

THE EFFECT OF KNOWLEDGE MANAGEMENT INFRASTRUCTURE AND CAPABILITIES ON ORGANIZATIONAL LEARNING IN PAKISTAN

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Abstract

The higher education institutions in Pakistan need to effectively utilize their capabilities to enhance organizational learning through IT-based infrastructure. This study examines the direct and indirect effects of knowledge management infrastructure and capabilities on organizational learning. To test the hypothesized relationships, data was collected from 250 respondents based on convenient sampling technique. The partial least square (PLS) structural equation modeling technique was applied for testing of hypotheses. The results revealed that IT-based knowledge management infrastructure is significantly related to organizational learning directly and through knowledge management capabilities. The study findings reinforced the need for the development of IT infrastructure in the service sector to enhance organizational learning.

Keywords: *Knowledge Management, Infrastructure, Capability, Organizational Learning*

Introduction

The concept of knowledge management has been in the limelight for the last two decades. The implications of a sound knowledge management infrastructure are imperative for the education sector as organizations use these capabilities to perk up the quality of the education system and organizational performance.¹ A similar effect on the

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¹ Heeseok Lee, Byounggu Choi, "Knowledge Management Enablers, Processes, and Organizational Performance: An Integrative View and Empirical Examination," *Journal of Management Information Systems* 20, no. 1 (2003): 200.

effectiveness of schools in Taiwan was found due to a rapid change in educational trends as higher education institutions face difficulties all over the world.² Therefore, the present study recognizes that knowledge management is vital to an increase in learning capabilities which benefit higher education institutes.³

Based on the knowledge-based view, knowledge management is a critical resource that supports an organization to gain more value.⁴ This approach has gained more importance due to increasing global competition which is persistently calling to adopt participative approaches to improve organizational learning abilities.⁵ The higher education sector is facing complex challenges for achieving objectives and sustainable competitive advantages all over the world.⁶ During the knowledge management implementation process, both IT based infrastructure as well as capabilities become essential. Thus, effectiveness of managing and sharing knowledge not only develops the learning abilities of an organization but also assists in gaining a competitive advantage.⁷

Organizations need to establish a strong system to effectively and efficiently maintain and store useful knowledge that facilitates organizations to enhance their knowledge management capabilities.⁸ Past studies have extensively acknowledged the relationship of knowledge

² Ammar Zwain, Kong Teong Lim, and Siti Norezam Othman, "Knowledge Management Processes And Academic Performance in Iraqi HEIs: An Empirical Investigation," *International Journal of Academic Research in Business and Social Sciences* 2, no. 6 (2012): 273.

³ R. Jamil, Maleeha Lodhi, "Role of Knowledge Management Practices for Escalating Universities' Performance in Pakistan," *Management Science Letters* 5, no. 10 (2015): 950.

⁴ Rajiv Sabherwal, Sanjiv Sabherwal, "How do Knowledge Management Announcements Affect Firm Value? A Study of Firms Pursuing Different Business Strategies," *IEEE Transactions on Engineering Management* 543 (2007): 413.

⁵ Stefano Bresciani, Alberto Ferraris, Gabriele Santoro, and Heidi R. Nilsen. "Wine Sector: Companies' Performance And Green Economy as a Means of Societal Marketing," *Journal of Promotion Management* 22, no. 2 (2016): 252.

⁶ F.M. Arouet, "Competitive Advantage and the New Higher Education Regime," *Entelequia. Revista Interdisciplinar* 10, (2009): 25.

⁷ Cong Qi, Patrick Y. K Chau, "Will Enterprise Social Networking Systems Promote Knowledge Management and Organizational Learning? An Empirical Study," *Journal of Organizational Computing and Electronic Commerce* 28, no. 1 (2018): 45.

⁸ Rajiv Sabherwal, Sanjiv Sabherwal, "How do Knowledge Management Announcements Affect Firm Value? A Study of Firms Pursuing Different Business Strategies," *IEEE Transactions on Engineering Management* 543 (2007): 413.

management with innovation⁹ as the former effectively manages employee knowledge and also efficiently creates valuable information among employees which increases the innovation process.¹⁰ Thus, it is considered a leading strategy used by various industries to enhance organizational performance.¹¹

Recently, most studies explored the importance of the knowledge management process in service sector.¹² However, this needs to be further explored in different contextual and organizational settings within the Pakistani educational institutes.¹³ This is especially imperative for developing economies like Pakistan and to indicate measures for improving the performance of the Pakistani higher institutes.¹⁴

Thus, there has been a necessity for a strong system to use knowledge effectively in order to improve organizational learning capacity.¹⁵ Academic organizations gradually establish a robust IT based infrastructure to enhance learning capability.¹⁶ IT-based knowledge management has significantly escalated the performance of the

⁹ Patricia Yin Yin Lau, Gary N. McLean, Yen-Chen Hsu, Bella Ya-Hui Lien, "Learning Organization, Organizational Culture, And Affective Commitment In Malaysia: A Person-Organization Fit Theory," *Human Resource Development International* 20, no. 2 (2017): 170.

¹⁰ Satyendra Singh, Yolande E Chan, and James D McKeen, "Knowledge Management Capability and Organizational Performance: A Theoretical Foundation," *Conference Paper at the University of Warwick, Coventry* (20 - 22 March 2006): 12.

¹¹ Ra'ed Masa'deh, Rifat Shannak, Mahmoud Maqableh, and Ali Tarhini, "The Impact Of Knowledge Management on Job Performance in Higher Education: The Case of the University of Jordan," *Journal of Enterprise Information Management* 30, no. 2 (2017): 248.

¹² Cong Qi, Patrick Y. K Chau, "Will Enterprise Social Networking Systems Promote Knowledge Management and Organizational Learning? An Empirical Study," *Journal of Organizational Computing and Electronic Commerce* 28, no. 1 (2018): 45.

¹³ R. Jamil, Maleeha Lodhi, "Role of Knowledge Management Practices for Escalating Universities' Performance in Pakistan," *Management Science Letters* 5, no. 10 (2015): 950.

¹⁴ R. Jamil, Maleeha Lodhi, "Role of Knowledge Management Practices for Escalating Universities' Performance in Pakistan," *Management Science Letters* 5, no. 10 (2015): 954.

