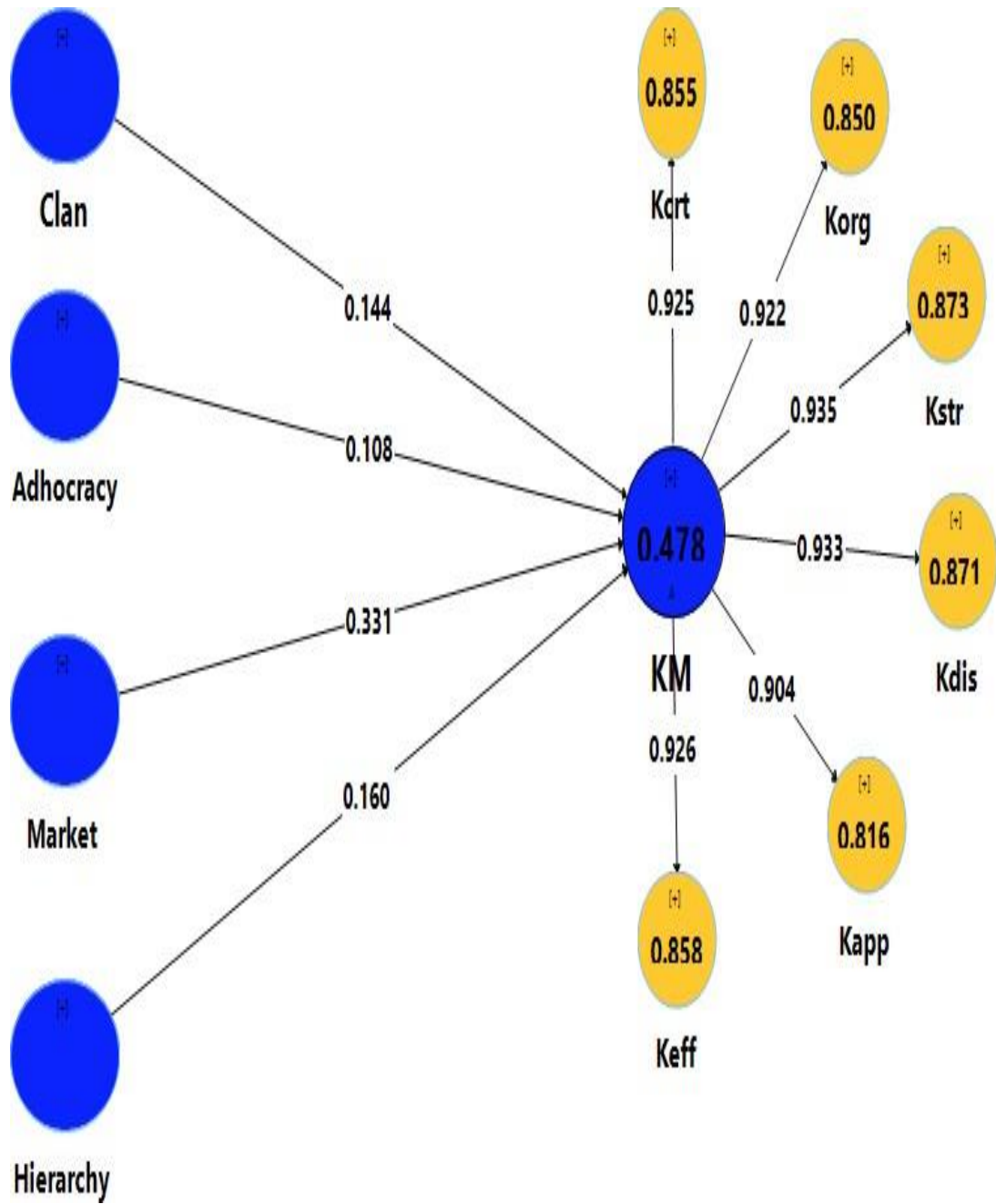


Figure 6.2: Structural Path Model (Knowledge Management as an Endogenous Variable and Clan Culture, Adhocracy Culture, Market Culture, and Hierarchy Culture as Exogenous Variables)

The PLS path modeling assessment for various types of Organizational Culture-Knowledge management relationship is shown in Figure 6.2. This figure reflects the following observations:

i. Explanation of Knowledge Management (target endogenous variable) variance:

The coefficient of determination (R^2) is 0.478 for the Knowledge management endogenous latent variable, which shows that the four latent variables (Clan culture, Adhocracy culture, Market culture, and Hierarchy culture) moderately explain 47.8% of the variance in Knowledge management.

ii. Path coefficient sizes of inner model and its significance:

The inner model explains that Market culture has the strongest impact on Knowledge management (0.331), followed by Hierarchy culture (0.160). Hereafter, Clan culture also has an impact on Knowledge management (0.144). Adhocracy culture has the least impact on Knowledge management (0.108). The hypothesized path relationship between all the exogenous variables such as Clan culture, Adhocracy culture, Market culture, and Hierarchy culture and endogenous variable Knowledge management are statistically significant because standardized path coefficient values for all the variables are greater than 0.1(Wong, 2013). Thus, it can be concluded that Clan culture, Adhocracy culture, Market culture, and Hierarchy culture are moderate predictors of Knowledge management but Market Culture has strongest Impact on knowledge management out of all four culture types.

iii. Assessing Structural Path Significance in Bootstrapping

Structural Path significance has been checked using a two-tailed t-test with sub-sample of 5000 and significance level of 5%. (Wong, 2013 and Sarstedt, Ringle, & Hair, 2017) have explained that the path coefficient is considered to be significant if the value of T-statistics is greater than 1.96 and p-value is less than 0.05 at 5 percent level of significance.

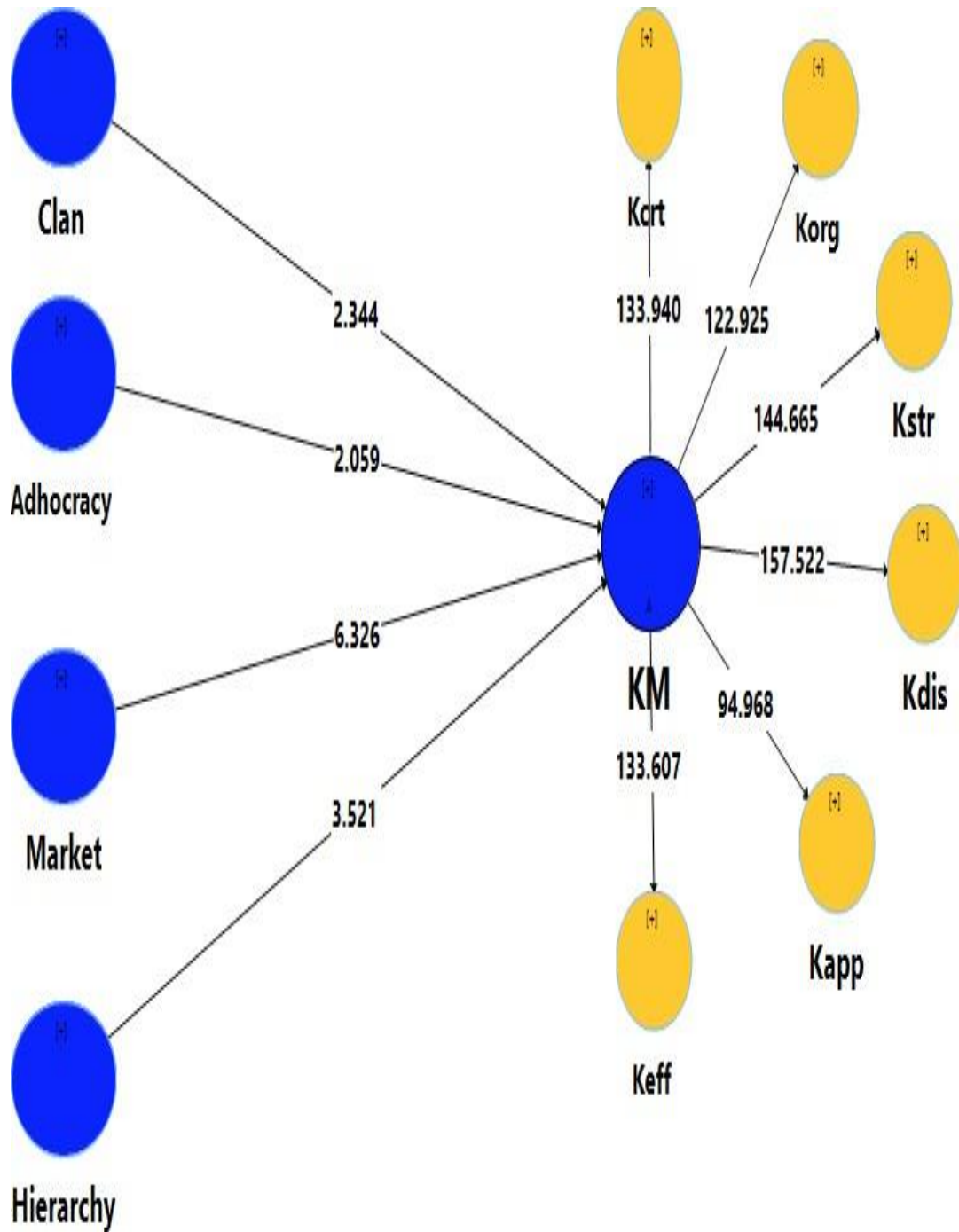


Figure 6.3: Structural Path Model Significance (Knowledge Management as an Endogenous Variable and Clan Culture, Adhocracy Culture, Market Culture, and Hierarchy Culture as Exogenous Variables)

Table 6.3: Result of Structural Model and Significance Tests (Knowledge Management and Organizational Culture-Inner Model)

	R²	Path coefficient	T-values (> 1.96)	P values (> 0.05)
Clan -> KM	0.478	0.144	2.344	0.01
Adhocracy -> KM		0.108	2.059	0.03
Market -> KM		0.331	6.326	0.00
Hierarchy -> KM		0.16	3.521	0.00
OC-> KM	.471	0.686	13.298	0.00

Table 6.4: Structural Path Significance of Outer model (Knowledge Management and Organizational Culture)

Construct	Sub-Construct	Items	T-value of outer loading > 1.96	p-value < 0.05
ORGANIZATIONAL CULTURE	CLAN CULTURE	ClanDC1a	32.50	0.00
		ClanOL2a	35.53	0.00
		ClanME3a	37.47	0.00
		ClanOG4a	34.62	0.00
		ClanSE5a	32.10	0.00
		ClanCS6a	33.97	0.00
	ADHOCRACY CULTURE	AdhDC1b	31.57	0.00
		AdhOL2b	30.04	0.00
		AdhME3b	28.14	0.00
		AdhOG4b	32.62	0.00
		AdhSE5b	29.93	0.00
		AdhCS6b	33.85	0.00
	MARKET CULTURE	MktDC1c	28.22	0.00
		MktOL2c	28.65	0.00
		MktME3c	32.92	0.00
		MktOG4c	29.11	0.00
		MktSE5c	24.87	0.00
		MktCS6c	24.57	0.00
	HIERARCHY CULTURE	HchDC1d	24.86	0.00
		HchOL2d	22.11	0.00
		HchME3d	27.26	0.00

		HchOG4d	26.24	0.00
		HchSE5d	28.88	0.00
		HchCS6d	26.90	0.00
KNOWLEDGE MANAGEMENT	KNOWLEDGE CREATION	Kcrt1	32.27	0.00
		Kcrt2	37.87	0.00
		Kcrt3	33.52	0.00
		Kcrt4	37.59	0.00
		Kcrt5	36.31	0.00
	KNOWLEDGE ORGANIZATION	Korg1	34.30	0.00
		Korg2	35.12	0.00
		Korg3	31.87	0.00
		Korg4	35.38	0.00
		Korg5	30.52	0.00
	KNOWLEDGE STORAGE	Kstr1	28.25	0.00
		Kstr2	32.95	0.00
		Kstr3	30.61	0.00
		Kstr4	31.10	0.00
		Kstr5	34.18	0.00
		Kstr6	33.64	0.00
	KNOWLEDGE DISSEMINATION	Kdis1	30.17	0.00
		Kdis2	28.02	0.00
		Kdis3	30.12	0.00
		Kdis4	27.19	0.00
		Kdis5	27.34	0.00
		Kdis6	24.02	0.00
	KNOWLEDGE APPLICATION	Kapp1	33.04	0.00
		Kapp2	30.63	0.00
Kapp3		34.19	0.00	
Kapp4		32.37	0.00	
KNOWLEDGE EFFECTIVENESS	Keff1	31.90	0.00	
	Keff2	32.63	0.00	
	Keff3	31.51	0.00	
	Keff4	34.86	0.00	
	Keff5	33.05	0.00	
	Keff6	33.86	0.00	

In the context of present study, Figure 6.3 and Table 6.3 show that T-value for “Clan Culture-Knowledge management linkage” (2.349) is more than 1.96 and p value (.01) is less than 0.05 at 5 percent level of significance, which are considered significant. Therefore, *H7: There is no significant positive relationship between Clan culture and knowledge management of North Indian Higher Education Institutions, is not accepted.*

T value for “Adhocracy culture - Knowledge management linkage” (2.060) is more than 1.96 and p value (.03) is less than 0.05 at 5 percent level of significance, which are considered significant. Therefore, *H8: There is no significant positive relationship between Adhocracy culture and knowledge management of North Indian Higher Education Institutions, is not accepted.*

T value for “Market Culture-Knowledge management linkage” is (6.327) and p value (.00) is less than 0.05 at 5 percent level of significance, which are considered significant. Therefore, *H9: There is no significant positive relationship between Market culture and knowledge management of North Indian Higher Education Institutions, is not accepted.*

T value for “Adhocracy culture - Knowledge management linkage” (3.520) is more than 1.96 and p value (.00) is less than 0.05 at 5 percent level of significance, which are considered significant. Therefore, *H10: There is no significant positive relationship between Hierarchy culture and knowledge management of North Indian Higher Education Institutions, is not accepted.*

6.2.3 Structural Model of Knowledge Management as an Endogenous Variable and Overall Organizational Culture as an Exogenous Variable

To measure the impact of overall organizational culture on Knowledge management, measurement model for all the exogenous and endogenous constructs’ reliability and validity has been already proved in previous chapter under the validation and assessment of measurement models. After measurement model, structural model has been measured for the dependency relationship. Following Hypothesis has been studied using structural equation modeling.

H11: There is no significant positive relationship between Overall Organizational culture and knowledge management of North Indian Higher Education Institutions.

Figure 6.4 reflects that in this structural model, the construct Organizational Culture has been considered as exogenous variables, whereas Knowledge management has been taken as endogenous variable. The causal relationship between the exogenous and endogenous variables has been assessed through path diagram.

