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UNDERSTANDING BARRIERS OF KNOWLEDGE MANAGEMENT IMPLEMENTATION (INTERPRETIVE STRUCTURAL MODELLING APPROACH)

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Abstract

Knowledge management is an important aspect for organizational success acting as a valuable tool for organizational survival to sustain competitiveness and achieve higher performance

Five hundred questionnaires were distributed to employees of top five IT companies of Maharashtra state and three hundred and fivequestionnaires were returned. The paper finally concludes with presenting the managerial implications of results of the study, helping managers of IT industry to implement KM successfully.

Keywords: Knowledge Management, Knowledge Management Implementation, Barriers, Interpretive Structural Modelling

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Introduction

Knowledge, which is the bundle of facts, theories and principles,is an essential part of human Life.According to Karadsheh et al. (2009), business results can be enhanced through knowledge only. Also, Martínez-Sánchez et al., (2011) highlighted innovation is only possible through elusive constituent called as knowledge. .Through this study, we intend to showcase KM as an important aspect for organizational success acting as a valuable tool for organizational survival to sustain competitiveness and achieve higher performance. It requires the involvement of three key components i.e. people, processes and technology, which may act as a barrier to effective implementation of KM which is the focus area of this study. Hence, the prime focus should be to connect these three key components for the purpose of leveraging knowledge, which is only possible by minimizing barriers of KM implementation.Thisstudy is probably the first of its type to identify barriers of KM in Indian IT industry. This study identifies the most probable barriers of KM implementation and evaluates the importance of these barriers in improving KM implementation through presenting a three-layered framework. This study is focuses on key domains of KM related to employees, organizations, and technology.

Barriers to KM

Many basic hindrances to successful implementation of KM have been identified by many researchers and practitioners so far. The barriers mainly include the culture, understanding of the importance of KM and support from top management (Lang, 2001; Plessis and Boon, 2004).

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Hubert and Lopez (2013) on the other hand stressed on understanding organization culture which is key to drive employee attitude and behaviour before implementation of any organizational level change.

Riege (2005) had identified as many as 40 barriers categorized as personal, organizational and technological.

Conceptual Framework

This study considers barriers categorized under individual factor, organizational factor and technological factorsuggested by Riege (2005). The first type includes human related factors like

attitude and behavior of users. The second type includes factors related to organization like culture, support from management and motivation. The third type of barrier is related to technology adapted within the organization in implementing it.

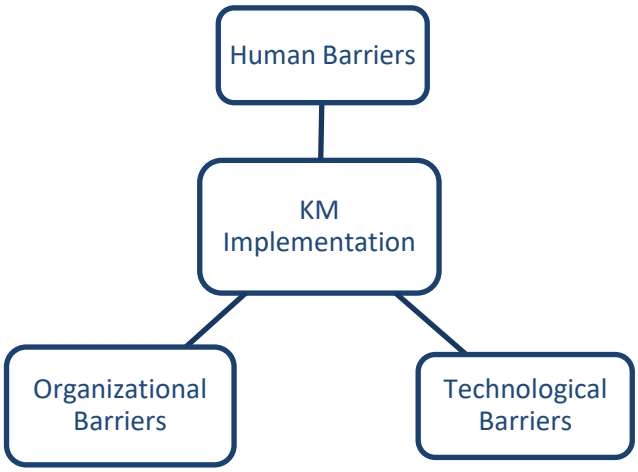

Figure 1: Barriers of KM Implementation Model

. All the factors were tested to identify the most ruinous barriers of KM implementation in the IT industry.

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Research Methodology

Research Questions

1) What factors act as barriers for implementation of KM?

2) What factors are most effective barriers to implement KM to gain competitive advantage in IT industry of India?

Research Objectives

1) To identify the barriers of KM implementation in IT industry.

2) To evaluate the impact of barriers on KM implementation in IT industry.

3) To present a comprehensive framework of barriers for successful implementation of KM in IT industry.

Research Variables

Table 2: Barriers of KM Implementation		
Independent Variables	**Source**	**Dependent Variable**
Human Barriers (H)	Riege (2005); McLaughli, Paton and Macbeth (2008); Herman (2011); Yiu and Lin (2002)	KM Implementation (X)
Organization Barriers (O)		
Technology Barriers (T)		

Research Model

To accomplish the identified research objectives, a 'KM Implementation Model' is proposedwith three barriers as shown in figure 2. Three barriers viz. Human barriers, Organizational barriers and technological barriers have been identified to have an impact on KM Implementation.

