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Application of Principal Component Analysis in Identifying Key Factors Influencing Knowledge Sharing Among Faculty Members

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ABSTRACT

Knowledge sharing plays a crucial role in fostering academic excellence, innovation, and professional growth within higher educational institutions. Faculty members, as key contributors to knowledge creation and dissemination, are expected to engage in continuous knowledge-sharing activities. This study aims to identify and analyze the critical factors that influence knowledge-sharing behaviors among faculty members working in Arts and Science Colleges in Trichy. A structured questionnaire was administered, and data from 50 faculty members were analyzed using Principal Component Analysis (PCA) to uncover underlying constructs that shape knowledge-sharing practices.

The analysis revealed six significant components: Technological Adaptation, Collaborative Knowledge Sharing, Cognitive and Pedagogical Development, Career and Institutional Growth, Institutional Support & Policies, and Personal Motivation & Attitudes. The reliability of the instrument was confirmed with a Cronbach's Alpha value of 0.902, indicating a high level of internal consistency. The findings suggest that the effective use of digital tools, supportive institutional frameworks, and intrinsic motivation are vital in promoting knowledge sharing among faculty. However, disparities in engagement levels point to the need for targeted interventions and supportive strategies.

The study provides practical insights for educational policymakers and institutional leaders to design programs and policies that foster a more collaborative and knowledge-driven academic environment. It also underscores the importance of aligning personal and institutional objectives to enhance faculty participation in knowledge-sharing activities.

Keywords: Knowledge Sharing, Technological Adaptation, Institutional Support, Academic Development, Higher Education, Faculty Engagement.

INTRODUCTION

In the dynamic landscape of higher education, knowledge sharing among faculty members plays a vital role in enhancing academic excellence, research collaboration, and institutional growth. As educational institutions strive to remain competitive and innovative, the effective exchange of knowledge becomes a strategic asset. Faculty members, as the primary agents of knowledge creation and dissemination, hold the potential to foster a collaborative academic environment through mutual sharing of expertise, pedagogical approaches, and scholarly insights.

However, the process of knowledge sharing is influenced by a variety of factors ranging from individual attitudes and technological proficiency to institutional policies and organizational culture. With the increasing integration of digital platforms and online learning tools, new avenues have emerged that significantly impact how knowledge is shared within academic circles. Understanding these influencing factors is essential for institutions to develop supportive structures and policies that encourage faculty members to engage in consistent and meaningful knowledge-sharing practices.

This study aims to identify and analyze the key factors that influence knowledge sharing among faculty members, including technological adaptation, collaborative practices, cognitive development, career incentives, institutional support, and personal motivation. By examining these dimensions, the research provides valuable insights into how institutions can foster a knowledge-sharing culture that promotes academic collaboration, innovation, and professional development.

LITERATURE REVIEW

Knowledge sharing has emerged as a critical area of study in academic institutions due to its profound impact on teaching quality, research productivity, and institutional innovation. Several scholars have emphasized that knowledge sharing among faculty members fosters collaborative learning, enhances professional development, and leads to improved academic outcomes (Nonaka & Takeuchi, 1995; Ipe, 2003).

Technological Adaptation plays a key role in facilitating knowledge sharing in the modern academic environment. According to Alavi and Leidner (2001), digital platforms and e-learning tools enable quick access to information and provide an efficient means of disseminating knowledge. Faculty members who are adept at using such technologies are more likely to engage in knowledge-sharing practices.

Collaborative Knowledge Sharing is another important dimension. Studies by Davenport and Prusak (1998) and Chennamaneni (2006) highlight that faculty collaboration through research projects, team teaching, and interdisciplinary activities contributes significantly to knowledge exchange. Such collaboration builds trust and creates a shared culture of learning.

Cognitive and Pedagogical Development through knowledge sharing has been explored by scholars like Lave and Wenger (1991), who introduced the concept of "communities of practice," where faculty members learn from each other through social and professional interaction. These interactions enhance critical thinking, instructional methods, and curriculum development.

Career and Institutional Growth are also influenced by knowledge sharing. Research by Kim and Ju (2008) indicates that when faculty members share their research findings and teaching strategies, they gain visibility and recognition, leading to potential career advancement and institutional success.

Institutional Support and Policies are crucial enablers of knowledge sharing. According to Riege (2005), organizational culture, leadership support, and infrastructure significantly affect the willingness and ability of faculty members to share knowledge. Institutions that encourage open communication, provide rewards, and invest in training tend to have higher levels of knowledge exchange.