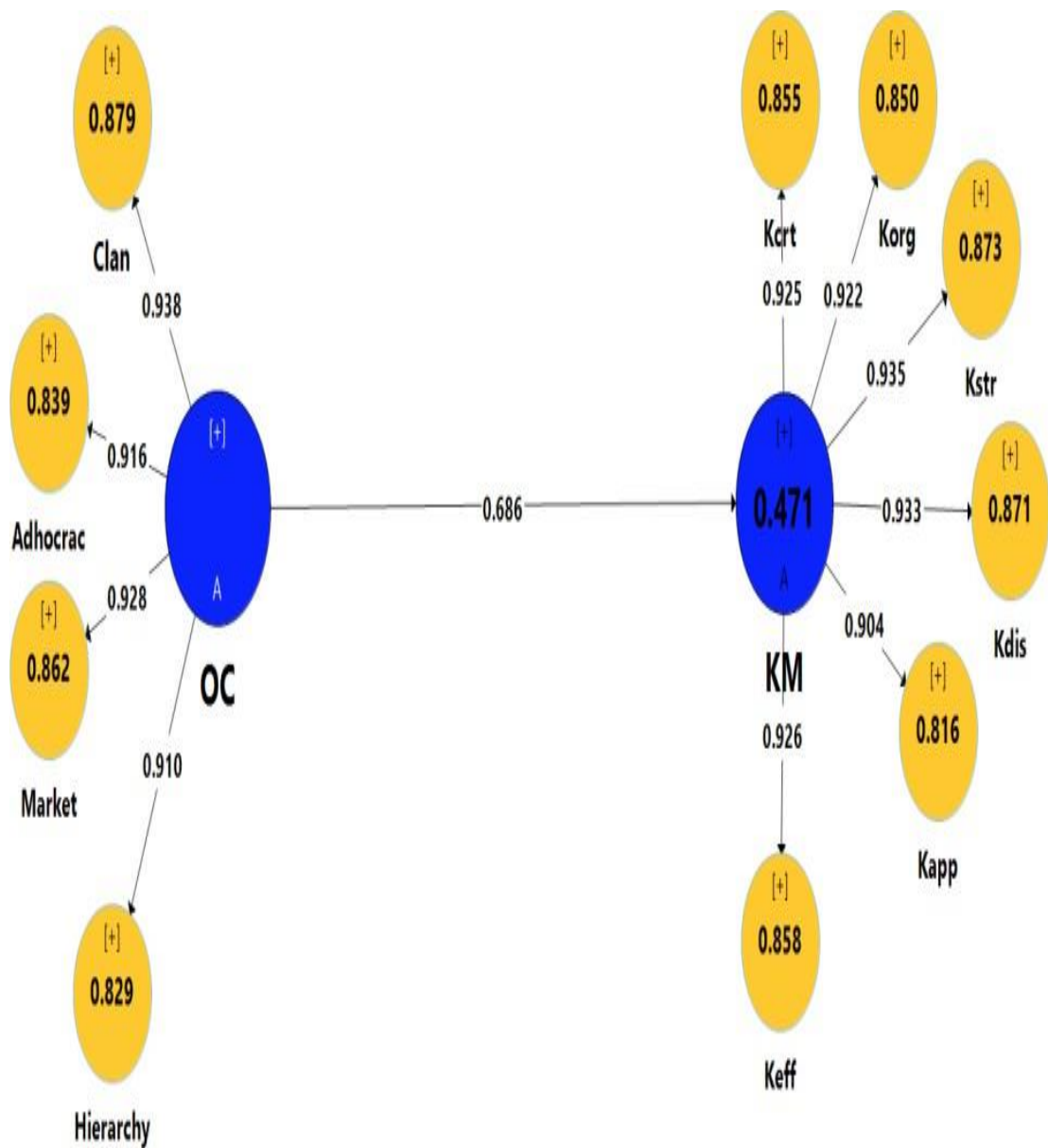


Figure 6.4: Structural Path model (Knowledge Management as an Endogenous Variable and Overall Organizational Culture as an Exogenous Variable)

The PLS path modeling assessment for overall Organizational Culture-Knowledge management relationship is shown in Figure 6.3. This figure reflects the following observations:

- i. Explaining the variance of Knowledge management (target endogenous variable):

The coefficient of determination (R^2) is 0.471 for the Knowledge management endogenous latent variable, which means that the latent variable Organizational culture moderately explain 47.1% of the variance in Knowledge management.

- ii. Path coefficient sizes of inner model and its significance:

The inner model explains that organizational culture has a positive impact on Knowledge management (0.686). The hypothesized path relationship between exogenous variable OC and endogenous variable Knowledge management is statistically significant because standardized path coefficient value is greater than 0.1(Wong, 2013). Thus, it can be concluded that Organizational culture is a strong predictor of Knowledge management.

- iii. Assessing Structural Path Significance of inner model in Bootstrapping

Structural Path significance of inner model has been checked using a two-tailed t-test with sub-sample of 5000 and significance level of 5%. (Wong, 2013 and Sarstedt, Ringle, & Hair, 2017) have explained that the path coefficient is considered to be significant if the value of T-statistics is greater than 1.96 and p-value is less than 0.05 at 5 percent level of significance.

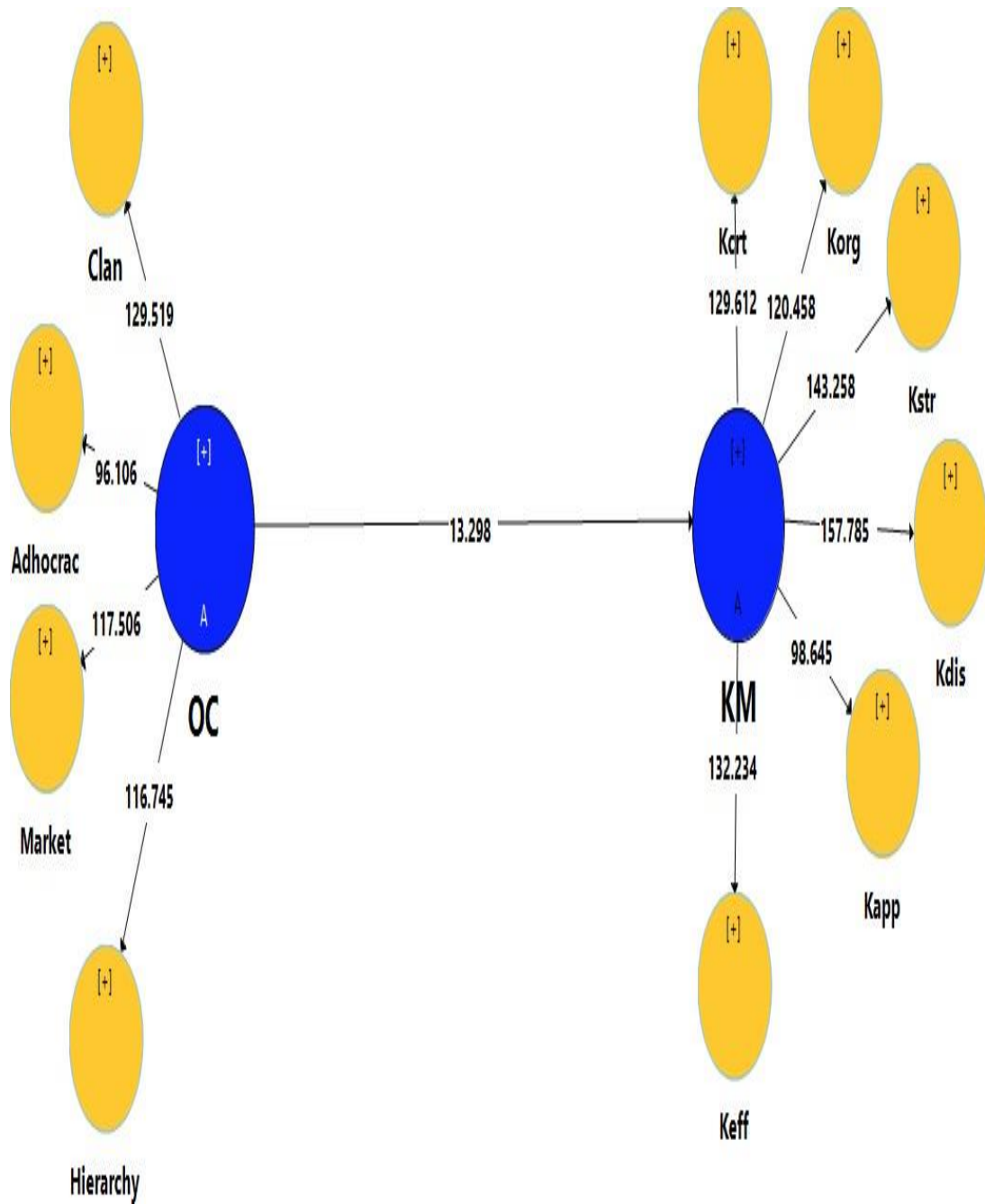


Figure 6.5: Structural Path model Significance (Knowledge Management as an Endogenous Variable and Overall Organizational Culture as an Exogenous Variable)

In the context of present study, Figure 6.5 and Table 6.3 show that T-value for “organizational Culture-Knowledge management linkage” (13.269) is more than 1.96 and p-value (.00) is less than 0.05 at 5 percent level of significance, which are considered significant. Therefore, *H11: There is no significant positive relationship between organizational culture and knowledge management of North Indian Higher Education Institutions is not accepted.*

iv. Assessing Structural Path Significance of outer model in Bootstrapping

After checking the path coefficient for inner model, Structural Path significance for outer model has been explored using a two-tailed t-test with sub-sample of 5000 and significance level of 5%. (Wong, 2013 and Sarstedt, Ringle, & Hair, 2017) have explained that outer model is considered to be significant if the value of T-statistics of outer loadings of indicators of endogenous and exogenous variables (organizational culture and Knowledge management) are greater than 1.96 and p-values are less than 0.05 at 5 percent level of significance. Table 6.4 shows that all the T-values of outer loadings are greater than 1.96 and P-values are less than 0.05. Therefore, it can be concluded that outer loadings of indicators of knowledge management and organizational culture are highly significant.

Table 6.5: Summary of Findings

Sr. No.	Findings
1	There is a significant relationship between Clan culture and Knowledge management of North Indian Higher Education Institutions.
2	There is a significant relationship between Adhocracy culture and Knowledge management of North Indian Higher Education Institutions.
3	There is a significant relationship between Market culture and Knowledge management of North Indian Higher Education Institutions.
4	There is a significant relationship between Hierarchy culture and Knowledge management of North Indian Higher Education Institutions.
5	There is a significant relationship between Organizational culture and Knowledge management of North Indian Higher Education Institutions.

CHAPTER 7

MODERATION ANALYSIS

This chapter explains the moderating role played by Information and Communication Technology (ICT) in Knowledge management - Organizational culture relationship. Section 7.1 explains the moderation analysis. Section 7.2 reveals the position of ICT in North Indian Higher Education Institutions. Section 7.3 presents the results of moderation analysis for impact of ICT on Knowledge management - Organizational culture relationship.

7.1 Explanation of Moderation Analysis

There are many studies which are based on the correlation between independent variable and dependent variable in literature review. For getting the deep insights, researchers should push their boundaries beyond the simple bivariate causal relationship, and should shift their efforts towards testing the advanced hypotheses about how, why and when. Such hypotheses would help in explaining the functional procedures of causality by introducing a third construct into causal relationship between two constructs. Moderation analysis provides insights about the conditions in which relationship between independent and dependent variables exist (Frazier et al., 2004). Moderation analysis actually analyses the contextual relationship between two variables and explains about the change in this relationship after introducing a third variable (Hair et al., 2010). “A moderator variable refers to an independent variable, which has an impact on the strength and/or direction of relationship between another independent variable and a dependent variable (Lai, 2013).” It explains the impact of a third variable on the correlation between two variables by examining the strength and direction of this relationship (Vij & Farooq, 2017). A moderator effect can be tested where there is a strong correlation between an independent and a dependent variable, but usually it is tested where there is an unexpected weak relationship found between two variables (Kim et al. 2001).

As regression explains the strength or extent of correlation between independent and dependent variables, moderating effect identifies if the relationship between two variables changes after introducing a particular variable or not. Like,

under present study, the relationship between Knowledge Management and Organizational Culture are to be studied, hereafter it is attempted to understand if this relationship remains same or moderated by the third variable ICT. The moderation would help to understand if the relationship between Knowledge Management and Organizational Culture is more pronounced in North Indian higher education institutions in the presence of Information and Communication Technology (ICT).

7.2 Position of Information and Communication Technology (ICT) in North Indian Higher Education Institutions

Information and Communication Technology (ICT) plays a very significant part in facilitating strong-effective management and administrative functions in Higher education field. ICT facilitates not only student administration but also different resource administration in HEIs (Christiana, 2008). Singh, (2008) explained that ICT helps in eliminating operational inefficiency and facilitate effective decision-making in various sectors of governance. Higher Education Service area can help in empowering the governing authorities to organize the educational plan throughout the country with the support of ICT. It helps in the exchange of information and also facilitates the access to higher education. Kumar and Kumar, (2006) suggest that IT based KM initiatives help in providing a good quality of educational services. (Omerzel et al., 2011; Wilkens et al., 2004; Nezhadgholi and Aghaei, 2013) attempted to explain the correlation between Organizational Culture and Knowledge Management in HEIs and have selected the institutions with effective ICT implementation for data collection on the assumption that an effective implementation of ICT has significant impact on the effective knowledge management.

This section reveals the position of ICT in North Indian Higher Education Institutions. As ICT has been taken as a moderating variable in present study so, it is important to learn the position of ICT in North Indian HEIs.

Table 7.1: Profile of ICT Indicators

ICT Indicators	Types of HEIs						Total % ge
	Central University	Deemed University	Private University	State Public University	NII & Other	Overall North Indian HEIs	
	Yes	Yes	Yes	Yes	Yes	yes	
Presence of fixed telephone	67	50	59	83	80	339	67.8
Presence of mobile devices	72	52	60	82	82	348	69.6
Presence of computers	68	49	64	83	81	345	69
Presence of Internet access	66	51	64	82	82	345	69
Efficient method of access/bandwidth for Internet use	62	49	61	82	78	332	66.4
Presence of local network	59	53	54	80	81	327	65.4
Presence of Website	63	50	54	83	79	329	65.8
Recently invested in ICT for up-gradation	56	47	52	80	76	311	62.2
Have enough services for which the Internet is used	60	48	51	81	80	320	64
Provide ICT training	63	47	52	81	79	322	64.4
Have barriers to PC usage	57	44	51	81	78	311	62.2
Have barriers to internet usage	56	45	53	84	76	314	62.8
My institution is near to the geographic location where ICT goods are sold	57	48	50	77	77	309	61.8
TOTAL	806	633	725	1059	1029	4252	65.4

Table 7.1 explains the presence of various ICT tools. Here, list of 13 ICT indicators (which are utilized most widely in every organization) have been provided based on the (UNESCO, 2002) report to understand the current position of ICT in various categories of universities. Respondents have been asked about the presence of these ICT indicators in their institutions. It shows that state public universities and NII and others institutions are clearly reflecting better position in terms of the availability of ICT indicators. However, it cannot be ignored that maximum no. of respondents from these universities also agreed upon that they have barriers on PC and internet usage. Then central universities are at third place which is not very much ahead of Private universities in terms of presence of ICT indicators in their institutions. Deemed universities have least percentage of ICT indicators available in their institutions. It can be explained that Total 66% of respondents from North Indian agreed with the availability or presence of these ICT indicators in their institutions. 70% respondents explained that most used technological facilities in their institutions are Mobile phones, computers with internet access and fixed telephones. Approx. 66% of respondents of North Indian higher education Institutions also confirm that they have efficient method of access/bandwidth for Internet use and they also efficiently use their websites and local networks. 64% respondents claimed that their institutions have enough services for which the Internet is used and also provide ICT related training. Though 62% respondents also made it clear that they have barriers to PC usage and Internet Usage in their institutions. 62% respondents also confirms that their institutions have recently invested in the upgradation of ICT and their institution is near to the geographic location where ICT goods are sold. Overall, majority of respondents from North Indian Institutions make it clear that they use these ICT indicators.