¹⁵ Rajiv Sabherwal, Sanjiv Sabherwal, "How Do Knowledge Management Announcements Affect Firm Value? A Study of Firms Pursuing Different Business Strategies," *IEEE Transactions on Engineering Management* 543 (2007): 413.

¹⁶ Rehm Shah, Asad Abbas Rizvi, and Nabi Bux Jumani, "Status of Knowledge Management Practices in Pakistani Universities," *International Journal of Innovation in Teaching and Learning (IJITL)* 4, no. 2 (2019): 62.

universities and also permitted them to manage special knowledge.¹⁷ It also helped mutual knowledge transmission between an institution and its students.¹⁸ Firms nowadays devote considerable attention to establish such a system to utilize intangible resources (e.g. human & intellectual capital) just like tangible resources, for gaining a sustainable competitive advantage.¹⁹

In the current competitive environment for Pakistani higher education institutions, developing knowledge management infrastructure has become vital to gain a sustainable competitive advantage. It effectively summarizes complex knowledge in order to obtain desired outcomes and to develop unique capabilities for improving organizational learning.²⁰ Recent similar studies have also identified a set of unique characteristics of the knowledge management process and its implication in Spain²¹ Malaysia²² and Jordan.²³ As organizations need to be competitive by

¹⁷ A. Fidalgo-Blanco, M. L. Sein-Echaluce, F. J. García-Peñalvo, "Knowledge Spirals in Higher Education Teaching Innovation," *International Journal of Knowledge Management (IJKM)* 10, no. 4 (2014): 19.

¹⁸ A. Fidalgo-Blanco, M. L. Sein-Echaluce, F. García-Peñalvo, "Epistemological and Ontological Spirals: From Individual Experience in Educational Innovation to the Organisational Knowledge in the University Sector," *Program* 49, no. 3 (2015): 270.

¹⁹ Bader Yousef Obeidat, Mai Maher Al-Suradi, Ra'ed Masa'deh, and Ali Tarhini, "The Impact of Knowledge Management on Innovation: An Empirical Study on Jordanian Consultancy Firms," *Management Research Review* 39, no. 10 (2016): 1220.

²⁰ T. Andreeva, & A. Kianto, "Does Knowledge Management Really Matter? Linking Knowledge Management Practices, Competitiveness and Economic Performance," *Journal of Knowledge Management* 16, no. 4 (2012): 621; Ra'ed Masa'deh, Mahmoud Maqableh, and Huda Karajeh, "A Theoretical Perspective on the Relationship between Leadership Development, Knowledge Management Capability, and Firm Performance," *Asian Social Science*, 10, no. 6 (2014): 128; Bader Yousef Obeidat, Ra'ed (Moh'd Taisir) Masa'deh, and Ayman Bahjat Abdallah, "The Relationships among Human Resource Management Practices, Organizational Commitment, and Knowledge Management Processes: A Structural Equation Modeling Approach," *International Journal of Business and Management* 9, no. 3 (2014): 4.

²¹ Lucía Muñoz-Pascual, Jesús Galende, "The Impact of Knowledge and Motivation Management on Creativity: Employees of Innovative Spanish Companies," *Employee Relations* 39, no. 5 (2017): 740.

²² Patricia Yin Yin Lau, Gary N. McLean, Yen-Chen Hsu, Bella Ya-Hui Lien, "Learning Organization, Organizational Culture, and Affective Commitment in Malaysia: A Person Organization Fit Theory," *Human Resource Development International* 20, no. 2 (2017): 170.

²³ Ra'ed Masa'deh, Rifat Shannak, Mahmoud Maqableh, and Ali Tarhini, "The Impact of Knowledge Management on Job Performance in Higher Education: The case of the University of Jordan," *Journal of Enterprise Information Management* 30, no. 2 (2017): 248.

successfully creating, acquiring, disseminating and storing useful knowledge to achieve long term economic advantages and improve organizational learning.²⁴ As organizations now understand that through an effective IT-based infrastructure for knowledge management in place, they can win a competition by successfully creating, acquiring, disseminating and storing useful knowledge to achieve long term economic advantages and improve organizational learning.²⁵ Thus, this study identifies an intense need to establish empirical evidence based on similar lines that effective knowledge management infrastructure and capabilities are absolutely essential to achieve organizational competitiveness and quality of learning for the higher education sector of Pakistan.²⁶

Literature Review

Knowledge Management IT Infrastructure (KMIT) and Knowledge Management Capabilities (KMC)

Knowledge-based infrastructure in past studies²⁷ predominantly emphasized the importance of knowledge management processes in different organizational contexts and settings. Yet organizations struggle to combine the KM process with technological structure and network systems to manage the flow of information.²⁸ Moreover, KMIT is highly instigative as it develops unique competitive abilities of an organization.²⁹ Previously, knowledge management capabilities were found to be an essential ingredient of the process that assists organizations to manage

²⁴ A. Fidalgo-Blanco, M. L. Sein-Echaluce, F. J. García-Peñalvo, "Knowledge Spirals in Higher Education Teaching Innovation," *International Journal of Knowledge Management (IJKM)* 10, no. 4 (2014): 19; R. Jamil, Maleeha Lodhi, "Role of Knowledge Management Practices for Escalating Universities' Performance in Pakistan," *Management Science Letters* 5, no. 10 (2015): 957.

²⁵ Ibid.

²⁶ Rehmat Shah, Asad Abbas Rizvi, and Nabi Bux Jumani, "Status of Knowledge Management Practices in Pakistani Universities," *International Journal of Innovation in Teaching and Learning (IJITL)* 4, no. 2 (2019): 62.

²⁷ Jelena Rašula, Vesna Bosilj Vukšić, and Mojca Indihar Štemberger, "The Impact of Knowledge Management on Organisational Performance," *Economic & Business Review* 14, no. 2 (2012): 150; Kuan Yew Wong, Li Pin Tan, Cheng Sheng Lee, and Wong, W. P. , "Knowledge Management Performance Measurement: Measures, Approaches, Trends And Future Directions," *Information Development* 31, no. 3 (2015): 241.

²⁸ Michael H Zack, "Developing a Knowledge Strategy," *California Management Review* 41, no. 3 (April 1999): 125.