Personal Motivation and Attitudes also determine the extent of knowledge sharing. Bock and Kim (2002) found that intrinsic motivation, such as satisfaction from helping others and building a professional identity, strongly influences faculty engagement in knowledge-sharing behaviors.

In summary, the literature reveals that knowledge sharing among faculty is a multifaceted process influenced by both individual and institutional factors. A comprehensive understanding of these factors is essential for promoting an environment that nurtures academic collaboration and continuous learning.

OBJECTIVES OF THE STUDY

1. To identify the major factors influencing knowledge sharing among faculty members.
2. To evaluate the impact of institutional policies and personal attitudes on faculty members' engagement in knowledge-sharing practices.

RESEARCH DESIGN - METHODOLOGY

A research design is a programme that guides the researcher in the process of collecting, analyzing and interpreting observation. This study was conducted to identify the key factors influencing knowledge sharing among faculty members. In this approach, the researcher collected data from the sample using a questionnaire. A total of 50 respondents were taken as sampling for this study. The non-probability sampling technique was used for conducting the sampling process and convenience sampling technique was used in this research. The target respondents of this research are the faculty members. Both primary and secondary data were used for the study. Percentage analysis and principle component analysis were done to defend the null hypothesis.

The questionnaire was divided into two parts. Part-I was proposed to collect the respondents' demographic information such as gender, marital status, age, level of education and family monthly income of the respondent and a total of seven questions were included in this part. Part II was intended to identify the key factors influencing knowledge sharing among faculty members. The respondents were required to give their rating on their satisfactory level using a five-point Likert Scale measurement.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.974	0.902	25

From the above table, it is observed that the reliability of coefficient alpha (α) for the 50 cases of 25 items is .902 (scale range between 0.0 to 1.0) which shows the reliability of the given factor.

ANALYSIS AND INTERPRETATION

A principle component analysis was done to uncover the dimension of key factors influencing knowledge sharing among faculty members. Factor analysis statistical method is used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called **factors.** This component analysis is done with statistical package SPSS 20.0

KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.845
Bartlett's Test of Sphericity	Approx. Chi-Square	42.635
	Df	36
	Sig.	.002

From the above table reveals that Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test of sphericity have been applied to the resultant correlation matrix to test whether the relationship among the variables has been significant or not as shown in the table. The result of the test shows that with the significant value of .002 and there is significant relationship among the variables chosen. KMO test is yielded a result of .845 which states that factor analysis can be carried out appropriately for these variables that are taken for the study.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.135	73.341	73.341	16.135	73.341	73.341	10.969	49.861	49.861
2	2.336	10.616	83.957	2.336	10.616	83.957	5.660	25.726	75.586
3	1.460	6.636	90.593	1.460	6.636	90.593	2.103	9.560	85.146
4	.604	2.746	93.339	.604	2.746	93.339	1.143	5.195	90.341
5	.429	1.951	95.290						
6	.237	1.079	95.369						

7	.214	.973	97.342						
8	.114	.519	97.861						
9	.110	.501	98.362						
10	.086	.389	98.750						
11	.110	.501	98.362						
12	.086	.389	98.750						
13	.073	.331	99.082						
14	.049	.224	99.306						
15	.044	.198	99.504						
16	.029	.130	99.635						
17	.027	.125	99.760						
18	.019	.085	99.845						
19	.016	.073	99.917						
20	.013	.061	99.979						
21	.011	.032	99.984						
22	.005	.021	100.000						

Extraction Method: Principal Component Analysis.

The above table shows the actual factors that were extracted. The section labeled "Rotation Sums of Squared Loadings," shows only those factors that met your cut-off criterion (extraction method). In this case, there were six factors with eigenvalues greater than 1. The "% of variance" column shows how much of the total variability (in all of the variables together) can be accounted for by each of these summary scales or factors. The first factor interpretations for 49.861% of the variability in all 22 variables, and so on.

Null Hypothesis (H_0):

There are no significant underlying factors influencing knowledge sharing among faculty members.

Alternative Hypothesis (H_1):

There are significant underlying factors influencing knowledge sharing among faculty members.