Table 7.2: Importance of ICT Indicators

ICT Indicators	North Indian Higher Education Institutions				
	Highly Unimportant	Unimportant	Average	Important	Highly Important
Presence of fixed telephone	4	14	61	225	35
Presence of mobile devices	7	38	87	195	21
Presence of computers	4	5	61	212	63
Presence of Internet access	6	12	46	215	66
Efficient method of access/bandwidth for Internet use	5	3	70	220	34
Presence of local network	6	45	91	167	18
Presence of Website	5	5	48	221	50
Recently invested	1	20	70	200	20
Have enough services for which the Internet is used	3	8	75	204	30
Provide ICT training	3	9	88	197	25
Have barriers to PC usage	1	6	74	217	13
Have barriers to internet usage	2	6	83	198	25
My institution is near to the geographic location where ICT goods are sold	1	25	84	187	12

Table 7.2 reflects the ratings given to each ICT indicator that is being used in north Indian HEIs, as per their importance. As per the Respondents from North Indian Higher education Institutions, computers, internet access and fixed telephones are the most important ICT indicators. Respondents feel presence of website and efficient method of access/bandwidth for Internet use are also important indicators for ICT enables institutions. Respondents claim that it is also important to have enough services for which the internet is being used. They feel least important ICT indicator is Local network. North Indian HEIs respondents have felt these ICT indicators are important to facilitate the internal processes of Institutions. On the contrary, respondents explains that Institutional geographic location near where ICT goods are sold and recent investments for ICT up gradations are rated as less important as compared to other ICT indicators.

7.3 Moderating Effect of ICT on the Relationship between the Knowledge Management and Organizational Culture Construct

This study has been attempted to assess the moderation effect of ICT on the relationship between the Knowledge Management and Organizational Culture. Partial least square based moderating effect technique with two stage approach has been applied for analyzing the moderation impact of a continuous variable (ICT) using Smart-PLS 3, instead of applying multi-group analysis in order to maintain integrity of data. This method facilitate to test the moderating effect of ICT on the relationship between OC and KM without transforming a continuous variable (ICT) into a categorical variable artificially, which facilitate in avoiding the loss of information (Sharma et al., 1981; Rucker, McShane, & Preacher, 2015; Pavel, 2018; Memon et al., 2019). As Sharma et al, (1981) explains that when moderating effect is measured on the basis of significance of R^2 value, changing continuous variable into categorical variable artificially for multi-group analysis may lead to provide manipulative value of R^2 . Based on literature review, it is assumed that there may be a relationship between ICT (Moderating variable) and Knowledge Management (Dependent variable), hence the multi-group analysis is not appropriate as multi-group analysis does not provide robust result in this situation (Sharma et al., 1981; Rucker, McShane, & Preacher, 2015). On the other hand, it is possible to measure the moderating effect of the variable, which has a significant impact on dependent variable. It does not rule

out the possibility of the moderating impact of such variable as long as there is no relationship between Moderating variable and Independent variable (Baron & Kenny, 1986). Neither preset study nor literature proves any relationship between ICT (Moderating variable) and OC (Independent variable).

To analyze the magnitude and direction of the relationship between Knowledge Management and Organizational Culture in North Indian Higher Education Institutions, when introducing ICT as moderating variable, moderation analysis with two-stage approach has been applied. (Hair et al., 2017); (Memon et al., 2019) (Becker et al., 2018); and (Chin et al., 2003) recommended the two-stage approach to run a moderation analysis, when the moderating variable has been measured formatively. Two-stage approach explicitly exploits the merit of PLS-SEM to measure latent variable scores. The two stages include;

Stage 1: Main effect model without introducing any interaction term is to be measured, which facilitate to estimate the latent variables scores. These latent variable scores are to be saved for further analysis during the second stage.

Stage 2: To estimate the interaction term, single item measure has been created by multiplying the latent variable scores of the exogenous variable and moderator variable (saved during Stage 1). In this stage, single item variables generated from their multi-item latent variable scores represent the actual latent variables. Figure 7.1 illustrate the structure model with moderating effect of ICT using Two-stage approach.

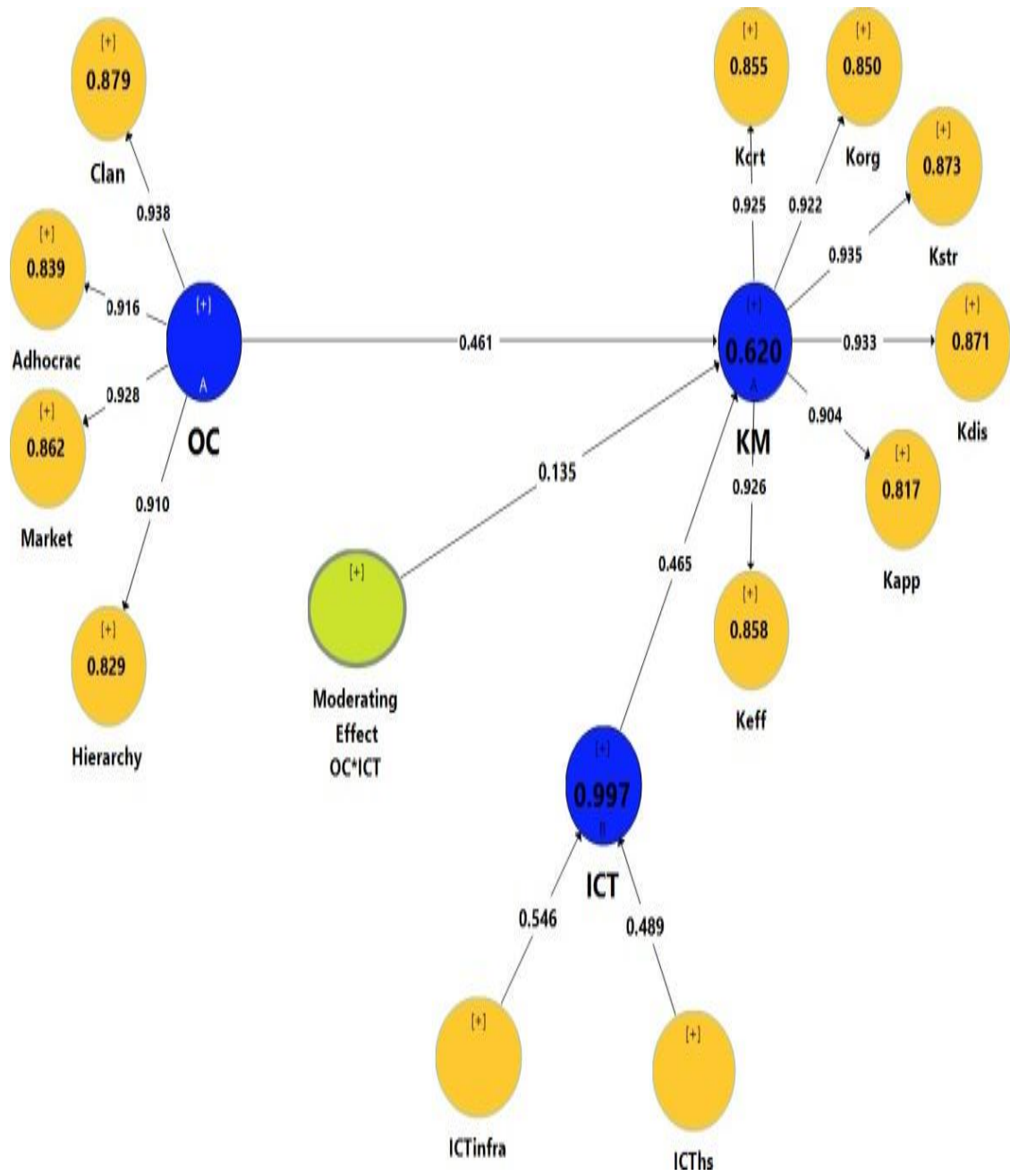


Figure: 7.1 Structural Model with Moderating Effect of ICT

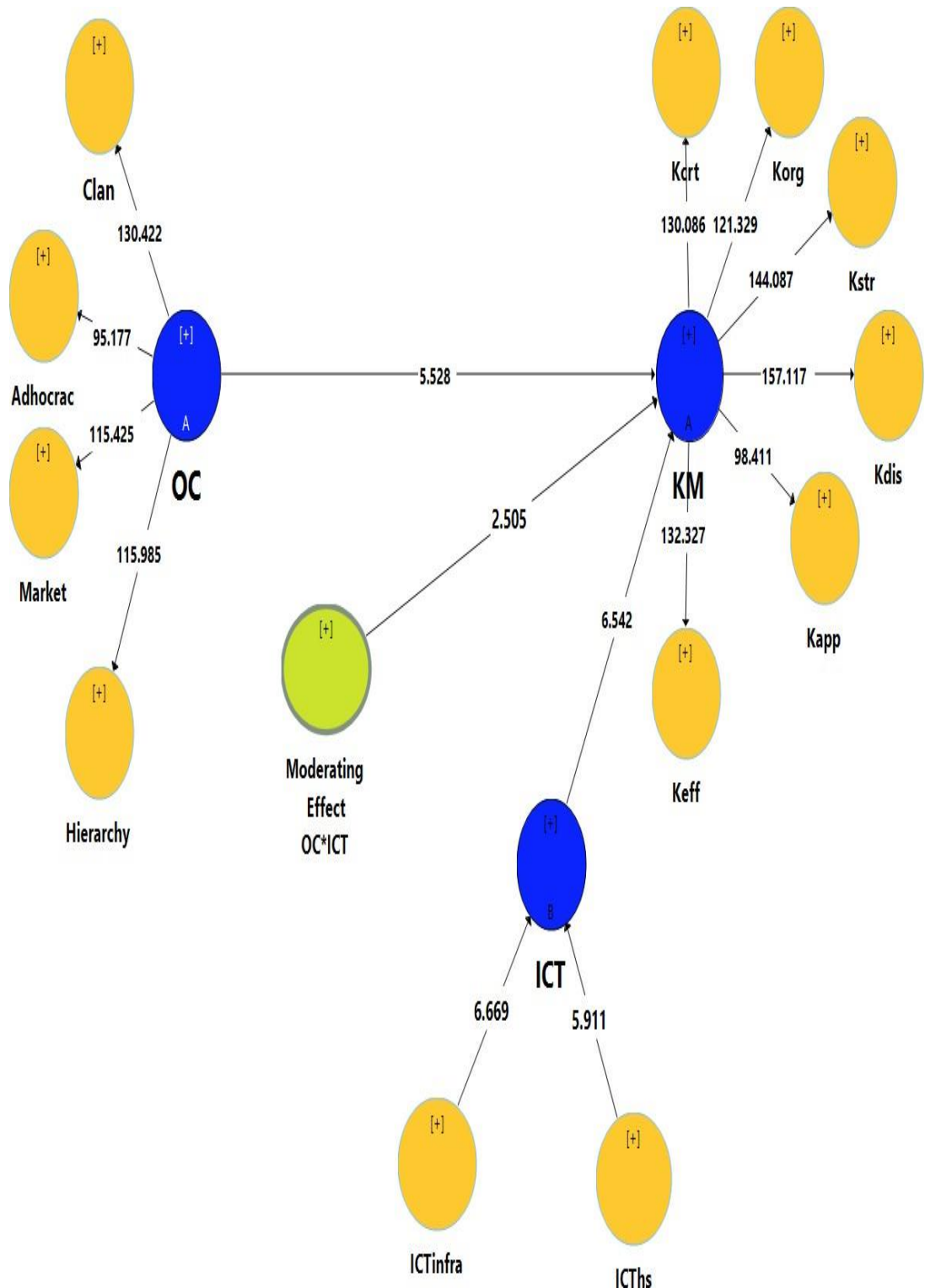


Figure-7.2: Bootstrapping Structural Model with Moderating Effect

The analysis of the structural model reflects that Organizational culture has a positive impact on Knowledge Management. Path coefficient value is 0.686, T-value is 13.269 and P-value is 0.00 at 5% significance level which means effect of organizational culture on knowledge management is significant. R^2 value .471 explains that organizational culture is capable of explaining 47.1% of the variance of knowledge management in North Indian Higher Education Institution. R^2 0.25, 0.50, and 0.75 is taken as weak, moderate, and strong respectively (Henseler et al., 2009; Hair et al., 2010). Hereafter third variable moderator ICT has been introduced and R^2 of 0.605 reveals that organizational culture and the moderator ICT explain 60.5 % of the variance in Knowledge management. It also reveals that Organizational culture has a positive impact on Knowledge Management. Path coefficient value is 0.326, T- value is 3.827 and P-value is 0.00 at 5% significance level which means effect of organizational culture on knowledge management is significant. Now interaction term has been introduced and results show that moderating effect of ICT on relationship between OC and KM is also significantly positive, since path coefficient value is 0.135, T. value is 2.505 and P-value is 0.01 (based on a 5% significance level). R^2 value is 0.620. Additionally, the moderating effect of ICT makes the impact of Organizational Culture on Knowledge Management in North Indian Higher Education Institutions rise to explain 62% of the variance. Change in R^2 value is 0.015 which explains that after introducing one interaction term, the R^2 has been changed about 1.5% i.e., additional variance. Finally, it is verified that information and communication technology (ICT) moderate the relationship between the Knowledge management and Organizational culture, as f^2 effect value is 0.04 (Chin, 2010) (Table 7.1, figure 7.1 & 7.2). Moderating effects have f^2 value (i.e., effect size) less than or equal to 0.02, considered as weak effect size, effect size = or > 0.15 considered as moderate, and effect sizes more than 0.35 considered as strong (Chin et al., 2003) and (Sarstedt, Ringle, & Hair, 2017). Even a weak f^2 value should not ignore to report as low value of effect size does not mean that the moderator effect is negligible. Under some conditions, a small interaction effect might be meaningful, if due to the moderating effect, change in beta value is meaningful, and then it is significant to consider these conditions (Chin et al., 2003).