²⁹ Ra'ed Masa'deh, Rifat Shannak, Mahmoud Maqableh, and Ali Tarhini, "The impact of knowledge management on job performance in higher education: The case of the University of Jordan," *Journal of Enterprise Information Management* 30, no. 2 (2017): 249.

specialized knowledge.³⁰ Therefore, higher education institutions need to build a knowledge management infrastructure where employees can easily share and generate novel ideas for organizations in order to enhance their business value.³¹

KMC is vital for gaining sustainable competitive advantage through the effective utilization of specialized knowledge.³² Moreover, it also significantly strengthens organization's competitiveness via generating new information from various knowledge resources.³³ Bose (2003)³⁴ argued that KMC improves the learning capacity of organizations by efficiently handling internal and external information. It protects an organization from external threats and makes them capable to compete in a dynamic and unstable environment.³⁵

Moreover, KMC is a complementary element for gaining competitive advantage that equips an organization with product knowledge.³⁶ It is believed that KMC enhances the organizational capacity to utilize various knowledge based resources (human intellect) and removes all barriers to knowledge sharing process³⁷ Such as Mao *et al.*,

³⁰ Heeseok Lee, Byounggu Choi, "Knowledge Management Enablers, Processes, and Organizational Performance: An Integrative View and Empirical Examination," *Journal of Management Information Systems* 20, no. 1 (2003): 200; Hüseyin Tanriverdi, "Information Technology Relatedness, Knowledge Management Capability, and Performance of Multibusiness Firms," *Mis Quarterly* 29, no. 2 (2005): 322.

³¹ Hongyi Mao, Shan Liu, Jinlong Zhang, and Zhaohua Deng, "Information Technology Resource, Knowledge Management Capability, and Competitive Advantage: The Moderating Role of Resource Commitment," *International Journal of Information Management* 36, no.6 (2016): 1068.

³² Sundar G. Bharadwaj, P. Rajan Varadarajan and John Fahy, "Sustainable Competitive Advantage in Service Industries: a Conceptual Model and Research Propositions," *Journal of Marketing* 57, no. 4 (1993): 88.

³³ S.-H. Chuang, "A Resource-Based Perspective on Knowledge Management Capability and Competitive Advantage: An Empirical Investigation," *Expert Systems With Applications* 27, no. 3 (2004): 460.

³⁴ Ranjit Bose, "Knowledge Management-Enabled Health Care Management Systems: Capabilities, Infrastructure, and Decision-Support," *Expert Systems with Applications* 24, no.1 (2003): 60.

³⁵ R.S. Sohi, "Leveraging Partner Relationships to Enhance Organizational Learning," Paper presented at the 4th International Marketing Conference Indian Institute of Management, Calcutta, December 22-24, 2016, 43.

³⁶ S. H. Chuang, "A Resource-Based Perspective on Knowledge Management Capability and Competitive Advantage: An Empirical Investigation."

³⁷ Yang Chen, Yi Wang, Saggi Nevo, Jiafei Jin, Luning Wang, Wing S. Chow, "IT Capability and Organizational Performance: The Roles of Business Process Agility and Environmental Factors," *European Journal of Information Systems* 23, no. 3 (2014): 330; N. Melville, K. Kraemer, and V. Gurbaxani, "Information Technology and Organizational Performance: An Integrative Model of IT Business Value," *MIS Quarterly* 28, no. 2 (2004): 288.

(2016)³⁸ revealed that KMIT is a significant positive determinant of KMC in power, IT and finance sectors. Similarly, Hung³⁹ reported KM as a positive predictor of KMC while comparing two medical centers.⁴⁰ Thus, the present study tested the following hypothesis:

H₁: KMIT is significantly related to KMC

Knowledge Management IT Infrastructure (KMIT) and Organizational Learning (OL)

The organizations must build KMIT networks to gain efficiencies. Knowledge management is also a key element of an organization that increases business value and creates a positive impact on organizational effectiveness.⁴¹ Knowledge management infrastructure is considered an organizational asset that increases business value and creates a positive impact on organizational effectiveness.⁴² The organizations need to build KMI networks because it provides a suitable environment to gain the cost-effective advantage. In addition, KMI also facilitates the knowledge management process which increases the organization's efficiency through enhancing their learning abilities.⁴³ Recent studies introduced the concept of KM in the educational sector of Pakistan. Higher educational institutions of Pakistan are not only improving the quality of education and research abilities but also working successfully to strengthen the economy of Pakistan.⁴⁴

³⁸ Hongyi Mao, Shan Liu, Jinlong Zhang, and Zhaohua Deng, "Information Technology Resource, Knowledge Management Capability, and Competitive Advantage: The Moderating Role of Resource Commitment," *International Journal of Information Management* 36, no. 6 (2016): 1068.

³⁹ S.-Y. Hung, J. Tsai, W. Lee, and P. Y. Chau, "Knowledge Management Implementation, Business Process, and Market Relationship Outcomes: An Empirical Study," *Information Technology & People* 28, no. 3 (2015): 500.

⁴⁰ Annette M. Mills, Trevor A. Smith, "Knowledge Management and Organizational Performance: a Decomposed View," *Journal of Knowledge Management* 15, no. 1 (2011): 160.

⁴¹ I. Beccerra-Fernandez, A. Gonzalez, A., and R. Sabherwal, "Knowledge Management: Challenges, Solutions and Technologies: Pearson Prentice Hall," Upper Saddle River, NJ. (2004), 76.

⁴² Ibid, 77.

⁴³ Christoph Lattemann, Soren Kupke, Stefan Stieglitz, Marc Fetscherin, "The Governance Of Virtual Corporations," *The Journal of E-Business* VI, no. 2 (2006): 58.

⁴⁴ W Abbas, Ahmed, Khalid, & Yasmeen, "Analyzing the Factors that can Limit The Acceptability to Introduce New Specializations in Higher Education Institutions: A Case Study of Higher Education Institutions of Southern Punjab, Pakistan," *International Journal of Educational Management* 31, no. 4 (2017): 530.