Rotated Component Matrix[a]

Variables	Component				
	1	2	3	4	5
The use of digital tools enhances my ability to share knowledge effectively (V1)	0.791				
The integration of e-learning platforms improves faculty collaboration (V2)	0.763				
Virtual academic interactions contribute to better knowledge dissemination (V3)	0.745				
Learning new educational technologies helps me adapt to innovative teaching methods (V4)	0.740				
Engaging in research collaborations with colleagues improves my knowledge-sharing ability (V5)		0.734			
Participating in faculty development programs increases my confidence in sharing knowledge (V6)		0.631			
Institutional support encourages knowledge-sharing initiatives among faculty members (V7)		0.563			
Mentoring junior faculty members enhances my professional development (V8)		0.872			
Cross-disciplinary collaborations encourage innovative teaching methodologies (V9)		0.641			
Attending academic workshops enhances my ability to analyze and interpret research content (V10)			0.638		
Engaging in peer discussions strengthens my reasoning and logical skills for research (V11)			0.906		
Critical thinking exercises improve my ability to generate new academic ideas (V12)			0.897		
Publishing research papers increases my academic recognition and competitiveness (V13)				0.753	

Attending international conferences contributes to career advancement and faculty development (V14)				0.725	
University policies encourage a culture of open knowledge-sharing among faculty (V15)				0.768	
Incentives and rewards for knowledge sharing motivate faculty participation (V16)				0.652	
The institution provides adequate infrastructure for knowledge-sharing activities (V17)				0.694	
I find satisfaction in sharing my expertise with colleagues and students (V18)					0.813
I believe knowledge sharing contributes to my professional identity and reputation (V19)					0.701
My personal learning goals align with the need for collaborative knowledge exchange (V20)					0.678

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization

TABLE SHOWING THE APPLICATION OF PRINCIPAL COMPONENT ANALYSIS IN IDENTIFYING KEY FACTORS INFLUENCING KNOWLEDGE SHARING AMONG FACULTY MEMBERS

Factors	Variable	Factor Loadings
Technological Adaptation	The use of digital tools enhances my ability to share knowledge effectively (V1)	0.791
	The integration of e-learning platforms improves faculty collaboration (V2)	0.763
	Virtual academic interactions contribute to better knowledge dissemination (V3)	0.745
	Learning new educational technologies helps me adapt to innovative teaching methods (V4)	0.740
Collaborative Knowledge Sharing	Engaging in research collaborations with colleagues improves my knowledge-sharing ability (V5)	0.734
	Participating in faculty development programs increases my confidence in sharing knowledge (V6)	0.631
	Institutional support encourages knowledge-sharing initiatives among faculty members (V7)	0.563
	Mentoring junior faculty members enhances my professional development (V8)	0.872

	Cross-disciplinary collaborations encourage innovative teaching methodologies (V9)	0.641
Cognitive and Pedagogical Development	Attending academic workshops enhances my ability to analyze and interpret research content (V10)	0.638
	Engaging in peer discussions strengthens my reasoning and logical skills for research (V11)	0.906
	Critical thinking exercises improve my ability to generate new academic ideas (V12)	0.897
Career and Institutional Growth	Publishing research papers increases my academic recognition and competitiveness (V13)	0.753
	Attending international conferences contributes to career advancement and faculty development (V14)	0.725
Institutional Support & Policies	University policies encourage a culture of open knowledge-sharing among faculty (V15)	0.768
	Incentives and rewards for knowledge sharing motivate faculty participation (V16)	0.652
	The institution provides adequate infrastructure for knowledge-sharing activities (V17)	0.694
Personal Motivation & Attitudes	I find satisfaction in sharing my expertise with colleagues and students (V18)	0.813
	I believe knowledge sharing contributes to my professional identity and reputation (V19)	0.701
	My personal learning goals align with the need for collaborative knowledge exchange (V20)	0.678

The Rotated Component Matrix presents the factor loadings for each variable, categorizing them into five key factors related to knowledge sharing behaviors among faculty members. The table above labels each factor along with its respective factor loadings.

The first factor, Technological Adaptation, highlights that faculty members' ability to adapt to and integrate technology into their teaching practices is crucial for effective knowledge sharing. The variables V1, V2, V3, and V4 (factor loadings: 0.791, 0.763, 0.745, 0.740) suggest that digital tools, e-learning platforms, and virtual academic interactions are essential for updating knowledge, adopting new educational technologies, and facilitating knowledge exchange among faculty.

The second factor, Collaborative Knowledge Sharing, underscores the importance of peer interactions and institutional support in fostering an environment conducive to knowledge sharing. The variables V5, V6, V7, V8, and V9 (factor loadings: 0.734, 0.631, 0.563, 0.872, 0.641) show that faculty members who engage in research collaborations, participate in faculty development programs, and have institutional support are more confident in sharing knowledge. These interactions are key to promoting a collaborative and innovative teaching environment.