Table 7.3: Structural Model and Moderation Effect of ICT Results

	R2	β	t-value	F ² effect	P-value > 0.05	Q ² effect
Model 1: OC → KM	.471	.686	13.269	0.891	.00	0.246
Model 2: OC → KM	.605	.326	3.827	0.136	.00	0.316
ICT → KM		.514	6.029	0.338	.00	
Model 3: OC → KM	.620	.461	5.528	0.175	.00	0.320
ICT → KM		.465	6.542	0.267	.00	
OC*ICT → KM		.135	2.505	0.04	.012	

Therefore, H12 is not accepted.

Predictive relevance of the PLS path model has been explained by running blindfolding procedure (omission distance D=7). (Chin et al., 2003) and (Sarstedt, Ringle, & Hair, 2017) explain that Q² values above zero for any endogenous construct explain that predictive accuracy of path model is acceptable for specific construct. Q² values of 0.02, 0.15, and 0.35 indicate that an exogenous construct has a low, medium, or high predictive relevance, respectively, for a particular endogenous construct. Results shows that cross-validated redundancy Q² values are more than zero for endogenous construct KM (Q² = 0.32), which explains the model's predictive accuracy. This Q² effect values shows that exogenous construct has a very high predictive relevance.

CHAPTER 8

FINDINGS, DISCUSSION, IMPLICATIONS, CONCLUSION, AND SUGGESTIONS

This chapter explains the significant findings, discussion, conclusion, implications and suggestions for future practitioners and researchers. Section 8.1 reflects the findings of present study. Section 8.2 throws a light on important discussion regarding the present study. Section 8.3 explains the implications for researchers, managers and governing bodies. Section 8.4 reflects the conclusion and suggestions for future research.

8.1 Key Findings

On the basis of previous chapters includes data analysis and interpretation, present study presents the following significant findings;

1. As analyzed in section (5.1), this Study explains that Central universities are putting most of their efforts towards knowledge application process and putting least attention towards knowledge creation process. Other all processes of KM are well maintained in these universities. It means these institutions implement their knowledge resources very well.
2. As analyzed in section (5.1), it was found that Deemed universities are putting most of their efforts towards knowledge storage process, which reflects that these institutions have a standard process for storing the knowledge to make it easily accessible for the staff and students. These institutions are putting least efforts towards knowledge creation process.
3. As per section (5.1), Employees of State Private Universities pay more attention towards knowledge dissemination and knowledge application processes. It reflects that these institutions provide timely messages/reports with appropriate information to different departments, staff, students, other HEI and other relevant organizations. These universities are putting least attention towards knowledge creation and effectiveness processes as compare to other processes of KM.

4. As per section (5.1), it is found that State public universities pay most of their attention and almost equal attention towards knowledge storage as well as Knowledge dissemination processes. These universities are putting least attention towards knowledge organization.
5. As per section (5.1), NII and other institutions pay their highest attention towards knowledge application. These HEIs put their least attention towards Knowledge effectiveness and Knowledge creation process.
6. As analyzed in section (5.1), it was found that State public is most efficiently creating knowledge in their institutions as compare to other category of institutions. While, State private universities and NII and other institutions are better in knowledge organization process than other categories of institutions, which shows these institutions are most efficiently handling knowledge organization process in their institutions.
7. As analyzed in section (5.1), this Study explains that Deemed universities and state public universities are ahead of other categories of institutions in Knowledge storage process. State private universities are better in knowledge dissemination process than other categories universities, which prove that they are handling knowledge dissemination process very well.
8. As per section (5.1), NII and others category of institutions are ahead of other categories of universities in knowledge application process. However, State public are also ahead of other categories of institutions in Knowledge effectiveness.
9. As analyzed in section (5.2), this Study explains that The comparison of various knowledge management processes reflects that there is a significant difference in knowledge creation process, knowledge storage process, knowledge dissemination process, and knowledge application process among various categories of North Indian higher education institutions such as central universities, state public, state private universities, Deemed Universities and National Importance institutions and others.

10. As analyzed in section (5.2), It also reflects that various category of North Indian higher education institutions are equally maintaining the knowledge organization process and knowledge effectiveness process. All categories of HEIs putting equal attention in these processes.
11. As per section (5.3), Central universities are dominated by the Hierarchy culture, with the mixture of other three types of culture. The Adhocracy culture has got least scores and fourth rank in these universities.
12. As analyzed in section (5.3), this Study explains that dominating culture in Deemed universities is hierarchy culture; with the mixture of other three types of culture and these universities are also the least dominated by the Adhocracy culture.
13. As per section (5.3), dominating culture in State private universities is again hierarchy culture and Clan culture has got least scores.
14. As per the findings of section (5.3), dominating culture in State Public universities is Hierarchy culture and Adhocracy culture is in least extent.
15. As per the analysis of section (5.3), NII and other institutions have dominated in Hierarchy culture. Clan culture has got least scores in these institutions. Results clearly shows that hierarchy culture has got dominantly best scores in every category of North Indian HEI's and market culture is second dominating culture in these HEIs.
16. As per the analysis of section (6.2.2), it is found that there is a significant positive correlation between various types of organizational cultures such as Clan culture, Adhocracy culture, Market culture, and Hierarchy culture and knowledge management of North Indian Higher Education Institutions. However, highest beta value of market culture and KM explains that effect of market culture is more on KM than any other types of culture.
17. As analyzed in section (6.2.3), it is found that there is also a significant positive correlation between overall Organizational culture and Knowledge management of North Indian Higher Education Institutions. It also proves that

balanced mixture of four types of culture in OC with dominating market culture has better impact on the KM.

18. As analyzed in section (7.2), it is found that State public universities and NII and other institutions are clearly reflecting better position in terms of the availability of ICT indicators. Then central universities are at third place which is not very much ahead of Private universities in terms of presence of ICT indicators in their institutions. Deemed universities have least percentage of ICT indicators available in their institutions.
19. As per section (7.2), overall total 66% of respondents from North Indian HEIs agreed with the availability or presence of these ICT indicators in their institutions.
20. As per section (7.2), 70% respondents explained that most used technological facilities in their institutions are Mobile phones, computers with internet access and fixed telephones.
21. As per section (7.2), Approx. 66% of respondents of North Indian higher education Institutions also confirm that they have efficient method of access/bandwidth for Internet use and they also efficiently use their websites and local networks.
22. As per section (7.2), 64% respondents claimed that their institutions have enough services for which the Internet is used and their institutions also provide ICT related training.
23. As per section (7.2), 62% respondents also made it clear that they have barriers to PC usage and Internet Usage in their institutions. 62% respondents also confirms that their institutions have recently invested in the up-gradation of ICT and their institution is near to the geographic location where ICT goods are sold. Overall, majority of respondents from North Indian Institutions make it clear that they use these ICT indicators.
24. As analyzed in section (7.2), it is found that as per the Respondents from North Indian Higher education Institutions, computers, internet access and fixed telephones are the most important ICT tools in their institutions.

Respondents feel presence of website and efficient method of access/bandwidth for Internet use are also important for ICT enabled institutions.

25. As analyzed in section (7.2), North Indian Higher education Institutions feel least important ICT indicator is Local network. North Indian HEIs respondents have felt this ICT indicator is only important to facilitate the internal processes of Institutions.
26. As analyzed in section (7.3), it is found that ICT moderates the relationship between Knowledge management and Organizational culture in North Indian Higher Education Institution. Results shows that ICT has weak moderating effect on the relationship between organizational culture and knowledge management. Even a weak effect of moderating variable should not be ignored to report as low value of effect size cannot be interpreted as the moderating impact is negligible. Under some conditions, a small interaction effect might be meaningful, if due to the moderating effect, change in beta value is meaningful, and then it is significant to consider these conditions (Chin et al., 2003).

8.2 Discussion

The identification of current knowledge management processes adopted by the various categories of North Indian Higher education institutions reflects that Central universities are putting most of their efforts towards knowledge application process but lacking in knowledge creation process. All other Knowledge management processes such as knowledge effectiveness, dissemination, organization and storage processes are well maintained in central universities. Only knowledge creation process falls under poor score category as per the measurement scale, any process gains below 3 indicate poor mark and that gains over 3 indicate good mark. It means these institutions implement their knowledge resources very well as employees of these universities have capability to apply learned practices in the educational process and research activities. Institutions also apply its knowledge for the marketing of its abilities. These institutions implement their knowledge for the development of new services and new curricula as well. But as they lack in knowledge creation process

which may be because of not having well defined strategies for creation of new knowledge from the existing one. Administration of central universities may not put much effort to encourage their employees' involvement in R&D center and research activities or for further studies to enhance their skills. They may not be able to provide sufficient training to their employees. It can be said that institutions may not be dedicating much of their resources, time or allocate budget to obtain knowledge from within or outside the institutions.

Deemed universities are putting most of their efforts towards knowledge storage process. It reflects that these institutions have a standard process for storing the knowledge to make it easily accessible for the staff and students. They make use of database, information technology, repositories and other applications to store knowledge. They may have policy to copyright and patent new knowledge and store records about employees' skills, competencies and expertise. These HEIs may have mechanism to store knowledge on the content, implementation of education process and research projects and also make the records of employees' informal discussions and meetings in campus. These Institutions are putting least efforts towards knowledge creation process. Knowledge effectiveness, organization and application processes are well maintained in deemed universities. Knowledge dissemination is also well regulated only knowledge creation falls under poor score category.

Employees of State Private Universities pay equal and most of their attention towards knowledge dissemination and knowledge application processes. It means these institutions provide timely messages/reports with appropriate information to different departments, staff, students, other HEI and other relevant organizations. They may have centrally stored knowledge system like libraries, knowledge forums and recourse centers to display and distribute knowledge. These institutions may have formal channels for knowledge sharing like meetings, presentations, lectures, conferences, trainings, courses, tours and other activities. Institutions also encourage the usage of social networks by employees and students. These institutions are not only good in dissemination process, but also put equal attention in implementation process. Employees of these universities have capability to apply learned practices in the educational process and research activities. Knowledge storage and Knowledge

organization, Knowledge creation and Knowledge effectiveness are well regulated. These universities are putting least attention towards knowledge creation and effectiveness processes as compare to others but, all the processes fall under the good score category as these processes also have got mean score equal to 3, which means good.

State public universities pay most of and almost equal attention towards knowledge storage as well as Knowledge dissemination processes. These results support the existing literature (Allameh et al., 2011), which proves that university of Iran put most of their attention towards knowledge storage than other processes. State Public universities pay almost equal attention towards Knowledge dissemination process as well, which means the knowledge HEIs store, efficiently distribute among their employees. Knowledge application, knowledge effectiveness, knowledge creation processes are also well maintained in state public universities. These institutions pay equal attention towards these three processes. These universities put least attention towards knowledge organization process as compare to other processes but, all the processes fall under the good score category.

NII and other institutions pay highest attention towards knowledge application process like state private university and central university. Hereafter, these institutions pay almost equal attention towards knowledge storage, knowledge organize as well as Knowledge dissemination processes. These HEIs put their least attention towards Knowledge effectiveness and Knowledge creation process. It can be noticed that NII and other institutions are maintaining all their knowledge management processes better than any of the other categories of north Indian institutions.

It is also clear that state public universities are ahead of other universities in practicing three KM processes i.e., knowledge creation process, knowledge storage process and knowledge effectiveness. It means these universities are handling knowledge management processes most efficiently as compare to other categories of institutions. State private universities are ahead of other universities in knowledge organization and knowledge dissemination. NII and others institutions are ahead of other categories of institutions in knowledge organization and knowledge application process, which

shows State private universities and NII and other are equal in maintaining Knowledge organization process.

Finally, it can be concluded that all the categories of north Indian higher education institutions putting more efforts towards Knowledge application process. Hereafter, knowledge dissemination and knowledge storage processes are also very well maintained which means employees of higher education institutions are efficiently storing the knowledge and do not even hesitate to share it with one- another. North Indian HEIs pay least attention towards the knowledge creation process. Agrawal (2001) has explained that organizations should create a balance between knowledge application process and Knowledge creation process. Employees pay more attention towards knowledge application process than knowledge creation process because knowledge creation process needs more time and investment of resources and outcomes from knowledge creations are very uncertain in nature as compare to the knowledge application process. But knowledge application requires lesser cycle time, resources and outcomes are also less risky. Hence, employees and organizations tend to pay more attention towards knowledge application process over knowledge creation. A good reward system for knowledge management processes may lead to create balance between both the processes as successful new knowledge creation facilitate an organization in generating an effective comparative advantage.

Moreover, North Indian Higher education institutions have got mean score more than three in most of their KM processes which means employees are well maintaining all the KM processes in their institutions. Institutions are also realizing the effectiveness of Knowledge they implement but, these HEIs are not paying much attention to develop new knowledge as Knowledge creation has got least scores in most of the categories of HEIs. All these findings oppose the existing literature based on knowledge management in higher education in India (Namdev-Dhamdhere, 2015) which found that the created knowledge in the academic institutions is not well stored. Most of the times captured and created knowledge in higher education intuitions is remain unknown to all the employees, which is called grey literature. Such knowledge might be functional if it is well recorded and maintained. HEI's have treasure of knowledge but they are unable to organize this knowledge properly, hence utilization

of this knowledge is really less. Present study shows that North Indian institutions are well maintaining all the KM processes, which shows that these HEIs understand the importance of KM in their institutions. These institutions know the fact that KM processes are very expensive and there is always a risk of failure. Financial factors act as a limitation for deciding the boundaries for the expansion of knowledge activities. However, in this competitive era, no institutions can avoid the need of KM. Results show that North Indian HEIs are not ignoring the fact that KM has become very essential for the survival of every institution and maintaining almost all KM processes very well.

Comparison of various knowledge management processes of the North Indian higher education institutions reflects that there is a significant difference in knowledge creation process, knowledge storage process, knowledge dissemination process, and knowledge application process among Central universities, State public, State private universities, Deemed Universities and National Importance institutions and others but, there is a no significant difference found in knowledge organization process and knowledge effectiveness process among various categories of north Indian higher education institutions. It shows that various categories of universities in North India are putting almost equal attention towards the knowledge organization and effectiveness processes. North Indian higher education institutions are paying equal attention to review knowledge on a regular basis. These institutions regularly keep the list of experts and record of current good work practices and have designated manager to keep knowledge up to date. They also provide proper responses to their employees on their ideas and knowledge. Institutions have well defined policy to match sources of knowledge to the problems and challenges. Employees of North Indian Higher education institutions are witnessing the effectiveness of knowledge management processes. All the institutions have improved growth in its organizational memory, copyright and patents and usage of knowledge and improved overall services. Employees have claimed the visible growth in the knowledge capacity and improved skills of their staff. Institutions have better adaptation of services as per student requirements. These findings somewhat support the existing literature (Nayak et al., 2014) which explained that there is no significant difference in Knowledge organization process in a public and a private higher education

institution in south India. Points of difference in present study is that It has found significant difference in knowledge creation, and Knowledge application in North Indian higher education institutions but existing study did not find any difference in knowledge creation, and Knowledge application processes.