In this regard, IT-based knowledge management infrastructure (KMIT) is one of the important dimensions of KMIT that significantly influences various organizational features such as creativity, learning, competitiveness and innovation.⁴⁵ KM-IT-based Infrastructure mainly includes IT resources, IT human resources and IT relationship resources. IT resource symbolizes those resources that provide technological orientation to an organization, IT human resource represents managerial, technical skills and IT relationship resource syndicates different business units that assist an organization to share risk.⁴⁶ Indeed, by establishing the proper KMIT, organizations can develop cross-unit knowledge synergies through sharing, transferring and storing knowledge among different business units that improve organizational learning process.⁴⁷ Organizational learning is vital for human, economic, social, political and technological development through maintaining and utilizing organizational knowledge management capabilities.⁴⁸ Thus, the present study hypothesized that:

H₂: KMIT is significantly related to OL

Knowledge Management Capabilities (KMC) and Organizational Learning (OL)

KMC effectively absorbs both, scientific and technological knowledge that improves the organization's learning process.⁴⁹ As such, KMC is an organizational ability that is used for the integration of knowledge resources from different components of a business.⁵⁰ Moreover, organizational learning refers to enhancement of learning

⁴⁵ Hongyi Mao, Shan Liu, Jinlong Zhang, and Zhaohua Deng, "Information Technology Resource, Knowledge Management Capability, and Competitive Advantage: The Moderating Role Of Resource Commitment," *International Journal of Information Management* 36, no. 6 (2016): 1071.

⁴⁶ *Ibid.*, 1069.

⁴⁷ Sue Young Choi, Heeseok Lee and Youngjin Yoo, "The impact of information technology and transactive memory systems on knowledge sharing, application, and team performance: a field study," *MIS quarterly* 34, 4 (2010):860; Clyde W. Holsapple, "The Inseparability of Modern Knowledge Management and Computer-Based Technology," *Journal of Knowledge Management* 9, (2005): 48.

⁴⁸ S. Ghavifekr, R. B. Jani, H. B. B. Kenayathulla, "Gender and Employability in Higher Learning Institutions in Malaysia: Implication for Leadership and Policy," *People: International Journal of Social Sciences* 2, no. 1 (2016): 65.

⁴⁹ J. A. Aragón-Correa, García-Morales, and Cordon-Pozo, "Leadership and Organizational Learning's Role on Innovation and Performance: Lesson from Spain," *Industrial Marketing Management* 36, no. 3 (2007): 349.

⁵⁰ Hüseyin Tanriverdi, "Information Technology Relatedness, Knowledge Management Capability, and Performance of Multibusiness Firms," *Mis Quarterly* 29, no. 2 (2005): 324.

capabilities and competencies by sharing and storing knowledge.⁵¹ KMC supports organizations to achieve better performance that encourages an organization to develop unique capacities for gaining sustainable competitive advantage.⁵² That is why organizations are more focused to build knowledge management infrastructure and improving the efficiency of the education sector through remarkable utilization of organizational capabilities.⁵³

Previously, Tsai⁵⁴ emphasized that organizational learning ability is strengthened by improving knowledge absorption capacity through which external knowledge is acquired to create organizational differentiation. On the other hand, organizations use learning process as a business strategy for achieving the desired outcomes since learning process facilitates an organization to acquire, create and retain human knowledge and develop new skills so as to meet market adaptations.⁵⁵ In addition, organizational learning contains four processes i.e. acquisitions, distribution, interpretation of information and organizational memory. These processes effectively retrieve information through repositories, databases and use such retrieving knowledge to take rational decisions. Previously, a positive correlation between technological absorptive capacity and organizational learning in Spanish technology sector suggested that technological absorption capacity effectively absorbs scientific and technological knowledge, which supports an organization to improve learning process. A study by Garcia-Morales⁵⁶ picked 237 service and manufacturing sector companies from Europe and found positive connections between KMC and OL. They further identified KMC an important element in the knowledge management process that effectively

⁵¹ Armendia P Dixon, "Parents: Full Partners in the Decision-Making Process," *NASSP Bulletin* 76, no. 543 (1992): 15.

⁵² Rifat O Shannak, M. Ra'ed, and Mohammad Ali, "Knowledge Management Strategy Building: Literature Review," *European Scientific Journal* 8, no. 15 (2012): 29.

⁵³ *Ibid.*, 31.

⁵⁴ W. Tsai, "Knowledge Transfer In Intraorganizational Networks: Effects Of Network Position And Absorptive Capacity On Business Unit Innovation And Performance," *Academy of Management Journal* 44, no. 5 (2001): 996.

⁵⁵ A. Dellinger, B. Yang, S.W. Howton, "The Relationship Between The Learning Organization Concept And Firms' Financial Performance: An Empirical Assessment," *Human Resource Development Quarterly* 13, no. 1 (2004): 12.

⁵⁶ V. J. García-Morales, M M Jiménez-Barrionuevo, and L Gutiérrez-Gutiérrez, "Transformational Leadership Influence on Organizational Performance through Organizational Learning and Innovation," *Journal of Business Research* 65, no. 7 (2012): 1040.

utilizes and manages human knowledge to accomplish long-term goals.⁵⁷ Similarly, Cohen and Levinthal in another study⁵⁸ confirmed a strong association between KMC and OL. Thus, this study intended to investigate the hypothesis that:

H₃: KMC is significantly related to OL

The Mediating Role of KMC between KMIT and OL

Researchers have investigated KMC as a mediator in past studies. For instance, Mao *et al.*⁵⁹ studied 192 organizations from different industries i.e. IT, finance and power from both of the central and western regions of China and found that KMC significantly mediated between IT resources and competitive advantage. Similarly, Chuang⁶⁰ highlighted that KMC facilitates the organizations for enhancing their learning ability through developing and combining valuable resources. KMC was deliberated as organizational ability to acquire special knowledge from different business units and engagement critical knowledge with the knowledge management process to achieve strategic objectives.⁶¹ Organizations are willing to deal with KMC⁶² and understand that without utilizing KMC, they will yield low returns and hence financial loss.⁶³ Therefore, examining interventions of KMC in utilizing knowledge management infrastructure for improved organizational learning is imperative. Thus it is hypothesized that:

H₄: KMC significantly mediates between KMIT and INN

⁵⁷ S.-H. Chuang, "A Resource-Based Perspective on Knowledge Management Capability and Competitive Advantage: An Empirical Investigation," *Expert Systems with Applications* 27, no. 3 (2004): 463.