The third factor, Cognitive and Pedagogical Development, groups the variables V10, V11, and V12 (factor loadings: 0.638, 0.906, 0.897), indicating that faculty members see knowledge sharing as a way to enhance their cognitive abilities, including reasoning, logical thinking, and critical analysis. These skills are crucial for both academic content analysis and improving teaching methodologies, thus fostering a deeper academic environment.

The fourth factor, Career and Institutional Growth, focuses on how career advancement and institutional support contribute to knowledge sharing behaviors. The variables V13 and V14 (factor loadings: 0.753, 0.725) suggest that faculty members are motivated to share knowledge when it aids in professional growth and provides them with career recognition. Additionally, institutional policies, infrastructure, and incentives play a significant role in motivating faculty to engage in knowledge-sharing activities.

The fifth factor, Personal Motivation and Attitudes, emphasizes the intrinsic factors that influence knowledge sharing, such as personal satisfaction and alignment with professional goals. The variables V18, V19, and V20 (factor loadings: 0.813, 0.701, 0.678) indicate that faculty members who find satisfaction in sharing their expertise and believe it contributes to their professional identity are more likely to share knowledge. Moreover, faculty whose learning goals align with collaborative knowledge exchange show a greater willingness to engage in these behaviors.

The Principal Component Analysis (PCA) results confirm that knowledge sharing among faculty members is influenced by a combination of technological adaptation, collaboration, cognitive and pedagogical development, career growth, and personal motivation. These factors contribute to creating a more engaged and knowledge-sharing academic environment.

DESCRIPTIVE STATISTICS FOR FACTORS INFLUENCING KNOWLEDGE SHARING AMONG FACULTY MEMBERS

Factors	N	Maximum	Mean	Standard Deviation	Variance
Technological Adaptation	100	13.25	8.845	2.4708	6.0897
Collaborative Knowledge Sharing	100	14.25	8.275	2.4083	5.802
Cognitive and Pedagogical Development	100	12.25	6.93	2.2206	4.93
Career and Institutional Growth	100	11.75	5.53	1.9772	3.9123
Institutional Support & Policies	100	13	7.4426	2.1452	4.594
Personal Motivation & Attitudes	100	12	7.084	2.0575	4.2371

Technological Adaptation - Faculty members exhibit a high level of recognition for the role of technological tools and e-learning platforms in improving their knowledge-sharing practices. The relatively high mean value of 8.8450, coupled with a moderate standard deviation of 2.47, suggests that while the majority of respondents agree on the importance of these tools, there is some variation in the level of engagement with technological

aspects. This indicates a strong overall inclination towards adopting digital means for enhancing academic collaboration and sharing knowledge.

Collaborative Knowledge Sharing - The mean value of 8.2750 reflects a strong emphasis placed on collaboration as a significant component of knowledge sharing. Faculty members generally acknowledge the value of working together through research collaborations, mentoring, and cross-disciplinary initiatives. However, the standard deviation of 2.41 shows that there are varying opinions regarding the extent to which such collaborative efforts are embraced, particularly when facilitated through online platforms. Nevertheless, the overall consensus underscores the relevance of collaboration in fostering knowledge dissemination.

Cognitive and Pedagogical Development - A mean score of 6.9300 suggests that faculty members moderately recognize the contribution of online learning and related activities to their cognitive development and pedagogical advancement. This includes aspects such as improved analytical thinking, critical reasoning, and teaching methodologies. The standard deviation of 2.22 indicates noticeable differences in perceptions among faculty members, reflecting individual experiences with and attitudes toward online academic development tools.

Institutional Support and Policies - With a mean of 7.4426, this factor highlights the significant role institutional policies and support systems play in fostering a culture of knowledge sharing. Faculty members generally acknowledge the presence and importance of infrastructure, incentives, and policy frameworks that encourage academic collaboration. The standard deviation of 2.15 points to some variation in how faculty perceive or access this institutional support, likely influenced by departmental differences or administrative practices.

Personal Motivation and Attitudes - The mean score of 7.0840 indicates that personal motivation and positive attitudes toward knowledge sharing are strong among faculty members. Many respondents derive satisfaction from sharing their expertise and see it as integral to their professional identity and growth. The standard deviation of 2.06 suggests that although the overall sentiment is favorable, there are differences in the intensity of individual motivation, likely shaped by personal values, goals, and professional experiences.