Analysis of Organizational culture of North Indian HEIs has clearly reflected that hierarchy culture has got dominantly best scores in every category of HEIs. As per the consequence of the fact, there is no surprise that North Indian higher education institutions have rigid system. These institutions reflect inward-orientation. These institutions focus on stable environment and control. These institutions work as per the structured procedures and strategies, which also provide direction to their employees regarding their day-to-day work processes. Leaders of these institutions have quality of coordinating and organizing their employees. Employees of these institutions also relate with the characteristics of Market culture. As market culture is the second most strongly present culture out of the four culture types in these HEIs, which is most likely a consequence of the fact that environment of North Indian HEIs must be very competitive. Their ultimate objective of such institution is to differentiate oneself from others. These institutions are result-oriented. Their main focus is to improve the quality of work performance. Employees of these institutions are competitive and result-oriented. Heads are very strict, and demanding. Team leaders and employees' commonly focus on reputation and performance. Their strategic goals are achieving measurable results. These institutions have outward focus, which means they know the importance of interaction with external environment and do not ignore the fact that survival of any organization is not possible if they are not taking into account their external environment in this competitive era. These results are consistent with the studies (Omerzel et al., 2011) and Kwan and Walker (2004). Kwan and Walker (2004) study was carried out in universities of Hong Kong, and (Omerzel et al., 2011) study was carried out in HEIs of Slovenia whose findings also show that Most of the institutions are dominated by hierarchy culture and market culture. The results do support the establishment of Cameron and Quinn (2006) which explains that organizations must have a balanced mixture of organizational culture to adapt the external environment. Present study also reflects a balanced mixture of four types of culture.

Analysis of position of North Indian HEIs with regards to ICT reflect that State public universities and NII and other institutions are clearly reflecting better position in terms of the availability of ICT indicators. However, it cannot be ignored that maximum no. of respondents from these universities also agreed upon that they have barriers on PC and internet usage. Then central universities are at third place which is not very much ahead of Private universities in terms of presence of ICT indicators in their institutions. Deemed universities have least percentage of ICT indicators available in their institutions. It can be explained that Total 66% of respondents from North Indian agreed with the availability or presence of these ICT indicators in their institutions. 70% respondents explained that most used technological facilities in their institutions are Mobile phones, computers with internet access and fixed telephones. Approx. 66% of respondents of North Indian higher education Institutions also confirm that they have efficient method of access/bandwidth for Internet use and they also efficiently use their websites and local networks. 64% respondents claimed that their institutions have enough services for which the Internet is used and also provide ICT related training. Though 62% respondents also made it clear that they have barriers to PC usage and Internet Usage in their institutions. 62% respondents also confirms that their institutions have recently invested in the up-gradation of ICT and their institution is near to the geographic location where ICT goods are sold. As per the Respondents from North Indian Higher education Institutions, computers, internet access and fixed telephones are the most important ICT indicators. Majority of Respondents feel presence of website and efficient method of access/bandwidth for Internet use are also important indicators for ICT enables institutions. Most of the respondents claim that it is also important to have enough services for which the internet is being used. They feel least important ICT indicator is Local network. This may be due to the fact that respondents may perceive the importance of Local network is only restricted to facilitate the internal processes of Institutions, but in this competitive era, it is very important for the organizations to focus on external environment while focusing on internal environment. Survival of any organization is not possible without external emphasis. Approx. 69 % of respondents of North Indian HEI's make use of ICT tools. They also understand the importance of usage of ICT tools and putting efforts to utilize these ICT indicators effectively. On the contrary,

some of the respondents explain that though their institutions are near the geographic location where ICT goods are sold but, they do not feel any relevance of their geographical location near ICT goods traders. As 62% respondents also confirms that their institutions have recently invested in the up-gradation of ICT but, out of them most of the respondents also perceived that these up-gradations are not that relevant or important for their institution. Overall, majority of respondents from North Indian Institutions make it clear that they use these ICT indicators. But still there are chances of improvements in these institutions. It cannot be ignored that approx. 35%-40% respondents do not even know the appropriate position of their institution with regards to ICT indicators. They do not perceive their institution have availability of given ICT instruments and other indicators. So, still there is a need to make improvement in ICT infrastructure in these institutions and institutions should provide appropriate training to operate these ICT instruments to their employees. So, that they should clearly know the importance and usage of ICT tools, which are installed in their Institutions.

Results reflect that various types of organizational culture such as clan culture, Adhocracy culture, market culture, hierarchy culture have significant relationship with knowledge management of North Indian Higher Education Institutions. There is also a significant positive correlation between Organizational culture and knowledge management of North Indian Higher Education Institutions. As a matter of fact, it can be explained that as hierarchy and market cultures are dominating cultures in North Indian higher education institutions. Hierarchy culture has properties of focusing on stable environment and control. These institutions work as per the structured procedures and strategies, which also provide direction to their employees regarding their day-to-day work processes. Leaders of these institutions have quality of coordinating and organizing their employees. All these characteristics favorable for building trust among employees and motivate them to take part in knowledge storage, dissemination and application processes in an efficient way. Employees of these institutions also relate with the characteristics of Market culture. As market culture is the second most strongly present culture types out of the four culture types in these HEIs, which is most likely a consequence of the fact that environment of North Indian HEIs must be very competitive and aspirational. The ultimate objective of such

institution is to differentiate oneself from others. These institutions are result-oriented and can motivate their employees to realize the effectiveness of knowledge. Their main focus is to improve the quality of work performance. Employees of these institutions are competitive and result-oriented. Heads are very demanding. Team leaders and employees' commonly focus on reputation and performance of institution. Their strategic goals are achieving measurable results. All these properties can help in achieving favorable and desirable results in the application of knowledge management process. As (David and Fahey, 2000) also support this opinion as they explained that Organizational culture represents the rules and practices of organization such as 'one should not interrupt a superior or meeting hours, and frequencies.' It creates the context for social interaction that supports the knowledge transfer between the different levels of hierarchy and proper application of knowledge. Authors also explain that Organizational culture affects new knowledge creation and adoption. Different characteristics of efficient OC help in improving knowledge creation and knowledge dissemination processes. Results of present study do not support the (Omerzel et al., (2011) contention that organizational culture and Knowledge management has no significant correlation in higher education institutions. This study has failed to explain any significant relationship between various types of organizational culture and knowledge management process in HEIs of Slovenia. The results of present study are in line with the study conducted by (Lawson, 2003) which explain that Knowledge management have positive relationship with KM process and sub-construct of organizational culture i.e., market culture has positive correlation with KM process. But, it explains the negative correlation of hierarchy culture with KM and no relationship of Clan and Adhocracy culture with Knowledge management process in Jamaican HEIs. It has also explained that Hierarchy culture type does not facilitate the successful application of knowledge management. The Market culture has proved a supporter of knowledge management initiatives. Present study also proves that though each culture type has positive correlation with Knowledge management but only market culture has major effect on KM, other all types of culture have less impact when analyzed individually. Effect size of Organizational culture on Knowledge management proves that overall Organizational culture as mixture of four types of culture has very strong effect on knowledge management in

North Indian higher education institutions. Finally, it proves that market culture supports the knowledge management process in north Indian higher education institutions effectively than other types of cultures when comparing individual impact of each culture type. These results are also in line with the findings of (Chidambaranathan et al., 2015) a Qatar based study, which also explained that KM has positive relationship with Market, adhocracy and clan culture. But it shows hierarchy culture does not facilitate the KM process.

Present study also explains that as hierarchy culture is a dominating culture in North Indian HEIs and study proves that market culture has maximum effect on Knowledge management process than other three types of culture, therefore develop the situation for shifting from dominating hierarchical culture to toward dominating market culture for North Indian HEIs. It can be more supportive for Knowledge Management process of North Indian HEIs. Standing and Benson (2000) have stated that universities have been working in rationalism (introducing cost cutting strategies), marketization (leads to Commodification which means taking knowledge as commodity to bargain, competition), and corporatization (introduction of management principal like performance appraisal) environment. Due to that there is a lack of trust and competition in employees for their positions between staff that discourage them to share knowledge and as per the feedback of staff and employees it is very difficult to manage the unselfish sharing of knowledge in such a competitive, lack of trust, less loyalty, and less job security kind of environment. But Authors believe that organization has to put effort in bringing the new techniques such as lessen the work load, encourage informal meetings, team activities, to encourage KM activities. As it takes decades to build a particular culture and not easy to change all of sudden but organizations can try to introduce little improvements to enhance KM activities. However, in the context of present study, overall organizational culture (as balanced mixture of four various types of culture) supports Knowledge management process in North Indian Higher education institutions moderately. Probably it is because of the fact that organizational culture has an impact on the behaviors related to knowledge-groups, various departments of organization and organization itself, moreover organizational culture also influence the employees of organization regarding where, when, with whom and what type of knowledge should be shared with others (King,

2007). Based on a research includes 431 European and American organizations, it is concluded that organizational culture act as a significant obstacle in knowledge management process, mainly in knowledge sharing (Hendriks, 2004). In fact, in theoretical studies, researchers consider OC at the top of a list of push or pull factors of knowledge management (Pillania, 2006; Lawson, 2003). Therefore, organizational culture is a very significant as well as complicated factor in knowledge management of higher education institutions. Another case study has implemented organizational culture to achieve the organization's mission related to knowledge management. This study reflects that organizational culture produce more value in knowledge management process than technical infrastructure changes to improve knowledge management as new organizational management roles and employees who utilize this technological infrastructure in efficient manner make impact on the improvement of Knowledge management (Pan & Scarbrough, 1999). Present study claims that organizational culture of North Indian higher education institutions has an impact on the knowledge management. The logic behind this claim can be the specific values of any institution. As these values as a part of organizational culture shapes the behavior of employees and this behavior can be favorable or unfavorable for the various processes of knowledge management. For example, Aspiration of employees and their motivation regarding the knowledge transfer, dominance of knowledgeable human assets and trust among personals support the knowledge management processes. On the other hand, cut throat competition among employees and their unwillingness for the exchange of ideas can adversely affect knowledge management in an institution.

Results show that Information and Communication Technology (ICT) Plays a moderating role in the relationship between Organizational culture and Knowledge management process in North Indian higher education institution. Consequently, the relationship between ICT, organizational culture and knowledge management is clear. Whether the results are showing a weak moderating impact of ICT on Knowledge management and organizational culture relationship, but this moderating role cannot be treated as negligible. If the level of ICT in HEIs is high, there is a possibility of stronger moderating impact of ICT on KM and OC relationship. This may be because ICT leads to eliminate the traditional boundaries between employees or team-members or between leaders and employees. ICT also facilitate an organic

organizational culture where knowledge can be transferred rapidly through the organization, which further leads to improve the organization and creation of knowledge more effectively. ICT also favors to develop- decentralized and flexible cultures that ultimately enhance the knowledge creation and dissemination process. This finally enhances the decision making and help organization to exploit knowledge. It ultimately leads to create the sense of responsibility and commitment among employees, who have significant role in organization to play. It means effect of organizational culture on knowledge management is more pronounced in the presence of Information and Communication Technology (ICT) in North Indian higher education institution.

Present Study does not in agreement with the finding of (Lopez-Nicolas et al., 2009) which has explained that corporate cultures based on hierarchy culture and market culture have no impact on the use of ICT for KM, while clan culture have impact on the use of ICT for KM. Existing literature explains that ICT improves the quality of services in Higher education institution and usage of ICT in KM process help in generating competitive advantages. Kumar and Kumar (2006) stated that IT based KM intervention are important for producing the better quality of educational services. Authors described that IT based KM interventions has an impact on improving quality of Indian education by improving these parameters of Higher Education institutions like R&D processes, Planning and development processes, course curriculum development; administration process and student affairs. Study focused on how many Indian stakeholders believe that IT based KM tools improves the quality of education in all above-mentioned aspects. Researchers found that most of the stakeholders were agreed with the concept that IT based KM system not only improve the quality of service but also help in reducing cost. (Bhusry, Ranjan, & Nagar, 2011) Authors suggest that if IT based KM intervention model is to be implemented; it would be leading to produce the better return on investment for Higher Education institutions. Ranjan (2011) For the business schools effective IT infrastructure for knowledge sharing is important and it will help the online sharing of resources what'll lead to the creation of value in form of academic and personal value. Various qualitative and theoretical studies have explained that Organizational Culture is a prime factor that has impact on Knowledge management process and ICT as an

infrastructure for KM process make the KM processes faster and easier. Namdev-Dhamdhere (2015) has explained that it is important for the higher education institutions to describe the application of ICT for the development of Knowledge base and sharing of knowledge. (Attallah et al., 2015), explained that Organizational culture is the prime factor behind the failure or success of KM process in any organization and also introduced some factors which are suitable for the Knowledge management process in educational institutional based study such as strategy, ICT infrastructure, rewards, and Systematic processes. Keyes (2008) has explained with the help of qualitative study, how to make organizations more productive by taking into account some cultural factors that affect the willingness of knowledge creating and sharing of knowledge workers. They also discussed the different organizational factors such as management support, tenure, use of ICT, trust, and comfort level with their peers have ability to promote or resist knowledge sharing process. There are some qualitative studies which also explained that use of ICT in KM process can only make the process faster other than that it does not act as a facilitator of KM processes (Haas and Hansen, 2007).

Present study has empirically explained the Relationship between Organizational culture and Knowledge management processes and also claims that ICT act as a positive moderator on the relationship between OC and KM in North Indian Higher Education Institutions.

8.3 Implications

8.3.1 Theoretical Implications

Assessment of relationship between Organizational Culture and Knowledge Management and moderating role of ICT on this relationship is a significant contribution to the existing body of knowledge. The topic of moderating role of ICT on the relationship between OC and KM has not been investigated before. Researching the Relationship between Organizational Culture and Knowledge Management in Higher education Institutions remains unstudied so far in the Indian context. This research not only examined the relationship between OC and KM in Indian higher education institutions but also examine the moderating role of ICT on

this relationship. Therefore, this study will act as a platform for future research in this area.

ICT practices assessment tools which take Infrastructure as well as human aspects of ICT in consideration for assessing the ICT practices of any organization was not available. This study has developed ICT practices measurement tool, which can be used for assessing ICT practices in any organization and measure ICT infrastructure and ICT human skills required to use the ICT infrastructure practices in any organization. This should be considered as a significant contribution since it introduced a Measurement tools for assessing ICT practices. This contribution can be very useful for the researchers and academician who would further want to explore the use of ICT in KM and who want to analyze the ICT practices in various organizations.