⁵⁸ W. M. Cohen, D. A. Levinthal, "Absorptive Capacity: A New Perspective on Learning and Innovation," *Administrative Science Quarterly* 35, no. 1 (1990): 140.

⁵⁹ Hongyi Mao, Shan Liu, Jinlong Zhang, and Zhaohua Deng, "Information Technology Resource. "

⁶⁰ S.-H. Chuang, "A Resource-Based Perspective," 465.

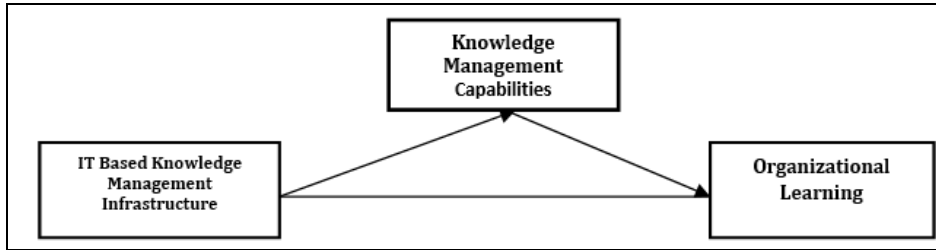
⁶¹ Heeseok Lee, Byounggu Choi, "Knowledge Management Enablers, Processes, and Organizational Performance: An Integrative View and Empirical Examination," *Journal of Management Information Systems* 20, no. 1 (2003): 200; Hüseyin Tanriverdi, "Information Technology Relatedness, Knowledge Management Capability, and Performance of Multibusiness Firms," *MIS Quarterly* 29, no. 2 (2005): 323.

⁶² Satyendra Singh, Yolande E Chan, and James D McKeen, "Knowledge Management Capability And Organizational Performance: A Theoretical Foundation," *Conference Paper at the University of Warwick, Coventry* (20 - 22 March 2006): 12.

⁶³ Hüseyin Tanriverdi, "Information Technology Relatedness, Knowledge Management Capability, and Performance of Multibusiness Firms," 324.

The research framework as highlighted below in Figure 1 depicts the hypothesized relationships both direct and indirect among proposed variables. The IT-Based Knowledge Management Infrastructure (KMIT) is an independent variable and is shown as the determinant of Organizational Learning (OL) as a dependent variable. Knowledge Management Capabilities (KMC) has been hypothesized to mediate the relationship between KMIT and OL.

Figure 1: Research Framework of the Study



Research Methodology

The research design of the study includes procedures, sampling, and data collection framework and data analysis.⁶⁴ Survey questionnaire is a superlative method for primary data collection,⁶⁵ and an effective technique to conduct cross-sectional research.⁶⁶ Since the present study supported quantitative mode of research through a structured questionnaire, this method seemed appropriate for testing the multiple hypotheses.⁶⁷

Population, Sample and Data Collection

Population refers to the total number of respondents and observations. Out of them, sample is drawn for statistical analysis.⁶⁸ The population for this study consists of employees working in private sector

⁶⁴ Alexander Topchy, Anil K. Jain, and William Punch, "Clustering Ensembles: Models Of Consensus And Weak Partitions," *IEEE Transactions On Pattern Analysis And Machine Intelligence* 27, no. 12 (2005): 1866.

⁶⁵ Tiffani Long, and Jennifer Bonds-Raacke, "Accelerated Reader: The Relation To Age Of Entry Into Formal Education," *Reading Improvement* 49, no. 4 (2012): 168.

⁶⁶ Alan Bryman, "Qualitative Research On Leadership: A Critical But Appreciative Review," *The Leadership Quarterly* 15, no. 6 (2004): 729.

⁶⁷ J. F. Hair, W. C. Black, B. J. Babin, R. E. Anderson, R. L. Tatham, *Multivariate Data Analysis vol. 6* (Upper Saddle River, NJ: Pearson Prentice Hall, 2006), 154.

⁶⁸ Jonathan Van Blerkom, "Mitochondria as Regulatory Forces in Oocytes, Preimplantation Embryos and Stem Cells," *Reproductive Biomedicine Online* 16, no. 4 (2008): 553.

universities of Islamabad, Pakistan. Since the total population in all the higher educational institutions of Pakistan is not exactly known, thus for the purpose of this study, we have used a non-probability-based convenient sampling technique which has also been used by other scholars for their research in the academic sector of Pakistan.⁶⁹

Keeping in view the minimum required sample size of 200 for applying Structural Equation Modelling technique, a total of 292 questionnaires were initially distributed among targeted respondents. Out of which 260 were returned which determined a response rate of 89 percent. Ten incomplete responses were removed and finally, 250 questionnaires were found valid for further statistical analysis.

Measures

The research instrument used for this study contained 32 items, which was adapted from different scholarly studies. Slight modifications were made in the wording of items to make more understandable for the targeted respondents. Five-point Likert scale questionnaire was employed varying from “1” standing for “strongly disagree” to “5” standing for “strongly agree.” Sources of measurement instruments are reflected in Table 1.

Table 1: Distribution of Instrument Variables

Factors	Items	Source
KM-IT Based Infrastructure	13	(Lu & Ram, 2011; Weill, Subramani, & Broadbent, 2002), (Bhatt & Grover, 2005)
Knowledge Management Capabilities	6	(Gold, Malhotra, & Segars, 2001; Pérez-López & Alegre, 2012)
Organization Learning	13	(Jiménez-Jiménez & Cegarra-Navarro, 2007; Jiménez-Jiménez & Sanz-Valle, 2011)

Data Analysis

This study followed a cross-sectional and quantitative research mode. For statistical data analysis, Smart PLS software was used to apply the Structural Modelling Technique. Smart PLS offers various advantages

⁶⁹ R. Jamil, Maleeha Lodhi, "Role of Knowledge Management Practices for Escalating Universities' Performance in Pakistan," *Management Science Letters* 5, no. 10 (2015): 958.

to scholars, specifically when indirect relationships (mediators and moderators) are tested, as is the case for the present study.⁷⁰