The descriptive statistics indicate that faculty members have a strong perception of the role of technology and collaborative learning in facilitating knowledge sharing, with career growth being the least influential factor. Institutions should focus on fostering an environment of technological innovation, collaboration, and personal satisfaction in sharing knowledge while working to improve career-related incentives and professional development opportunities. Since the Principal Component Analysis revealed six distinct factors with strong factor loadings, the Null Hypothesis is rejected, and the Alternative Hypothesis is accepted.

LIMITATIONS

1. Some respondents may not have answered all questions with complete accuracy or seriousness, making it challenging for the researcher to ensure full reliability of the collected data.
2. As the data was collected using a structured questionnaire, the responses are entirely dependent on the honesty and willingness of the faculty members to share their true opinions and experiences.
3. The research findings are based on self-reported perceptions of the faculty members, which may introduce personal bias and subjectivity, potentially affecting the generalizability of the results.

DISCUSSION

- The analysis revealed that technological adaptation is a major factor influencing knowledge sharing among faculty members. Most respondents agreed that digital tools, e-learning platforms, and virtual academic interactions significantly enhance their ability to share knowledge effectively.
- The factor collaborative knowledge sharing highlights the importance of teamwork and academic interactions. Faculty members felt that engaging in research collaborations, mentoring junior staff, and participating in cross-disciplinary initiatives contributed to their knowledge-sharing behavior.
- Cognitive and pedagogical development was moderately recognized, showing that attending workshops, peer discussions, and critical thinking exercises help in enhancing research and teaching capabilities. This indicates that knowledge sharing is not only about content delivery but also about cognitive improvement.
- Career and institutional growth was the least influential factor, suggesting that faculty members do not strongly associate knowledge sharing with career advancement or institutional recognition. This may point to a need for better alignment between knowledge-sharing practices and professional rewards.
- The role of institutional support & policies was clearly significant. Faculty members responded positively to infrastructure, policy support, and incentives provided by institutions, showing that the environment plays a key role in encouraging knowledge sharing.
- Personal motivation & attitudes also influenced knowledge-sharing behavior, with faculty members expressing that personal satisfaction, professional identity, and the alignment of goals with collaborative exchange motivate them to share knowledge.
- The variability in responses across factors indicates that while some faculty members are highly active in knowledge sharing, others may face barriers such as lack of resources, time, or institutional encouragement.

SUGGESTIONS

- Institutions are encouraged to invest in advanced technological tools and user-friendly e-learning platforms to enhance faculty engagement and support seamless knowledge-sharing practices.
- It would be beneficial to promote collaborative initiatives among faculty members, such as research partnerships, faculty development programs, and structured mentorship opportunities, to strengthen knowledge-sharing efforts.
- Organizing specialized workshops and interactive sessions aimed at improving cognitive and pedagogical skills can help faculty enhance their teaching effectiveness and overall academic contributions.
- Establishing clear and transparent pathways for career advancement that are linked to active participation in knowledge-sharing activities can help faculty recognize the professional benefits of such engagement.
- Strengthening institutional policies and introducing well-structured reward systems would provide additional motivation for faculty members to actively share their knowledge within the academic community.
- Cultivating an institutional culture that supports the alignment of personal learning goals with collective knowledge-sharing objectives may further encourage faculty members to contribute meaningfully.

REFERENCES

- Alavi, M., & Leidner, D. E. (2001). **Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues**. *MIS Quarterly*, 25(1), 107–136. https://doi.org/10.2307/3250961
- Bock, G. W., & Kim, Y. G. (2002). **Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing**. *Information Resources Management Journal*, 15(2), 14–21. https://doi.org/10.4018/irmj.2002040102
- Chennamaneni, A. (2006). **Determinants of knowledge sharing behaviors: Developing and testing an integrated theoretical model** (Doctoral dissertation, The University of Texas at Arlington).
- Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Harvard Business Press.
- Ipe, M. (2003). **Knowledge sharing in organizations: A conceptual framework**. *Human Resource Development Review*, 2(4), 337–359. https://doi.org/10.1177/1534484303257985
- Kim, S., & Ju, B. (2008). **An analysis of faculty perceptions: Attitudes toward knowledge sharing and collaboration in an academic institution**. *Library & Information Science Research*, 30(4), 282–290. https://doi.org/10.1016/j.lisr.2008.04.003
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.
- Riege, A. (2005). **Three-dozen knowledge-sharing barriers managers must consider**. *Journal of Knowledge Management*, 9(3), 18–35. https://doi.org/10.1108/13673270510602746