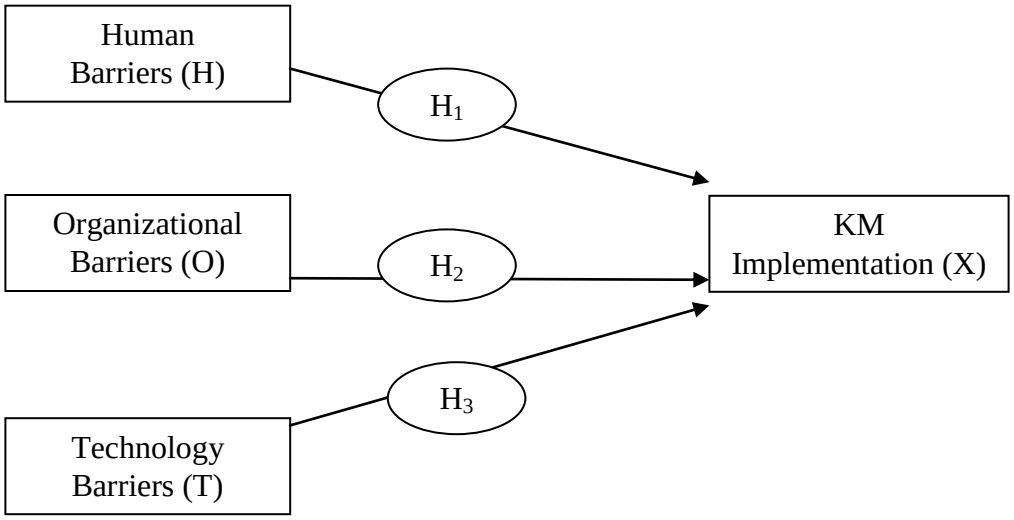

Figure 2: KM Implementation Model

Research Hypothesis

Research Hypothesis 1 (H_1): Human barriers have significant impact on KM Implementation.

Research Hypothesis 2 (H_2): Organizational barriers have significant impact on KM Implementation.

Research Hypothesis 3 (H_3): Technological barriers have significant impact on KM Implementation.

Research Instrument

Table 3: Human Barriers (H)			
Sr. No.	**Items**	**Critical Human Barrier Factors**	**Sources**
1	H1	Perceived usefulness of knowledge creating and sharing	AtilaKarabag (2010)
2	H2	Self Interest – Unwillingness for knowledge sharing	Ahmad and Daghfous (2010); Lin, Wu and Yen (2012)
3	H3	Trust issues from origin of knowledge	Riege (2005); Herman (2011)
4	H4	Perceived fear that sharing may reduce security	McLaughli, Paton and Macbeth (2008)
5	H5	Lack of trust in how the knowledge is used by its receiver	Riege (2005)
6	H6	Fear of losing personnel results	Kumar, Singh and Haleem (2014)
7	H7	Unwillingness to use technology	Riege (2005); Singh and Kant (2008); Ahmad and Daghfous (2010)
8	H8	Lack of communication	Riege (2005)
9	H9	Staff Defection - Lack of expertise in executing KM	Singh and Kant (2008)
10	H10	Individual differences (age, education, experience level, gender)	Riege (2005); Wong (2009); Lin, Wu, & Yen (2012)
11	H11	Differences in culture, values and belief systems	Riege (2005)
12	H12	Lack of self-confidence and worrying too much about other's opinion	Riege (2005)

Table 5: Organizational Barriers (O)			
Sr. No.	**Items**	**Critical Organizational Barrier Factors**	**Sources**
1	O1	Lack of knowledge sharing culture	Lin, Wu, & Yen (2012)
2	O2	Excessive bureaucracy or adherence to official rules and formalities (Red tape)	Kurt and Herbert (2001); Lin, Wu and Yen (2012)
3	O3	Ineffective communicationof KM benefits	Riege (2005); Lin, Wu and Yen (2012)
6	O4	Less priority for Knowledge retention (staff defection and retirement)	Riege (2005); Lin, Wu and Yen (2012)
8	O5	Lack of monetary and non-monetary motivation	Ahmad and Daghfous (2010); Lin, Wu and Yen (2012)
10	O6	Lack of technological training	Riege (2005); Singh and Kant (2008); Ahmad and Daghfous (2010); Lin, Wu and Yen (2012)