Structural Equation Modelling (SEM) proved to be highly effective for investigating variables, both dependent and independent⁷¹ and also to measure the complicated interdependence of latent variables.⁷² Thus, it was found appropriate to use SEM for the present study to test reliabilities, validities, and uni-dimensionality.⁷³ PLS-SEM was applied in two stages of data analysis, assessments of the measurement model and the assessments of the structural model. The measurement model determined factor loadings, composite reliability, convergent and discriminant validity while the structural model tested the hypothesis, and determined the significance of hypothesized relationships. The significance of relationships was tested through t and p values obtained by running bootstrapping function in Smart PLS.⁷⁴ Furthermore, recent studies have also suggested testing direct and indirect relationships (mediation through path model analysis) in Smart PLS.⁷⁵

⁷⁰ F. Hair Jr, M. Sarstedt, L. Hopkins and G. Kuppelwieser, "Partial Least Squares Structural Equation Modeling (PLS-SEM) An Emerging Tool in Business Research," *European Business Review* 26, no. 2 (2014): 112; J. F. Hair, C. M. Ringle, M. Sarstedt, "Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance," *Long Range Planning* 46, 1 (2013): 1-12; David Gefen, Edward E. Rigdon, and Detmar Straub, "Editor's Comments: An Update and Extension to SEM Guidelines for Administrative and Social Science Research," *MIS Quarterly* (2011): 3.

⁷¹ Barbara G. Tabachnick, Linda S. Fidell, and Jodie B. Ullman, "Using Multivariate Statistics," vol. 5 (Boston, MA: Pearson, 2007), 127.

⁷² Barbara M Byrne, and Fons JR Van de Vijver, "Testing for Measurement and Structural Equivalence in Large-Scale Cross-Cultural Studies: Addressing the Issue of Non-equivalence," *International Journal of Testing* 10, no. 2 (2010): 107.

⁷³ J. F. Hair, W. C. Black, B. J. Babin, R. E. Anderson, R. L. Tatham, *Multivariate data analysis*, vol. 6 (Upper Saddle River, NJ: Pearson Prentice Hall, 2006), 156.

⁷⁴ Ken Kwong-Kay Wong, "Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS," *Marketing Bulletin* 24, no. 1 (2013): 16.

⁷⁵ Muhammad Shujahat, Bakhtiar Ali, Faisal Nawaz, Susanne Durst, and Aino Kianto, "Translating the impact of knowledge management into knowledge-based innovation: The neglected and mediating role of knowledge-worker satisfaction," *Human Factors and Ergonomics in Manufacturing & Service Industries* 28, no. 4 (2018): 205; Zhining Wang, Pratyush Nidhi Sharma, and Jinwei Cao, "From Knowledge Sharing to Firm Performance: A Predictive Model Comparison," *Journal of Business Research* 69, no. 10 (2016): 4652; J. F. Hair, C. M. Ringle, M. Sarstedt, "Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance," *Long Range Planning* 46, no. 1 (2013): 7.

Results

Measurement Model Assessment

The first step confirmed the reliability and validity of the items as mentioned in Table 2. However, some of the indicators during the data analyses were removed due to their low factor loading values as highlighted in Table 3. As per the guidelines,⁷⁶ some of the items with low factor loadings (>0.40 and ≤ 0.70) were retained as they were theoretically important and their removal had no improved effect on average variance extracted (AVE) and composite reliability (CR).

Consequently, 30 items were incorporated in the final measurement model. Table 4 indicates that factor loadings values of all the constructs are within the acceptable limits between 0.40 and 0.70 or above. Similarly, CR and AVE of all the constructs are equal or above the recommended values of 0.50 and 0.70, as mentioned in Table 5. Thus, both reliability and convergent validity are established. Moreover, values of discriminant validity as indicated in Table 6, were also found adequate as per the popular method developed by Fornell and Larcker (1981).

Table 2: Indicator Outer Loading (Before Elimination)

Items	KMC	KMIT	OL
KMIT ^b -01		0.065	
KMIT-02		-0.097	
KMIT-03		0.467	
KMIT-04		0.523	
KMIT-05		0.495	
KMIT-06		0.660	
KMIT-07		0.847	
KMIT-08		0.847	
KMIT-09		0.835	
KMIT-10		0.772	
KMIT-11		0.813	
KMIT-12		0.918	
KMIT-13		0.637	
KMC-14	0.681		
KMC-15	0.814		
KMC-16	0.848		

⁷⁶ J. F. Hair, C. M. Ringle, M. Sarstedt, "Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance," *Long Range Planning* 46, no. 1 (2013): 9.

KMC-17	0.772		
KMC-18	0.773		
KMC-19	0.788		
OL-20			0.792
OL-21			0.752
OL-22			0.681
OL-23			0.828
OL-24			0.749
OL-25			0.825
OL-26			0.703
OL-27			0.524
OL-28			0.635
OL-29			0.706
OL-30			0.614
OL-31			0.739
OL-32			0.739

Figure 2: Factor Loading Before Elimination

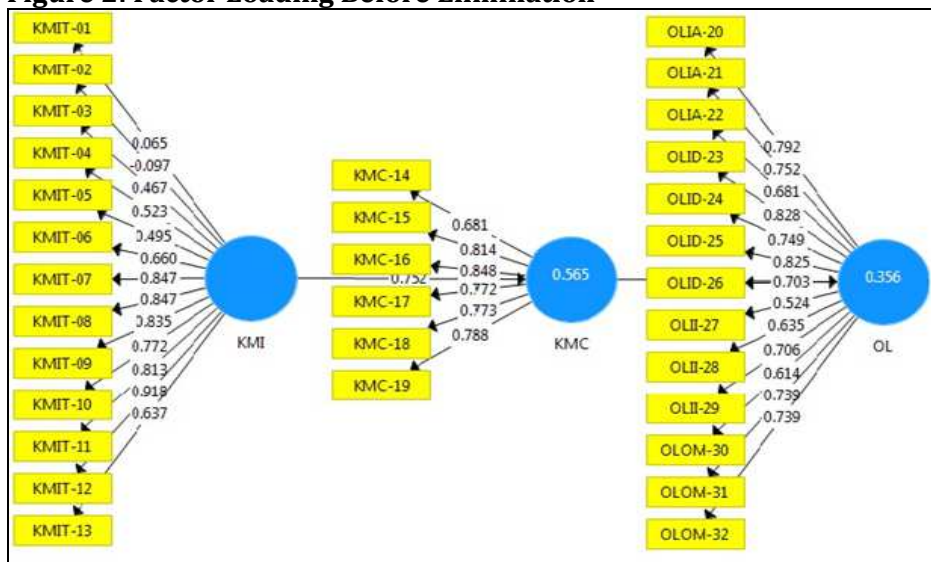


Table 3: List of Eliminated Items

Items	Indicator loading	AVE (before elimination)	Treatment	AVE (after elimination)
KMIT ^a -1	0.065	0.448	Eliminated	0.531
KMIT-2	-0.097		Eliminated	