Previous researches were treating ICT as an infrastructure for KM process in higher education institutions. Hendriks (2001) explains that most of the knowledge management literature present biased views towards a technological aspect and do not explain the broader organizational issues, hence, neglecting behavioral factors of technology in KM. This study reflected a new aspect of ICT as a moderator on the relationship between OC and KM, which is a significant addition to the existing literature. There are very less empirical studies in the literature which explains all these variables such as KM, ICT and KM altogether, which make this study to be considered as a main contribution to the current literature.

8.3.2 Policy-Level Implications

Policy-level implications explain how this study is significant for policy makers and how it enables the administrators, top management or policy makers to offer specific guidelines and suggestions based on its findings for the improvement of any business or services. The pattern of relationship between various types of Organizational culture and Knowledge management process identified in present research will help the Organizations in understanding the current level of Knowledge management processes and their current organizational culture. It will help them understanding which type of culture will facilitate their knowledge management processes and which type of culture act as a hindrance in KM process. This study also helps in

understanding the position of ICT infrastructure and how this ICT infrastructure and ICT human skills affect the relationship between OC and KM in their institutions. This deep understanding enables the organizations to offer specific guidelines and suggestions related to organizational Culture and ICT practices that facilitate KM processes to their employees and include them in their knowledge management policy at university level and University grant commission (UGC) and Ministry of human resource and development (MHRD) of India also get an impulse of providing guidelines to the universities to improve the quality of services in HEIs as universities are in to the direct business of knowledge. The findings of section (6.2.2) suggest that Organizational culture has a positive impact on knowledge management and out of four various types of culture; market culture has maximum impact on KM process. However, a balanced mixture of four types of culture with market culture as dominating can support KM process more efficiently in higher education institution. Findings of present research also give an impulse to the (UGC) and MHRD to consider Organizational cultural aspect while running the KM process in universities. Therefore, based on the findings of present study, policy makers can recommend HEI's to develop the situation for shifting from dominating hierarchical culture to toward dominating market culture in long-run. Besides, the results of section (5.1) also reflect that some categories of universities are not putting much attention towards Knowledge creation processes. This will help UGC to offer directions to the universities to perform certain activities to generate new knowledge such as

HEIs must have different strategies for creation of new knowledge from the existing one;

HEIs must encourage the involvement of staff in R&D center and research activities;

HEIs must encourage and support its employees in their further education;

HEIs must arrange training sessions for employees in campus and off- campus for updating their ICT related skills;

HEIs must dedicate recourses, time and allocate budget to obtain knowledge from within or outside the institution.

These activities have been also proposed by various researchers (Omerzel et al., 2011; Nayak et al., 2014; Vyas et al., 2020) to generate new knowledge in HEIs. Based on these guidelines, UGC can assess, which university is not adhering to the guidelines offered by the UGC or MHRD. Thus, it will ultimately help in bringing non-compliances by universities into light for UGC to be noticed. Overall, the results will enable, Administration of HEIs, UGC and MHRD as a policy maker to explain the directions and regulations of policy to the stakeholders on inclusive KM practices to consider organizational culture and ICT practices into consideration.

8.3.3 Organizational Implications

This study provides direction and guidance to organizations about how to run their KM process more efficiently by considering their current Organizational Culture and ICT aspect. Organizations can examine their current position of ICT practices, skills required to use the ICT infrastructure in KM process, their current KM process and Current organizational culture using given measuring instruments that will help them to recognize the scope of the improvements required for the success of KM process. Present study has been focused on the successful implementation of knowledge management initiatives that will help in creating competitive advantage of organizations in relation to the current organizational culture and moderating effect of ICT on relationship between OC and Knowledge Management process. Through empirical analysis, present study strongly holds up the notion that various types of organizational culture affect the implementation of knowledge management process. Present study creates great value to organizations, when they are preparing for the implementation of knowledge management initiatives. AS (Tuggle and Shaw, 2000) explained that OC should be aligned with the knowledge practices so that management can evaluate whether its OC encourages or discourages the KM processes in organization. Present study will help institutions in generating awareness regarding their current Organizational Culture. Organizations that understand their pattern of organizational culture types can develop strategic plans that help the management in making informed decisions on knowledge management initiatives to implement. This is extremely important for the organizations because organizations put significant efforts, investments of

funds, time, and personnel assets when they plan to implement knowledge management initiatives (Parikh 2001). As per Haas and Hansen (2007) have discussed how knowledge related capabilities translated to performance related outcome in long-run. Different types of knowledge affect the work activities differently. It is proved that different types of knowledge have different benefit for task units. (Sinha et al., 2012) Effective utilization of Knowledge Management is taken as a very critical factor that supports organizations to develop a competitive advantage for Educational Institutions. HEIs have started treating Knowledge as a push factor for organizational change and innovation, which are the main forces behind the survival of any organization in this dynamic environment. Though, Higher Educational Institutions are trying to introduce radical overhaul and are focusing on different stages of planning and application of knowledge strategies in order to increase their productivity, competitiveness, organizational effectiveness. With the help of effective knowledge management HEIs can achieve their ultimate goal to provide better services to the country by providing the skilled managers and leaders for future. Shukla (2012) suggested that KM process help in improving the quality of education and performance of Higher Education institutions. (Nayak et al., 2014) stated that in this era of cut-throat market competition, Higher Educational Institutions are exploring the field of knowledge management, to generate the competitive advantage. HEIs are directly into the knowledge-based business which includes creation and implementation of knowledge in their organizational processes. As present study has presented a measurement tools for analyzing the KM process and ICT measurement tools for measuring that includes both ICT infrastructure and ICT human skill into consideration. Various organizations can use these tools to analyze their KM process and ICT practices in their organizations. This study has analyzed and presented the dominating organizational culture of North Indian Higher Education institutions, which will lead to improve the strategic planning and help in improving mechanism of KM processes in institutions. Finally, it can be explained that on this topic of present work, which explain the moderating effect of ICT practices on the relationship between the Organizational culture and KM processes in North Indian higher education institutions, will help

management before running KM processes to understand the aspects of organizational culture and ICT that facilitate KM processes.

8.3.4 National-level Implications

National-level implications explain that how present study is significant for the nation. This study is based on higher education institutions of north Indian states hence; it has importance for our nation. As per the national-ICT policy for Indian education institutions, growth of a knowledge society leads to all round socioeconomic development of the nation and global competitiveness. This study is a step to help the North Indian Higher Education institutions not only to examine their culture and KM processes but also to develop suitable organizational culture, ICT practices, policies and strategies, which would help in improving KM processes in Institutions. Improved Knowledge Management process in Higher Educational field leads to improve the quality of education. As students of these institutions act as carrier of knowledge and transfer this knowledge in all those fields, which they take as their professions. Hence, with improved knowledge HEIs handle today's prime issues i.e. 'employability' and employability depends upon quality of Knowledge. It will ultimately lead to improve the services of Indian higher education and upgrade the society.

8.4 Conclusion and Suggestions

Present study significantly contributes towards the Knowledge management literature. Knowledge management is not a very old phenomenon as it has attracted a lot of attention from researchers, organizations and academics after 1995. The Impact of Organizational Culture on knowledge management process has started receiving some attention in foreign studies, However, literature does not provide a holistically study based on the relationship between Knowledge Management and Organizational Culture from Higher education institutional perspective. This study is the first empirical study in Indian higher education institutions which consider the relationship between organizational culture (which is considered as a prime factor behind the KM success or failure in literature) and moderating impact of ICT (which is taken as a significant part of as KM infrastructure in literature) on this relationship. As this study suggest HEIs should consider their organizational culture before implementation of

KM initiatives that would help in the strategic planning of institutions. Their KM initiatives would be successful if institutions have balanced mixture of various types of cultures with dominating market culture and make their strategic plans accordingly. An assessment of organizational cultural and ICT practices helps in setting an achievable mission. Organizations align their organizational culture with ICT practices for the facilitation of KM process, lead to generate organizational change (Kaarst et al., 2004). Literature review suggests that with the incorporation of the market culture type in organization will lead to improve the chances of successful implementation of knowledge management. Present study is also a first study who has presented ICT practices measurement tool for higher education institutions which consider ICT infrastructure and ICT human skills aspect of ICT practices together. Existing studies in literature based on Knowledge management has mainly focused on IT infrastructure and organizational environment (Attallah et al., 2015). Present study has validated this ICT instruments and concludes that ICT practices is a Reflective-formative higher-order construct with 'ICT infrastructure and ICT human skills as its dimensions. KM process scale and OC scales are also validated to analyze in Indian context. So, it can be explained that study contributes to the literature by presenting validated scales for KM process and ICT practices. The findings of the study contribute to the literature by providing empirical evidence related to Knowledge Management-Organizational Culture relationship in the Indian higher education institutions context. The study contributes towards the scholarly conversation regarding contextual role of ICT by presenting significant insights about the moderating role of ICT in Knowledge Management - Organizational Culture relationship.

This study recommends to the top level managers of organizations about how to run their KM process more efficiently by considering their current Organizational Culture and ICT aspect. Based on the findings of present study, top level management can give instructions to the leaders or middle level managers of various departments to examine their current position of ICT practices, skills required to use the ICT infrastructure in KM process, their current KM process and Current organizational culture using given measuring instruments. It will help them to recognize the scope of the improvements in the activities of knowledge-workers and employees who are

directly involved in creation, storage, organization, transfer and application of knowledge. Apart from the policy-makers, top management has to pay their attention towards the new opportunities for organizations by analyzing internal and external knowledge. Therefore, it is recommended for the top and middle level management of HEI's to develop an environment and culture of trust among the team-members that would help in free flow of knowledge from one department to another. However, they have to put more efforts on developing strategies to assist and support the various knowledge activities like new idea generation, knowledge creation, transfer and application. Top-management and administrators has to identify the methods for KM audit to understand the effectiveness of KM in long-run. They should train middle level managers or HOD's to implement the same audit methods in formal and consistent manner. It would ultimately lead to improve all the KM processes of organization. It is recommended to the Top-managers to give instructions to middle-level managers or team-leaders to recognize the knowledge gaps through discussions and informal meetings. In Long-run, they can try to fill this gap with further education or training of staff. They should teach them the ways of recording the lessons learnt and utilization of ICT to transfer the same with other staff. It is recommended to top management to get the middle level executives participate in joint KM projects and research activities. Present study has recommended the ways of successful implementation of knowledge management initiatives to cope-up with day to day problems and challenges in short-run. As per (Bangotra and Chahal, 2016) with successful implementation of Knowledge management processes, organizations can deal with its short-term challenges and can avoid future uncertainties as well. It will ultimately help in creating competitive advantage of organizations in long-run. The findings suggest that Organizational culture has a positive impact on knowledge management and out of four various types of culture; market culture has maximum impact on KM process. Therefore, based on the findings, present study recommends to the top-level management of HEI's to develop the situation for shifting from dominating hierarchical culture to toward dominating market culture in long-run. As Standing and Benson (2000) have stated that it takes decades to build a particular culture and not easy to change all of sudden, but top management and Knowledge strategy-developers can try to introduce little improvements to enhance KM activities

such as lessen the work load, encourage informal meetings, team activities, to encourage KM activities.

The results are based on input from Indian Higher education institutions. Future researchers may study the moderation effect of ICT practices in the context of other economies or fields. The Current study is based upon descriptive form of cross-sectional research design and gives insights about the Knowledge Management – Organizational Culture relationship. It may be the possibility that relationship between Knowledge Management and Organizational Culture differs from sector to sector, if the scope of this study is restricted to a particular sector, Inferences related to the specific higher educational industry can be drawn. Therefore, future researchers may restrict the scope of their study to a specific industry to explore the insights related to that particular industry about Knowledge Management – Organizational Culture relationship. Future researchers can study this relationship in various industries and can compare the results between two or more industries. Future researchers can conduct moderation analysis using other variables as moderators on this relationship such as reward system or they can focus on various individual factors of KM like self-efficacy, willingness to take part in KM process etc. Future research can be directed towards the organizational cultural issues in more depth such as reward system and management style, which is significant factors of organizational culture, can be explored in more detail and its relationship with KM and innovation in HEIs or various industries.

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APPENDIX-I

**Questionnaire: A study of Knowledge Management and Organizational Culture:
Enabling Role of ICT in North Indian Higher Education Institutions.**

Dear Sir/Madam,

Following are a few statements regarding your Institution. Please spare some time from your busy schedule and answer the following questions.

Section A-Organizational Culture

Please tick (X) one number for each of the statements, indicating the extent to which you agree or disagree with them.

Sr. No.	Statements of organizational culture (OCAI instrument)	(select one number that you find suitable) (1) Highly disagree (2) Disagree (3) Average (4) Agree (5) Highly Agree				
1.	Dominant Characteristics					
a)	My institution is a very personal place like an extended family where employees share a lot of themselves.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
b)	My institution is a dynamic and entrepreneurial place where People are willing to take risks.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
c)	My institution is a result oriented place and People are very competitive and achievement oriented.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
d)	My institution is a very controlled and structured place where we have Formal procedures to run the institution	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2.	Organizational Leadership					
a)	In my institution leadership is generally considered as mentoring, facilitating, or nurturing.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
b)	In my institution leadership is generally considered as entrepreneurship, innovation, or risk taking.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
c)	In my institution leadership is generally considered as no-nonsense, aggressive, results-oriented focus.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

d)	In my institution leadership is generally considered as coordinating, organizing, or smooth-running efficiency.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3.	Management of Employees					
a)	In my institution Management style is characterized by teamwork, consensus, and participation.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
b)	In my institution Management style is characterized by individual risk taking, innovation, freedom, and uniqueness.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
c)	In my institution Management style is characterized by hard-driving competitiveness, high demands, and achievement.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
d)	In my institution Management style is characterized by security of employment, conformity, predictability, and stability in relationship.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	Organizational glue: Factors that hold the organization together					
a)	Loyalty, Mutual trust, Commitment to organization is glue factors in my institution.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
b)	Commitment to innovation and development are glue factors in my institution.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
c)	Emphasis on achievement and goal accomplishment are glue factors in my institution.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
d)	Formal rules, policies and importance of maintaining a smooth-running organization are glue factors in my institution.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5.	Strategic emphases					
a)	My institution is emphasizing on human development, High trust, openness and participation.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
b)	My institution is emphasizing on acquiring new resources and creating new challenges.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
c)	My institution is emphasizing on competitive actions, achievement and hitting stretch targets.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
d)	My institution is emphasizing on permanence, stability, Efficiency, control and smooth operations.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

6.	Criteria of Success					
a)	My institution defines success as development of human resources, teamwork, employee commitment and concern for people.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
b)	My institution defines success on the basis of having the most unique or newest products.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
c)	My institution defines success on the basis of winning in the marketplace and outpacing the competition.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
d)	My institution defines success on the basis of efficiency, dependable delivery, smooth scheduling and low-cost production.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