Table 6: Technological Barriers (T)			
Sr.No.	**Items**	**Critical Technological Barrier Factors**	**Sources**
1	T1	Lack of compatibility between technology and organizational process	Riege (2005)
2	T2	Lack of technical support	Riege (2005)
3	T3	Lack of compatibility between technology and people	Riege (2005); Kim &Ju (2005)
4	T4	Redundant Information overload	Krcmar (2005)
5	T5	Improper planning and evaluation of technology	Singh and Kant (2008); Wong (2009); Ahmad and Daghfous (2010)

Table 7: KM Implementation (X)				
Dependent Variable	**Antecedents**	**Items**	**Scale**	**Sources**
KM Implementation(X)	Socialization (X1)	X11	Gathering information from others.	Nonaka et al. (1994); Lee et al. (2005)
		X12	Sharing information with others	
		X13	Creating a work environment of knowledge sharing	
	Externalization (X2)	X21	Creative communication with colleagues.	
		X22	Deductive and inductive knowledge sharing	
		X23	Provide subjective opinions in dialogues.	
	Combination (X3)	X31	Use IT systems for knowledge creation and sharing.	
		X32	Create documents to build up databases	
		X33	Creating database from technical information	
	Internalization (X4)	X41	Liaisoning with other departments	
		X42	Sharing results with other departments	
		X43	Sharing information with other departments	

Research Methods

For empirical testing of the hypothesis, primary data was collected through structured questionnaires measured on 7 point likert scale ranging from 1 as strongly disagree to 7 as strongly agree for each statement sending through emails to500 employees of top five IT companies of Maharashtra state i.e. TCS, Infosys, Wipro, Accenture and Capgemini through convenience sampling technique. Responses of 305 employees were finally considered for data analysis from 367 received responses after discarding incompletequestionnaires. Validity & reliability of the instrument was checked through exploratory factor analysis and cornbach coefficient alpha respectively, whereas regression was used to evaluate the impact of barriers on KM implementation. Interrelation between barriers was identified using ISM approach.

Data Analysis

Descriptive Statistics: Presence of KM Barriers

The extent of the presence of three barriers of KM implementation was identified using mean values of each barrier.

The result shows that human barriers is present in larger extent with mean value of 5.7, whereas organizational barrier and technological barrier are absent with mean value of 3.0 and 3.4 respectively. The overall mean of KM barriers is 4.0. It also depict that implementation of KM is little with mean value of 3.3.

Table 8: Descriptive Statistics: Presence of Barriers & KM Implementation

Human Barriers		**Organizational Barriers**		**Technological Barriers**		**KM Implementation**	
Items	**Mean**	**Items**		**Items**	**Mean**	**Items**	**Mean**
H1	5.6	O1	2.9	T1	3.6	X11	3.3
H2	5.9	O2	3.3	T3	3.5	X12	3.2
H5	5.9	O5	2.7	T4	3.2	X13	3.3
H9	5.6	O6	3.2	T5	3.1	X31	3.3
H10	5.6					X32	3.0
H11	5.9					X33	3.1

H12	5.8					X41	3.6
						X42	3.6
						X43	3.7
Total Mean	5.7	Total Mean	3.0	Total Mean	3.4	Total Mean	3.3

Validity & Reliability of the Instrument

Exploratory factor analysis (EFA) was conducted for data validation on 35 items of the instrument developed comprising of 23 items for 3 barriers i.e. human (H), organizational (O) and technological (T) barriersas independent variable and 12 items for 4 antecedents of KM implementation (X)as dependent variable.

Table 9: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.833
Bartlett's Test of Sphericity	Approx. Chi-Square	4356.146
	df	276
	Sig.	0.000

. The result of factor analysis shows that 7 items of human barrier (H) were retained under 1st component whereas 5 items were discarded due to low loading values. 4 items of Organizational barrier (O) were retained loaded under 3th component. 4 items of technological barrier were retained loaded under 2nd component. All the 3 items for 3 antecedents of KM implementation i.e. Socialization (X1), combination (X3) and internalization (X4) were retained under 4th, 6th & 5th components respectively, whereas one antecedent i.e. Externalization (X2) was discarded due to low loading values. Therefore, after factor analysis, 24 items were considered from both independent and dependent variables for further multivariate analysis. Variance explained (%) are mentioned for each component making it 64.17% of total variance explained by all the components. The Extraction Communality Coefficient (h^2) is also mentioned for each item in table 10.