Table 4: Indicator Outer Loading (After Elimination)

Items	KMC	KMIT	OL
KMIT-03		0.480	
KMIT-04		0.524	
KMIT-05		0.503	
KMIT-06		0.661	
KMIT-07		0.849	
KMIT-08		0.847	
KMIT-09		0.839	
KMIT-10		0.768	
KMIT-11		0.814	
KMIT-12		0.920	
KMIT-13		0.640	
KMC-14	0.682		
KMC-15	0.814		
KMC-16	0.848		
KMC-17	0.772		
KMC-18	0.773		
KMC-19	0.788		
OL-20			0.792
OL-21			0.752
OL-22			0.681
OL-23			0.828
OL-24			0.749
OL-25			0.825
OL-26			0.703
OL-27			0.524
OL-28			0.635
OL-29			0.706
OL-30			0.614
OL-31			0.739
OL-32			0.739

Table 5: Composite Reliability & Average Variance Extracted (AVE)

Variable	Composite Reliability	Average Variance Extracted (AVE) - Validity	Cronbach Alpha (α)
KMC	0.903	0.610	0.79
KMIT	0.923	0.531	0.83
OL	0.932	0.517	0.81

Table 6: Discriminant Validity

Variable	KMC	KMIT	OL
KMC	0.781		
KMIT	0.741	0.729	
OL	0.597	0.871	0.719

Structural Model Assessment

The structural model is assessed for hypotheses testing. First step examined the direct effects and the second step was to examine the indirect effect between hypothesized relationships. To determine the significance of direct paths, bootstrapping method was used and the significance of path coefficients were determined through t and p values.

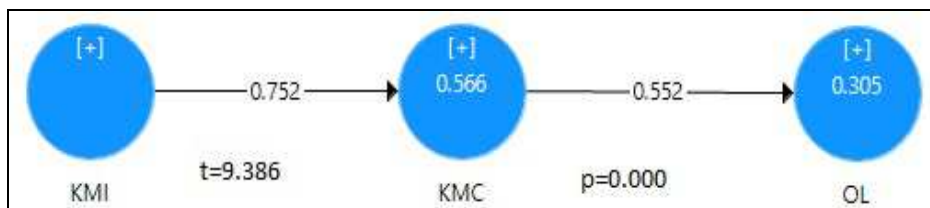
Reference to the values given in Table 7, there is a significant positive effect of KMIT on KMC ($\beta=0.740$, $t=20.018$ $p=0.000$), and OL ($\beta=0.889$, $t=67.197$, $p=0.000$). Therefore, H_1 and H_2 are supported. Similarly, there is a significant positive and direct effect of KMC on OL ($\beta=0.603$, $t=16.441$, $p=0.000$). Hence, H_3 is accepted. In addition,⁷⁷ a path analysis method was used to examine the mediation role of KMC between KMIT and OL. In this regard, t statistics and p -values for evaluating the indirect effect were obtained through bootstrapping technique in Smart PLS. The results indicate that there is significant indirect effect of KMIT on OL through KMC ($\beta=0.443$, $t=9.386$, $p=0.000$). These findings justified the mediation of KMC and supported H_4 .

⁷⁷ K. J. Preacher, & Hayes, A. F, "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models," *Behavior Research Methods* 40, no. 3 (2008): 879.

Table 7: Path Coefficients

Hypothesis	Relationship	B	t-Value	p-Value
H ₁	KMIT ^a →KMC ^b	0.740	20.018	0.000
H ₂	KMIT→OL ^c	0.889	67.197	0.000
H ₃	KMC→OL	0.603	16.441	0.000
H ₄	KMIT→KMC→ OL (Indirect Effect)	0.443	9.386	0.000

Figure 4: Mediating Role of KMC between KMIT and OL



Findings and Conclusion

This study examined the effect of KMIT on KMC and OL among employees working in higher educational institutes of Pakistan. The hypothesized relationships were tested using PLS-SEM technique. Findings of this research revealed that KMIT has a significant impact over both KMC and OL indirect relationships and contributed to the literature by emphasizing on KM as a strong predictor of organizational outcomes as supported by previous studies who examined similar relationships.⁷⁸ These studies highlighted the need for developing an efficient KM structure to enhance the academic qualities of higher education institutions.⁷⁹

The findings confirmed this hypothesized intervention of KMC as mediator. These findings were also validated by Mao and Ngah which had demonstrated that KMIT positively enhances organizational capabilities for learning. The researchers noted that KMIT is a critical factor for gaining competitive advantages by strengthening the learning abilities of

⁷⁸ Pooja K. Singh, Manoj Kumar , "A Study on Infrastructure and Organizational Learning: Rethinking Knowledge Performance Perspective," *PEOPLE: International Journal of Social Sciences* 3, no. 2 (2017): 66.

⁷⁹ Rehmat Shah, Asad Abbas Rizvi, and Nabi Bux Juman, "Status of Knowledge Management Practices in Pakistani Universities," *International Journal of Innovation in Teaching and Learning (IJITL)* 4, no. 2 (2019): 65.

the firms. When KMIT promotes KMC values and formulate robust KM strategies that help an organization to achieve financial advantages.⁸⁰

The study also hypothesized that the existence of KMIT-based infrastructure is also positively conducive to enhance KMC⁸¹ which leads to improving learning skills of the education industry.⁸² KMIT base infrastructure contained IT resource, IT human resource and IT relationship resource considered as core elements that effectively utilized and improved knowledge management capabilities.⁸³

Discussion

Over time, the value of knowledge management has been realized by most organizations around the world. This is also due to consistently increasing global competition, especially in the service sector as it is considered a critical factor for industry growth to enhance the organizational learning process and innovation.⁸⁴ Past studies verified that organizational learning is a major element that distinguishes an organization from others and assists them to gain a competitive advantage.⁸⁵ In addition, recent research also describes the positive association between knowledge management capability and organization learning.⁸⁶ In the organizational learning process, an organization strives to enhance their learning process by effectively retrieving information

⁸⁰ Hongyi Mao, Shan Liu, Shan Liu, Jinlong Zhang, and Zhaohua Deng, "Information Technology Resource, Knowledge Management Capability, and Competitive Advantage: The Moderating Role of Resource Commitment," *International Journal of Information Management* 36, no. 6 (2016): 1073.