Section B-Knowledge Management

Sr.no	Statements of knowledge creation	(select one number that you find suitable) (1) Highly disagree (2) Disagree (3) Average (4) Agree (5) Highly Agree				
1.	My institution has different strategies for creation of new knowledge from the existing one	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2.	My institution encourages the involvement of staff in R&D center and research activities.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3.	My institution encourages and supports its employees in their further education.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	My institution arranges training sessions for employees in campus and Off- campus for updating their skills.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5.	My institution dedicates resources, time and allocate budget to obtain knowledge from within or outside the institution.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Sr.no	Statements of knowledge organizing					
1.	My institution has well defined policy to review knowledge on a regular basis.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

2.	My institution regularly keeps the list of experts and record of current good work practices.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3.	My institution has designated manager to keep knowledge up to date.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	My institution provides responses to employees on their ideas and knowledge.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5.	My institution has well defined policy to match sources of knowledge to the problems and challenges	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Sr.no	Statements of knowledge storing					
1.	My institution has a standard process for storing the knowledge to make it easily accessible for the staff and students	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2.	My institution makes use of database, information technology, repositories and other applications to store knowledge.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3.	My institution has policy to copyright and patent new knowledge.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	My institution stores records about employees' skills, competencies and expertise.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5.	My HEI has mechanism to store knowledge on the content and implementation of education process and research projects	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6.	My HEI makes the records of employees' informal discussions and meetings in campus	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Sr.no	Statements of knowledge disseminating					
1.	My institution provides timely messages/reports with appropriate information to different departments, staff, students, other HEI and other relevant organizations	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2.	My institution has centrally stored knowledge system like libraries, knowledge forums and recourse centers to display and distribute knowledge.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

3.	My institution has formal channels for knowledge sharing like meetings, presentations, lectures, conferences, trainings, courses, tours and other activities	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	My institution arranges internal education workshops on teaching methods and approaches.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5.	My institution organizes debates on research achievements of employees /students and on terminology of research and education fields.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6.	My institution encourages the usage of social networks by employees and students	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Sr.no	Statements of knowledge application					
1.	My institution successfully applies learned practices in the educational process and research activities.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2.	My institution applies its knowledge for marketing of its potentials	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3.	My institution applies knowledge for the development of new services and new curricula.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	My institution takes learning process or generating new ways to do things as an ongoing process.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Sr.no	Statements of knowledge effectiveness					
1.	My institution has improved growth in its organizational memory, copyright and patents and usage of knowledge.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2.	My institution has seen a visible growth in the knowledge capacity and improved skills of its staff.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3.	My institution has improved services.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	My institution has better adaptation of services as per student requirements.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5.	My HEI has prevented duplicate researches and illegal usage of knowledge.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

6.	My institution has improved its knowledge sharing process horizontally and vertically.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
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Section C-Information & Communication Technology

Please tick (x) whether your Institution have these technologies/Indicators below or not if yes, rate their importance by highlighting(x) appropriate number (1; Highly unimportant to (5): Highly important

Sr. no.	ICT Indicators	Choose appropriate option whether Your institution has these technologies/ Indicators or not Yes(A)No(B)		if Yes, rate their importance by highlighting (X) appropriate number (select one number that you find suitable) (1) Highly unimportant (2) Unimportant (3) Average (4) important (5) Highly important Importance				
		A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
1)	Presence of fixed telephone	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2)	Presence of mobile devices	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3)	Presence of computers	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4)	Presence of Internet access	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5)	Efficient method of access/ bandwidth for Internet use	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6)	Presence of local network	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
7)	Presence of Website	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

8)	Recently invested in ICT for up-gradation	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
9)	Have enough services for which the Internet is used	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
10)	Provide ICT training	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
11)	Have barriers to PC usage	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
12)	Have barriers to internet usage	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
13)	My institution is near to the geographic location where ICT goods are sold	A <input type="checkbox"/>	B <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

Please tick (√) one number for each of the statements, indicating the extent to which you agree or disagree with them.

Sr.no.	Statements of ICT infrastructure	(Select one number that you find suitable) (1) Highly disagree (2) Disagree (3) Average (4) Agree (5) Highly Agree				
1.	My institution employs staff whose main duty is management of information and communication technology tools.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2.	My institution develops customized software applications when it is needed.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

3.	My institution has developed software which are easy to use for uploading, searching and retrieving knowledge	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	My institution has ICT infrastructure that support elements of the learning process.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5.	My institution provides electronic media facility to students to apply for admission and fee payment	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6.	My institution provides timetable / class schedule, attendance of students and Communication of academic details, transportation and accommodation related information to students in electronic form.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
7.	My institution uses ICT tools for student registration /enrolment.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
8.	My institution uses electronic media (ICT tools) for recruitment and work allotment to staff, attendance and leave management of staff, performance appraisal, and communication with staff.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
Statements of ICT related human skills						
1.	My institution staff have skills to make full use of the current ICT infrastructure	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2.	My institution staff has ability to adopt the emerging trends in technology	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3.	My institution staff has ability to use their ICT related skills in developing organizational strategies.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4.	My institution staff has ability to use their ICT related skills in almost all organizational processes	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5.	My institution staff write clear and useful documentation regarding operating system of ICT	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

6.	My institution staff has General Attitudes towards ICT and new technologies.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
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Section D-Demographic Details

Sr.n o.	Please tick (√) suitable option				
1)	Your Name				
2)	E-Mail ID				
3)	Name of institution				
4)	Age	1)20yrs-30yrs	2) 30yrs -40yrs	3) 40yrs- 50yrs	4) >50yrs
5)	Sex	1)Male	2) female		3) others
6)	Academic status or Designation	1)Teaching faculty: Professors/ Associate professors/ Assistant professor	2) IT staff	3)Administrative staff	4)Research staff
7)	Length of Job	1) 0 –1year	2) 2 – 3years	3) 4 –6years	4) 7 + years

Thank you very much for filling out this questionnaire. All the information in this questionnaire will be used only for the research purpose and will be kept strictly confidential.

PILOT TESTING

Pilot study has been conducted on 110 respondents from two higher education institutions. As per Cooper et al., (2003) pilot testing can be conducted with 25-100 respondents and according to (Srivastava et al., 2012) sample for pilot study in survey research should be 20% of the larger sample of parent study. Below Tables, show the Cronbach’s alpha test, which measures the questionnaire reliability. Validity of questionnaire has been checked with item to total correlation (Ferketich, 1991: Omerzel et al., 2011)

1. Organizational Culture

1. Clan Culture

Reliability and Validity Statistics

Cronbach’s Alpha=.805		N of items=6	N of cases=110
Variables	Item-to- total correlation	Cronbach’s Alpha If item deleted	
ClanDC1a	.521	.784	
ClanOL2a	.571	.773	
ClanME3a	.523	.784	
ClanOG4a	.580	.771	
ClanSE5a	.639	.757	
ClanCS6a	.547	.779	

2. Adhocracy culture:

Reliability and validity Statistics

Cronbach’s Alpha=.820		N of items=6	N of cases=110
Variables	Item-to- total correlation	Cronbach’s Alpha If item deleted	
AdhDC1b	.455	.817	
AdhOL2b	.575	.794	
AdhME3b	.598	.791	
AdhOG4b	.684	.769	
AdhSE5b	.627	.783	
AdhCS6b	.580	.793	

3. Market Culture

Reliability and Validity Statistics

Cronbach's Alpha=.854		N of items=6	N of cases=110
Variables	Item-to- total correlation	Cronbach's Alpha If item deleted	
MktDC1c	.610	.835	
MktOL2c	.564	.845	
MktME3c	.684	.822	
MktOG4c	.730	.815	
MktSE5c	.568	.843	
MktCS6c	.709	.816	

4. Hierarchy Culture

Reliability and Validity Statistics

Cronbach's Alpha=.841		N of items=6	N of cases=110
Variables	Item-to- total correlation	Cronbach's Alpha If item deleted	
HchDC1d	.681	.802	
HchOL2d	.627	.813	
HchME3d	.547	.828	
HchOG4d	.612	.816	
HchSE5d	.650	.808	
HchCS6d	.596	.819	

5. Overall Organizational culture

Reliability and Validity Statistics

Cronbach's Alpha= .943		N of items= 24		N of cases=110
Variables	Item-to- total correlation	Mean	Std. Deviation	Cronbach's Alpha If item deleted
ClanDC1a	.603	3.78	1.008	.941
AdhDC2a	.539	3.53	.885	.942
MktDG3a	.616	3.35	1.087	.941
HchDC4a	.722	3.35	1.169	.939
ClanOL1b	.720	4.20	1.003	.939
AdhOL2b	.647	4.15	.979	.940
MktOL3b	.551	3.94	1.191	.942
HchOL4b	.637	3.57	1.161	.940
ClanME1c	.536	2.63	.947	.942
AdhME2c	.566	3.45	1.001	.941
MktME3c	.673	3.32	1.049	.940
HchME4c	.561	3.61	.978	.938
ClanOG1d	.605	3.44	1.063	.941
AdhOG2d	.698	3.37	1.074	.939
MktOG3d	.749	2.47	1.002	.939
HchOG4d	.610	2.55	.964	.941
ClanSE5a	.662	3.32	1.141	.940
AdhSE5b	.604	3.28	1.068	.941
MktSE5c	.582	3.45	1.063	.939
HchSE5d	.604	3.57	1.062	.941
ClanCS6a	.557	4.35	.913	.941
AdhCS6b	.577	3.53	1.055	.941
MktCS6c	.634	3.30	1.260	.940
HchCS6d	.632	3.55	1.037	.940
No issues with reliability and validity of scale				

2. Knowledge Management

1. Knowledge Creation

Reliability and Validity Statistics

Cronbach's Alpha= .793	N of items=5	`N of cases=110
Variables	Item-to- total correlation	Cronbach's Alpha If item deleted
Kcrt1	.601	.744
Kcrt2	.528	.769
Kcrt3	.657	.725
Kcrt4	.459	.789
Kcrt6	.629	.737

Initially knowledge creation has been measured with 6 variables. But one variable has been eliminated because value of the corrected item-to-total correlation of item Kcrt5 was very low (.109). It is noticed, if this item would be eliminated, it would increase the Cronbach's alpha value from .754 to .793. So, this variable has been eliminated. Table above shows the reliability Statistics of the 5 variables of Knowledge creation dimension of KM. Cronbach's alpha value (0.793) shows a good measuring reliability of the questionnaire.

2) Knowledge Organization

Reliability and Validity Statistics

Cronbach's Alpha= .773	N of items=5	`N of cases=110
Variables	Item-to- total correlation	Cronbach's Alpha If item deleted
Korg1	.563	.726
Korg2	.464	.758
Korg3	.523	.740
Korg4	.582	.718
Korg5	.610	.711

3. Knowledge Storage

Reliability and Validity Statistics

Cronbach's Alpha= .817	N of items= 6	N of cases= 110
Variables	Item-to- total correlation	Cronbach's Alpha If item deleted
Kstr1	.539	.796
Kstr2	.490	.806
Kstr3	.659	.770
Kstr4	.615	.780
Kstr5	.573	.791
Kstr6	.613	.782

4. Knowledge Dissemination

Reliability and Validity Statistics

Cronbach's Alpha=.807	N of items=6	N of cases= 110
Variables	Item-to-total correlation	Cronbach's Alpha If item deleted
Kdis1	.655	.757
Kdis2	.592	.771
Kdis3	.505	.790
Kdis4	.625	.763
Kdis5	.439	.804
Kdis8	.582	.773

Initially knowledge disseminating with 8 variables has been measured. But two variables have been eliminated because value of the item-to-total correlation of items Kdis6 and Kdis7 were very low i.e. (.128 & .074) respectively. It was noticed, if these items were eliminated, it would increase the Cronbach's alpha value from .713 to .807. So, these items have been eliminated. Table above thus considers 6 variables.

5. Knowledge Application

Reliability and Validity Statistics

Cronbach's Alpha= .779	N of items=4	N of cases= 110
Variables	Item-to- total correlation	Cronbach's Alpha If item deleted
Kapp1	.601	.716
Kapp2	.485	.779
Kapp3	.629	.700
Kapp4	.642	.704

6. Knowledge Effectiveness

Reliability and Validity Statistics

Cronbach's Alpha= .845	N of items=6	N of cases= 110
Variables	Item-to-total correlation	Cronbach's Alpha If item deleted
Keff1	.641	.818
Keff2	.592	.826
Keff3	.659	.813
Keff4	.614	.822
Keff5	.665	.812
Keff6	.609	.826

7. Knowledge Management

Reliability and Validity Statistics

Cronbach's Alpha= .960	N of items= 32		N of cases= 110	
Variables	Item-to- total correlation	Mean	Std. Deviation	Cronbach's Alpha If item deleted
Kcrt1	.693	3.06	1.103	.959
Kcrt2	.604	3.30	1.185	.959
Kcrt3	.700	3.42	1.136	.958
Kcrt4	.615	2.50	1.131	.959
Kcrt6	.613	3.16	1.018	.959
Korg1	.662	3.35	1.145	.959

Korg2	.586	4.40	.848	.959
Korg3	.620	3.42	1.112	.959
Korg4	.688	3.38	1.084	.959
Korg5	.601	3.52	.965	.959
Kstr1	.615	3.53	1.020	.959
Kstr2	.559	2.67	.968	.959
Kstr3	.701	3.37	1.099	.958
Kstr4	.680	3.36	1.107	.959
Kstr5	.619	3.35	1.170	.958
Kstr6	.662	4.30	.954	.956
Kdis1	.722	3.31	1.073	.958
Kdis2	.643	3.42	1.128	.959
Kdis3	.551	3.55	1.063	.960
Kdis4	.709	3.43	1.104	.958
Kdis5	.582	3.53	1.081	.959
Kdis8	.574	3.45	1.072	.959
Kapp1	.564	3.49	1.064	.959
Kapp2	.632	3.47	1.123	.959
Kapp3	.680	3.49	1.107	.959
Kapp4	.703	4.23	.895	.956
Keff1	.694	3.37	1.188	.959
Keff2	.568	2.48	.955	.959
Keff3	.674	3.38	1.117	.959
Keff4	.721	3.32	1.031	.958
Keff5	.670	3.28	1.068	.959
Keff6	.693	4.33	.814	.959
No issues with reliability and validity				

KM was initially measured with 35 variables; 3 variables Kcrt5, kdis6 and Kdis7 have been eliminated because value of the item-to-total correlation of these items (Kcrt5, Kdis6 and Kdis7) were very low i.e. (.294, .203 & .069) respectively. It was noticed, if these items were eliminated, it would increase the Cronbach's alpha value from

(0.953) to (0.960). Table above thus considers 32 variables. Cronbach's alpha value (0.960) shows an excellent measuring reliability of the questionnaire.