Table 10: Exploratory Factor Analysis							
Items	**Factors**						
	1	**2**	**3**	**4**	**5**	**6**	**h^2**
Variance Explained (%)	23.8	10.4	13.8	6.5	4.7	4.9	
H1	0.568						0.340
H2	0.572						0.363
H5	0.667						0.465
H9	0.751						0.581
H10	0.723						0.532
H11	0.857						0.748
H12	0.788						0.637
O1			0.829				0.691
O2			0.710				0.530
O5			0.913				0.837
O6			0.870				0.761
T1		0.784					0.619
T3		0.866					0.758
T4		0.798					0.654
T5		0.864					0.750
X11				0.824			0.680
X12				0.837			0.707
X13				0.858			0.740
X31						0.777	0.611
X32						0.949	0.908
X33						0.635	0.414
X41					0.879		0.783
X42					0.818		0.673
X43					0.777		0.619

Notes: Total variance explained = 64.17%.

h^2 = Extraction Communality Coefficient.

After factor reduction total 24 items will be considered comprising of both independent and dependent variables. internal consistency reliability to test unidimensionality was assessed by cronbach's alpha. The resulting alpha values ranged from 0.70 to 0.87, which were above the acceptable threshold 0.70 suggested by Babbie (1992). According to Babbie (1992), the value of cronbach Alpha is classified based on the reliability index classification where 0.90-1.00 is very high, 0.70-0.89 is high, 0.30-0.69 is moderate, and 0.00 to 0.30 is low. The cronbach alpha value for all the variables were higher than 0.70 which falls into the classification of high. The mean values for Human Barrier (H) is greater than average (i.e. more than 4), which confirms the agreement of employees on the lacking of the human factors conducive to KM implementation, mean value for Organizational Barrier (O) is greater than average (i.e. more than 4), which confirms the agreement of employees on the lacking of the organizational factors conducive to KM implementation, mean value for Technological Barrier (T) is less than average (i.e. less than 4), which confirms the disagreement of employees on the lacking of the technological factors conducive to KM implementation. As per the calculation of standard deviation, not much deviation in data was found from mean as shown in table 11.

Table 11: Mean, SD And Cronbach's Alpha

Variables	Sample Size	Items	Mean	SD	α
H	305	7	5.7	1.2	0.883
O	305	4	3.0	1.0	0.907
T	305	4	3.4	0.8	0.874
X	305	9	3.3	0.9	0.789

SD - Standard Deviation; α – Cronbach's Alpha

Hypothesis Testing

The Statistical Package for the Social Sciences (SPSS) (Version 21) was used to facilitate the analysis. The regression analysis was performed to evaluate the impact of barriers on KM implementation.

Regression statistics in table 12 shows that correlation value R is 0.538, which depicts that there is a moderate relationship between barriers and KM implementation. The value of R Square is 0.29 i.e. the model explains 29% of variable which effect KM implementation and there might be other reasons for implementation of KM other than used in this study. The value of Durbin Watson test (2.01) depicts that the model is good as the value is near to 2.

Table 12: Regression statistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.538	0.290	0.283	0.5697
Predictors: T, H, O; Dependent Variable: X				

Table 13 reveals that barriers have significant impact on KM implementation as F (calculated value) (40.977) is greater than F (table value) (3.00), moreover, the p value (significant value) is 0.00 which is less than 0.05 significance level. Therefore, the research hypothesis is accepted i.e. barriers have significant impact on KM implementation.

Table 13: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	39.902	3	13.301	40.977	0.000
	Residual	97.701	301	0.325		
	Total	137.603	304			
Predictors: T, H, O; Dependent Variable: X						

All the three barriers, human (H), organizational (O) and technological (T) barriers have significant impact on KM implementation with p values of 0.004, 0.000 and 0.000 respectively as shown in table 14. Therefore, all the three sub hypothesis i.e. H_1, H_2 and H_3 are accepted.

Table 14: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.408	0.270		16.350	0.000
	H	-0.108	0.038	0.139	2.865	0.004
	O	-0.207	0.040	-0.258	-5.188	0.000
	T	-0.313	0.039	-0.398	-8.007	0.000
Predictors: T, H, O; Dependent Variable: X						

The beta coefficients for the significant barriers i.e. human, organizational and technological barriers are -0.108, -0.207 and -0.313 respectively. It depicts that if each barrier is decreased by unit's equivalent to their respective beta coefficients, the KM implementation will be increased by 1 unit as shown in figure 3.