⁸¹ Ibid.

⁸² A. Fidalgo-Blanco, M. L. Sein-Echaluce, F. J. García-Peñalvo, "Knowledge Spirals in Higher Education Teaching Innovation," *International Journal of Knowledge Management (IJKM)* 10, no. 4 (2014): 19.

⁸³ Michael Wade, John Hulland, "The Resource-Based View and Information Systems Research: Review, Extension, and Suggestions for Future Research," *MIS Quarterly* 28, no. 1 (2004): 125.

⁸⁴ Ra'ed Masa'deh, Rifat Shannak, Mahmoud Maqableh, and Ali Tarhini, "The Impact of Knowledge Management on Job Performance in Higher Education: The Case of the University of Jordan," *Journal of Enterprise Information Management* 30, no. 2 (2017): 248.

⁸⁵ Wenpin Tsai, "Knowledge Transfer in Intraorganizational Networks: Effects of Network Position and Absorptive Capacity on Business Unit Innovation and Performance," *Academy of Management Journal* 44, no. 5 (2001): 1001.

⁸⁶ Isabel Martinez-Conesa, Pedro Soto-Acosta, and Elias George Carayannis, "On the Path Towards Open Innovation: Assessing the Role of Knowledge Management Capability and Environmental Dynamism in SMEs," *Journal of Knowledge Management* (2017): 52.

through repositories, databases, documents, embodied knowledge and it applies to take strategic decisions.⁸⁷

The organizations achieve better performance and sustainable competitive advantage through knowledge management as it has a strategic role that enables organizations to develop a unique combination of their capabilities and resources to gain sustainable competitive advantage.⁸⁸ That is why organizations are focusing on building knowledge management infrastructure to further improve their efficiency and optimal utilization of their capabilities.⁸⁹ Thus, this study highlighted the importance of developing a strong knowledge management infrastructure to effectively enhance organizational learning and competencies.

KMC plays a vital role in knowledge management process that organizes special knowledge from different business units to achieve long term goal. Since KMCs are viewed as abilities that generate innovative knowledge through integration of various knowledge resources and activities that significantly affect organizational effectiveness and the learning process.⁹⁰ Education has become more competitive in recent times as it is difficult for an organization to enhance its learning process for a long time.⁹¹ As such, present study finds KMC a critical resource that increases the organizational learning abilities of educational sector to successfully share, retrieve and retain information.⁹²

⁸⁷ George P. Huber, "Organizational Learning: The Contributing Processes and the Literatures," *Organization Science* 2, no. 1 (1991): 98.

⁸⁸ R. Shannak, B. Obeidat, and D. Almajali, "Information Technology Investments: A Literature Review," In *Proceedings of the 14th IBIMA Conference on Global Business Transformation through Innovation and Knowledge Management: An Academic Perspective, Istanbul-Turkey, 23rd-24th June*, 1356. 2010.

⁸⁹ Hongyi Mao, Shan Liu, Shan Liu, Jinlong Zhang, and Zhaohua Deng, "Information Technology Resource, Knowledge Management Capability, And Competitive Advantage: The Moderating Role Of Resource Commitment," 1082.

⁹⁰ Mir Hasan Rezaee, and Naser Aliramazani, "Investigating the Role of Knowledge Management Capabilities in the Relationship between HR Strategies for Empowerment and Innovative Performance Case Study in Western Azerbaijan," (2017): 45.

⁹¹ Cong Qi, and Patrick Y. K. Chau, "Will Enterprise Social Networking Systems Promote Knowledge Management And Organizational Learning? An Empirical Study," *Journal of Organizational Computing and Electronic Commerce* 28, no. 1 (2018): 31.

⁹² Isabel Martinez-Conesa, Pedro Soto-Acosta, and Elias George Carayannis, "On the Path Towards Open Innovation: Assessing the Role of Knowledge

This study further strengthens the theoretical assumptions that supports the relationship between proposed variables. Since some of the past studies provided inconsistent findings with respect to the knowledge management dimensions and their associations with knowledge management capability and organizational learning. Thus, it required further investigations by the scholars by adding the KMI dimensions into the similar framework.⁹³ It further provided a useful contribution to existing literature and also opened up the opportunity for future researchers to promote the effectiveness of KMI in the education sector.⁹⁴

In view of these characteristics, the current research found that KMIT is imperative for educational institutions of Pakistan and highlights that the higher education sector is to keep up with the latest technologies ensuring global standards and creating technologically oriented knowledge basis to set the right direction for achieving sustainable competitiveness. In addition, top management of higher education institutions must pay attention to organizing the tech-oriented training of the academic and administrative workforce for effective creation and application of knowledge that enables organizations to sustain an effective learning process.

Limitations and Future Research Directions

The present study had to confront certain limitations. First, this study used a smaller sample size that consisted of academic and administrative staff which may question the generalization of findings of this study. Second, cross-sectional model was used to get respondents' feedback which may lack time-based change effect. Future studies may choose a different research designs and also consider comparative studies. The proposed framework may further be extended by investigating various psychological, organizational, and behavioral factors like member-exchange relationships, organizational support, individual self-efficacy, and other psycho-dynamic attributes.

Management Capability and Environmental Dynamism in SMEs," *Journal of Knowledge Management* (2017): 54.

⁹³ Pooja K. Singh, Manoj Kumar , "A Study on Infrastructure and Organizational Learning: Rethinking Knowledge Performance Perspective," *PEOPLE: International Journal of Social Sciences* 3, no. 2 (2017): 68.

⁹⁴ Rehmat Shah, Asad Abbas Rizvi, and Nabi Bux Jumani,"Status of Knowledge Management Practices in Pakistani Universities,"*International Journal of Innovation in Teaching and Learning (IJITL)* 4, no. 2 (2019): 62.