C. Information and Communication Technology (ICT)

1. ICT Infrastructure

Reliability and Validity Statistics

Cronbach's Alpha= 8.40	N of Items= 8	N of cases=110
Variables	Item-to-total correlation	Cronbach's Alpha If item deleted
ICTinfra1	.633	.813
ICTinfra2	.538	.826
ICTinfra3	.606	.817
ICTinfra4	.604	.817
ICTinfra5	.548	.824
ICTinfra6	.575	.821
ICTinfra7	.531	.826
ICTinfra8	.539	.826

2. ICT Human-Skills

Reliability and validity Statistics

Cronbach's Alpha= .853	N of items= 6	N of cases= 110
Variables	Item-to-total correlation	Cronbach's Alpha If item deleted
ICThs1	.523	.848
ICThs2	.683	.820
ICThs3	.642	.827
ICThs4	.653	.825
ICThs5	.610	.833
ICThs6	.716	.813

3. Information and Communication Technology

Reliability and Validity Statistics

Cronbach's Alpha= .915				
Variables	Item-to- total correlation	Mean	Std. Deviation	Cronbach's Alpha If item deleted
ICTinfra1	.685	3.25	1.096	.906
ICTinfra2	.540	4.25	.903	.912
ICTinfra3	.620	3.30	1.063	.909
ICTinfra4	.620	3.48	1.107	.909
ICTinfra5	.610	2.41	.970	.909
ICTinfra6	.605	3.36	.946	.909
ICTinfra7	.567	3.57	.981	.911
ICTinfra8	.541	4.36	.864	.911
ICThs1	.533	4.21	.959	.912
ICThs2	.727	3.24	1.141	.905
ICThs3	.642	3.43	1.096	.908
ICThs4	.714	2.47	1.073	.905
ICThs5	.631	3.35	1.037	.908
ICThs6	.732	3.33	1.150	.904

APPENDIX-III

DEMOGRAPHIC DETAILS OF RESPONDENTS

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	374	74.8%	74.8	74.8
	Female	126	25.2%	25.2	100
	Total	500	100%	100	

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30 years	169	33.8	33.8	33.8
	30-40 years	256	51.2	51.2	85
	40-50 years	53	10.6	10.6	95.6
	More than 50	22	4.4	4.4	100
	Total	500	100	100	

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30 years	169	33.8	33.8	33.8
	30-40 years	256	51.2	51.2	85
	40-50 years	53	10.6	10.6	95.6
	More than 50	22	4.4	4.4	100
	Total	500	100	100	

	Central University	Deemed University	Private University	State Public University	NII & Other
20-30 years	29	28	41	30	41
30-40 years	53	57	47	46	53
40-50 years	13	14	9	13	4
More than 50	5	1	3	11	2
Total	100	100	100	100	100

Academic Status or Designation						
	Central University	Deemed University	Private University	State Public University	NII & Other	Total North Indian HEIs
Professors	6	10	11	17	3	47
Associate professors	17	34	19	14	14	98
Assistant professor	46	38	45	42	47	218
IT staff	6	8	10	5	9	38
Administrative staff	7	4	7	10	4	32
Research staff	18	6	8	12	23	67
Total	100	100	100	100	100	500

Length of Job						
	Central University	Deemed University	Private University	State Public University	NII & Other	Total North Indian HEIs
0-1 year	3	2	2	4	6	17
2-3 years	16	15	19	14	24	88
4-6 years	24	21	30	22	27	124
7+ years	57	62	49	60	43	271
Total	100	100	100	100	100	500

LIST OF ITEM CODES & SOURCE(S)

Items Codes and Source(s) for Knowledge Management (KM) Construct

Item Code	Dimensions/ constructs	Statements	Source(s)
Kcrt1	Knowledge Creation	My institution has different strategies for creation of new knowledge from the existing one.	(Lawson, 2003; Downes, 2014)
Kcrt2		My institution encourages the involvement of staff in R&D center and research activities.	(Edler, 2003; Wilkens et al., 2004)
Kcrt3		My institution encourages and supports its employees in their further education.	(Downes, 2014; Edler, 2003; Wilkens et al., 2004)
Kcrt4		My institution arranges training sessions for employees in campus and Off- campus for updating their skills.	(Edler, 2003; Downes, 2014)
Kcrt5		My institution arranges guest lecturers for students by world's renowned academics.	Self-developed
Kcrt6		My institution dedicates recourses, time and allocate budget to obtain knowledge from within or outside the institution.	(Edler, 2003; Downes, 2014)
		Statements	
Korg1	Knowledge Organization	My institution has well defined policy to review knowledge on a regular basis.	(Lawson, 2003; Downes, 2014)
Korg2		My institution regularly keeps the list of experts and record of current good work practices.	(Lawson, 2003; Edler, 2003)
Korg3		My institution has designated manager to keep knowledge up to date.	(Lawson, 2003; Edler, 2003; Downes, 2014)
Korg4		My institution provides responses to employees on their ideas and knowledge.	(Lawson, 2003; Edler, 2003)

Korg5		My institution has well defined policy to match sources of knowledge to the problems and challenges.	(Lawson, 2003; Downes, 2014)
		Statements	
Kstr1	Knowledge Storage	My institution has a standard process for storing the knowledge to make it easily accessible for the staff and students	(Lawson, 2003; Downes, 2014)
Kstr2		My institution makes use of database, information technology, repositories and other applications to store knowledge.	(Lawson, 2003; Downes, 2014)
Kstr3		My institution has policy to copyright and patent new knowledge.	(Lawson, 2003; Downes, 2014; Edler, 2003)
Kstr4		My institution stores records about employees' skills, competencies and expertise.	(Wilkins et al., 2004; Downes, 2014)
Kstr5		My HEI has mechanism to store knowledge on the content and implementation of education process and research projects	(Wilkins et al., 2004)
Kstr6		My HEI makes the records of employees' informal discussions and meetings in campus	(Edler, 2003; Wilkins et al., 2004)
			Statements
Kdis1	Knowledge Dissemination	My institution provides timely messages/reports with appropriate information to different departments, staff, students, other HEI and other relevant organizations	(Lawson, 2003; Edler, 2003)
Kdis2		My institution has centrally stored	(Lawson, 2003; Edler, 2003)

		knowledge system like libraries, knowledge forums and recourse centers to display and distribute knowledge.	
Kdis3		My institution has formal channels for knowledge sharing like meetings, presentations, lectures, conferences, trainings, courses, tours and other activities	(Lawson, 2003; Wilkens et al., 2004; Downes, 2014)
Kdis4		My institution arranges internal education workshops on teaching methods and approaches.	(Wilkens et al., 2004)
Kdis5		My institution organizes debates on research achievements of employees /students and on terminology	(Wilkens et al., 2004)
Kdis6		My institution encourages knowledge sharing by proving monetary or non-monetary benefits to staff.	(Downes, 2014; Edler, 2003)
Kdis7		My institution has a value system or culture in which experienced employees transfer knowledge to new staff willingly.	(Edler, 2003)
Kdis8		My institution encourages the usage of social networks by employees and students	Self-developed
		Statements	
Kapp1	Knowledge Application	My institution successfully applies learned practices in the educational process and	(Lawson, 2003; Wilkens et al., 2004; Downes, 2014)

		research activities.	
Kapp2		My institution applies its knowledge for marketing of its potentials	(Wilkins et al., 2004)
Kapp3		My institution applies knowledge for the development of new services and new curricula.	(Lawson, 2003; Wilkins et al., 2004; Downes, 2014)
Kapp4		My institution takes learning process or generating new ways to do things as an ongoing process.	(Wilkins et al., 2004; Downes, 2014)
		Statements	
Keff1	Knowledge Effectiveness	My institution has improved growth in its organizational memory, copyright and patents and usage of knowledge.	(Chin-Loy, 2003)
Keff2		My institution has seen a visible growth in the knowledge capacity and improved skills of its staff.	(Downes, 2014; Chin-Loy, 2003)
Keff3		My institution has improved services.	(Downes, 2014)
Keff4		My institution has better adaptation of services as per student requirements.	Self-developed
Keff5		My HEI has prevented duplicate researches and illegal usage of knowledge.	(Lawson, 2003; Edler, 2003)
Keff6		My institution has improved its knowledge sharing process horizontally and vertically.	(Chin-Loy, 2003; Lawson, 2003)

Items Codes and Source(s) for Organizational Culture (OC) Construct

Sr.No	Item Code	Statements	Source(s)
1.	1.	Dominant Characteristics	Standardized Scale of Cameron and Quinn (2006)
a)	ClanDC1a	My institution is a very personal place like an extended family where employees share a lot of themselves.	
b)	AdhDC1b	My institution is a dynamic and entrepreneurial place where People are willing to take risks.	
c)	MktDC1c	My institution is a result-oriented place and People are very competitive and achievement oriented.	
d)	HchDC1d	My institution is a very controlled and structured place where we have Formal procedures to run the institution	
2.	2.	Organizational Leadership	
a)	ClanOL2a	In my institution leadership is generally considered as mentoring, facilitating, or nurturing.	
b)	AdhOL2b	In my institution leadership is generally considered as entrepreneurship, innovation, or risk taking.	
c)	MktOL2c	In my institution leadership is generally considered as no-nonsense, aggressive, results-oriented focus.	
d)	HchOL2d	In my institution leadership is generally considered as coordinating, organizing, or smooth- running efficiency.	
3.	3.	Management of Employees	
e)	ClanME3a	In my institution Management style is characterized by teamwork, consensus, and participation.	

f)	AdhME3b	In my institution Management style is characterized by individual risk taking, innovation, freedom, and uniqueness.
g)	MktME3c	In my institution Management style is characterized by hard-driving competitiveness, high demands, and achievement.
h)	HchME3d	In my institution Management style is characterized by security of employment, conformity, predictability, and stability in relationship.
4.	4.	Organizational Glue: Factors that hold the organization together
a)	ClanOG4a	Loyalty, Mutual trust, and Commitment to organization are glue factors in my institution.
b)	AdhOG4b	Commitment to innovation and development are glue factors in my institution.
c)	MktOG4c	Emphasis on achievement
d)	HchOG4d	Formal rules, policies and importance of maintaining a smooth-running organization are glue factors in my institution.
5.	5.	Strategic Emphases
a)	ClanSE5a	My institution is emphasizing on human development, High trust, openness and participation.
b)	AdhSE5b	My institution is emphasizing on acquiring new resources and creating new challenges.
c)	MktSE5c	My institution is emphasizing on competitive actions, achievement and hitting stretch targets.
d)	HchSE5d	My institution is emphasizing on permanence, stability, Efficiency, control and smooth operations.
6.	6.	Criteria of Success

a)	ClanCS6a	My institution defines success as development of human resources, teamwork, employee commitment and concern for people.	
b)	AdhCS6b	My institution defines success on the basis of having the most unique or newest products.	
c)	MktCS6c	My institution defines success on the basis of winning in the marketplace and outpacing the competition.	
d)	HchCS6d	My institution defines success on the basis of efficiency, dependable delivery, smooth scheduling and low-cost production.	

Note: All the items in questionnaire with numbering format “a” such as (1a, 2a, 3a, 4a, 5a, 6a) based on all the six characteristics belong to Clan culture. All the items in questionnaire with numbering format “b” such as (1b, 2b, 3b, 4b, 5b, 6b) based on all the six characteristics belong to Adhocracy culture. All the items in questionnaire with numbering format “c” such as (1c, 2c, 3c, 4c, 5c, 6c) based on all the six characteristics belong to ‘Market culture’. All the items in questionnaire with numbering format “d” such as (1d, 2d, 3d, 4d, 5d, 6d) based on all the six characteristics belong to Hierarchy culture.

Items Codes and Source(s) for Information and Communication Technology (ICT) Construct

Item code	Dimensions/constructs	Statements	Source(s)
ICTinfra1		My institution employs staff whose main duty is management of information and communication technology tools.	(López et al., 2009)
ICTinfra2		My institution develops customized software applications when it is needed.	(López et al., 2009)

ICTinfra3	ICT Infrastructure	My institution has developed software which are easy to use for uploading, searching and retrieving knowledge	(Vangala et al., 2017; Jamieson-Proctor, 2007; López et al., 2009).	
ICTinfra4		My institution has ICT infrastructure that support elements of the learning process.	(Jamieson-Proctor, 2007;De-Opacua et al., 2006;Vangala et al., 2017)	
ICTinfra5		My institution provides electronic media facility to students to apply for admission and fee payment	(Chen et al.,2015; De-Opacua et al., 2006; Vangala, et al., 2017)	
ICTinfra6		My institution provides timetable / class schedule, attendance of students and Communication of academic details, transportation and accommodation related information to students in electronic form.	(Krishnaveni, Meenakumari, 2010; De- Opacua et al., 2006; Vangala et al., 2017)	
ICTinfra7		My institution uses ICT tools for student registration /enrolment.	(Krishnaveni & Meenakumari 2010; De- Opacua et al., 2006; Vangala et al., 2017)	
ICTinfra8		My institution uses electronic media (ICT tools) for recruitment and work allotment to staff, attendance and leave management of staff, performance	(Krishnaveni, & Meenakumari, 2010;De- Opacua et al., 2006; Vangala et al., 2017)	
			Statements	
ICThs1			My institution staff have skills to make full use of the current ICT infrastructure	Self-developed

ICThs2	ICT Related Human-Skills	My institution staff has ability to adopt the emerging trends in technology	(De-Opacua et al., 2006; Jamieson-Proctor, 2007; López et al., 2009; Chen et al., 2015)
ICThs3		My institution staff has ability to use their ICT related skills in developing organizational strategies.	(De-Opacua et al., 2006; Chen et al.,2015)
ICThs4		My institution staff has ability to use their ICT related skills in almost all organizational processes	Self-developed
ICThs5		My institution staff write clear and useful documentation regarding operating system of ICT	(De-Opacua, et al., 2006; Jamieson-Proctor, 2007; López, et al., 2009; Chen, et al.,2015)
ICThs6		My institution staff has general attitude towards ICT and new technologies.	(López et al., 2009; Chen et al.,2015)

APPENDIX-V**List of Higher Education Institutions (from which the data has been collected)**

S.No	Name of the University/Institute
1.	Jamia Millia Islamia, New Delhi
2.	University of Delhi, New Delhi
3.	Motilal Nehru NIT,Allahabad UP
4.	Central University of Himachal Pradesh,Kangra shahpur
5.	Central University of Punjab,Bathinda
6.	National Institute of Technology, Delhi
7.	Indian institution of Foreign Trade, New Delhi
8.	Jaypee Institute of Information Technology, Greater Noida
9.	Lingaya's University,Faridabad
10.	Sant Longowal Institute of Engineering and Technology,Longowal
11.	Shiv Nadar University, Noida
12.	GLA University, Mathura, UP
13.	NIT Kurukshetra,Haryana
14.	Dev Sanakrit Vishwavidyalaya,Haridwar,
15.	D.A.V University,Jalandhar.
16.	Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, Uttar Pradesh
17.	Chaudhary Devi Lal University, Sirsa, Haryana
18.	Himachal Pradesh university, Shimla
19.	Punjabi University, Patiala, Punjab
20.	Jammu University, Jammu
21.	Jamia Hamdard, New Delhi
22.	University of Allahabad,Allahabad
23.	IIT Roorkee, Utrakhand
24.	Dr. B.R. Ambedkar National Institute of Technology, Jalandhar,Punjab
25.	Chitkara University,Solan