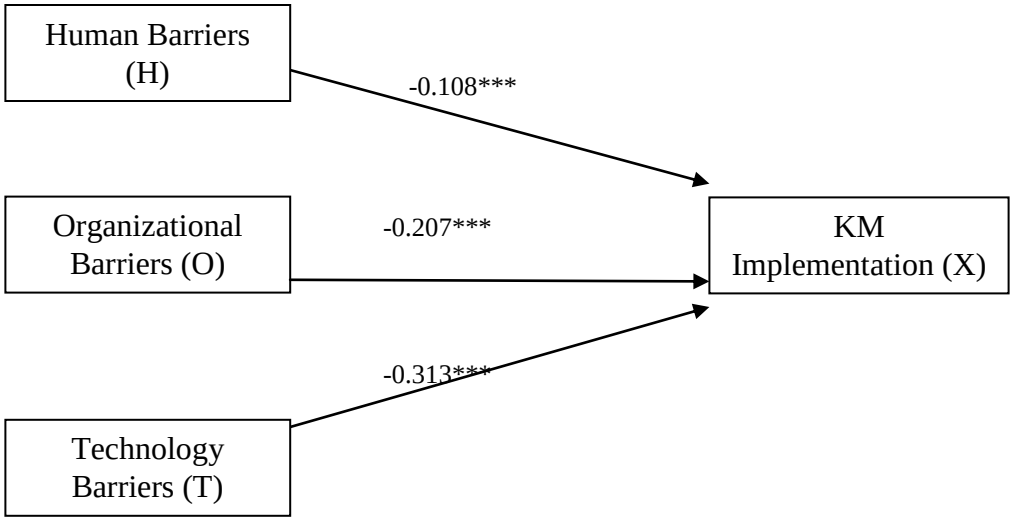

Figure 3: Empirical Model of KM Implementation

Interpretive Structural Modeling

Five experts, one from each IT company were identified for a personal interview on the subject matter with structured questionnaire, which helped to create contextual relationship between the identified barriers. Four symbols were used to denote the direction of relationship between any two barriers (i and j):

- **A, If 'i' is predictor of 'j'.**
- **B, If 'j' is predictor of 'i'.**
- **C, If 'i' and 'j' predict each other.**
- **D, If no predict each other.**

Structural Self-Interaction Matrix (SSIM)

Consultation and discussions with the five experts, helped in identifying the relationships between the identified barriers. On the basis of contextual relationship, the SSIM has been developed. Final SSIM is presented in table 15.

Table 15: Structural Self Interaction Matrix for Barriers

Barrier No	**Barrier**	**3**	**2**	**1**
1	Human	B	B	1
2	Organizational	A	1	
3	Technological	1		

Reachability Matrix

The next step is to develop the reachability matrix from the SSIM by transforming the information of each cell of SSIM into binary digits (i.e., 1s or 0s). This transformation has been done by substituting A, B, C, D by 1 and 0 as per the following rules. Rules for transformation are given below:

• A, If 'i' is predictor of 'j', then (i,j) is 1 and (j,i) is 0

• B, If 'j' is predictor of 'i' then (j,i) is 1 and (i,j) is 0

• C, If 'i' and 'j' predict each other then (i,j) is 1 and (j,i) is 1

• D, If no predict each other then (i,j) is 0 and (j,i) is 0

Following these rules, Reachability matrix is prepared as shown in table 16.

Table 16: Initial Reachability Matrix forBarriers				
Barrier No	**Barrier**	**1**	**2**	**3**
1	Human	1	1	1
2	Organizational	0	1	1
3	Technological	0	0	1

Level Partitioning of Reachability Matrix

Level identification process of these barriers is completed in three iterations.

Table 17: Level Partition – Iteration 1				
Barrier	Reachability Set	Antecedent Set	Intersection Set	Level
1	1,2,3	1	1	
2	2,3	12	2	
3	3	123	3	I

Table 18: Level Partition – Iteration 2				
Barrier	Reachability Set	Antecedent Set	Intersection Set	Level
1	12	1	1	
2	2	12	2	II

Table 19: Level Partition – Iteration 3				
Barrier	Reachability Set	Antecedent Set	Intersection Set	Level
1	1	1	1	III

Table 20: Final list of Level Partitions		
Level	Barrier No	Barrier
I	3	T
II	2	O
III	1	H

Result and Discussion

The descriptive statistics of the data shows that human barriers are present to large extent in the IT industry, whereas organizational and technological barriers are absent. The result depict that it is the human resource of the organization which create hindrance in the effective implementation of KM, whereas organizational systems and practices as well as technological facilitates available in the organization are very much conducive for the effective implementation of KM. Data also revealed that the implementation of KM is very little in the IT organizations, which means it is the human resource, which pose the most hindrance and can be termed as the most ruinous barrier.

On testing the hypothesis of the study, it was identified that all the three barriers, human (H), organizational (O) and technological (T) barriers have significant impact on KM implementation, which signifies the acceptance of all the three hypothesis proposed in the study. The beta coefficients for the significant barriers i.e. human, organizational and technological barriers are -0.108, -0.207 and -0.313 respectively. It depicts that if each barrier is decreased by unit's equivalent to their respective beta coefficients, the KM implementation will be increased by 1 unit.

The results of the regression analysis in this study are in line with the results of the various studies on KM implementation barriers like following authors claim for human barriers Cantoni, Bello and Frigerio (2001), Yiu and Lin (2002), McLaughli, Paton and Macbeth (2008), Herrnman (2011); **following authors claim for organizational barriers** Yiu and Lin (2002), Herrmann (2011); following authors claim for technological barriers Cantoni, Bello and Frigerio

(2001), McLaughli, Paton and Macbeth (2008)**,** Herrmann (2011); **as all proved that these three barriers significantly impact KM implementation.**

The various factors of all the three barriers, which significantly affect the implementation of KM in IT industry proved on the basis of the result of this study, are mentioned below:

Individual Barriers

1) Perceived usefulness of knowledge sharing and creating,
2) Self Interest - People are not willing to share knowledge,
3) Lack of trust in how the knowledge is used by its receiver,
4) Staff Defection - Lack of expertise in executing KM,
5) Individual differences (age, education, experience level, gender),
6) Differences in culture, values and belief systems,
7) Lack of self-confidence and worrying too much about other's opinion

Organizational Barriers

1) Lack of knowledge sharing culture,
2) Excessive bureaucracy or adherence to official rules and formalities (Red tape),
3) Lack of monetary and non-monetary motivation
4) Lack of technological training

Technological Barriers

1) Lack of compatibility between technology and organizational process,
2) Lack of technical support,
3) Redundant Information overload,
4) Improper planning and evaluation of technology

Implications

IT Organizations, if willingto have a successful KM implementation strategy, they need to focus on potential factors of three KM barriers. Having identified many barriers, comprising of human,

organizational and technological, this study suggests the first extensive accumulation of likely bottlenecks of KM implementation in IT industry.

Most importantly, little research has been conducted so far on overcoming barriers except few that attempted to provide some insights on these issues like studies conducted by Husted and Michailova (2002); Michailova and Husted (2003) and Riege (2004). Future studies on KM may address these issues more rigorously by covering more companies and in varied industrial sector to better assist managers in overcoming the barriers to enhance the effectiveness of KM implementation, and thus achieving competitive edge in the business world.

In short, knowledge dissemination has no value unless the recipient of knowledge receives it, agrees to accept it, and put it into effect. Conceptualizing the practical results of studies related to KM implementation is that there is no general formula or there is no shortcut of knowledge-sharing practices that will ensure success. Hence, it is impendent for every organization to ensure that the implementation of KM rightly. The creation of KM environment and culture does not involve any investment but understanding between employees is enough.

Now that we identified the most ruinous barriers that organization may face in terms of KM implementation, managers can estimate the extent of the presence of barriers in their organization and can systematically address the issues. All the challenges must be addressed, keeping in mind the structural and cultural influences that discourage knowledge sharing practices.

Conclusions

he question arises that what organizations need to do for effective KM implementation? This study identified the most ruinous barriers of KM implementation in IT Industry and suggests strategies to implement it effectively. It is believed that an organization is a important medium to implement KM, which is only possible when technology, people and organization as a whole work in synchronized manner to make the incremental efforts. For this purpose sequence of overcoming barriers has also been suggested in this study. At human level, unless and until a harmonious relationship is not developed between employees, they will be least interested to

share knowledge. A system which keeps employees motivated is desired to promote knowledge sharing culture. Organizations' values, mission and vision also is of vital importance clearly defines the message of knowledge sharing. Organizations for more effective KM can use individual solutions tailored to a specific employee as per there requirement and expectations. The organization must understand them and respond to them in a better way to keep them motivated and committed towards maintaining a knowledge sharing culture.

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