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EXPLORING KNOWLEDGE MANAGEMENT CHALLENGES AMONG VOCATIONAL STUDENTS IN HARYANA: A COMPARATIVE PERSPECTIVE

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Abstract-Knowledge management (KM) is increasingly recognized as a crucial aspect for effective learning and skill development. While extensive research exists on KM challenges within higher education institutions, limited attention has been paid to Industrial Training Institutes (ITIs), which primarily focus on practical skill-based training. Recognizing the unique demands of technical education, preliminary studies suggest that vocational courses may encounter distinct and potentially more pronounced KM challenges compared to traditional academic settings. This paper aims to investigate the knowledge management challenges experienced by ITI students in Haryana. Specifically, it seeks to determine the prevalence of these challenges and explore their variation across key demographic factors, including gender, course type (engineering vs. non-engineering), and area of residence (rural vs. urban). Data were collected from a sample of 509 ITI students in Haryana, and statistical tests were employed to compare the perceived KM challenges across these demographic variables. The findings reveal significant differences, indicating that rural students, female students, and students enrolled in non-engineering trades report facing greater knowledge management challenges. These results underscore the need for targeted interventions and strategies to enhance knowledge management practices within Haryana's ITIs, particularly for these identified student groups, to ultimately improve their learning outcomes and future employability.

Keywords-Vocational Institutes, Knowledge Management, Challenges, ITIs students etc.

I. INTRODUCTION

Traditionally, individuals and organizations have managed knowledge unconsciously. However, with the evolving landscape of education and industry, the necessity of consciously managing knowledge has gained prominence. Over the past decade, knowledge management (KM) has been increasingly recognized as a critical factor in organizational success. More deliberate and structured knowledge management can significantly contribute to organizational efficiency and innovation. Knowledge is a valuable asset that plays a crucial role in achieving individual and institutional goals. The rapid advancements driven by human knowledge are occurring at an unprecedented pace, with many changes being unexpected and irreversible. In this era of science, technology, and knowledge-driven applications, effective knowledge utilization will shape the future of education and professional growth.

II. KNOWLEDGE & KNOWLEDGE MANAGEMENT

Knowledge is the understanding, awareness, or familiarity gained through experience, education, or study. It consists of facts, information, and skills that individuals or groups acquire over time. Knowledge can be explicit, which is documented and easily shared (e.g., books, reports, manuals), or tacit, which comes from personal experience and intuition (e.g., problem-solving skills, expertise). It helps people make informed decisions, solve problems, and innovate in various fields.

- According to Alavi & Leidner (2001), "Knowledge is information combined with experience, context, interpretation, and reflection; it is a high-value form of information that is ready to apply to decisions and actions".
- Nonaka et al. (1996), "Knowledge management is the process of continuously creating, sharing, and utilizing knowledge through the interaction between tacit and explicit knowledge."
- According to Wiig (1997), "Knowledge management involves the systematic organization, structuring, and application of knowledge to improve decision-making and performance."

Knowledge Management (KM) is the systematic process of identifying, capturing, organizing, storing, sharing, and effectively

utilizing knowledge within an organization or institution. It involves transforming tacit knowledge (personal, experience-based knowledge) into explicit knowledge (formal, documented knowledge) to ensure that valuable information is accessible and usable by all stakeholders. It helps people access the right information at the right time to improve learning, decision-making, and performance (Grant, 2007; Davenport, 1998).

III. VOCATIONAL EDUCATION AND RELATED RESEARCH

As per National Center for Education Statistics, 2023, "Vocational education is defined as instruction that directly prepares individuals for employment in recognized occupations, or for advancement within those occupations, encompassing a range of fields from skilled trades to technical and professional careers."

This form of education emphasizes practical skills and knowledge relevant to specific job roles, often incorporating hands-on training and real-world applications to ensure graduates are equipped with the competencies demanded by the workforce. It refers to training and education that equips individuals with specific skills and technical knowledge required for a particular occupation or trade. It emphasizes practical experience and hands-on learning, often preparing learners for direct entry into the workforce or further technical education (UNESCO, 2015; NCERT, 2014).

Review of Literature

Table 1.Reviews Related to Knowledge Management Challenges

Author(s) (Year)	Country	Sample Size	Techniques	Challenges
Suharno, Nugroho Agung Pambudi, & Budi Harjanto (2023)	Indonesia	44 principals, 152 teachers, 202 students	Qualitative (interviews, observation, documentation, questionnaire, inductive & deductive analysis, meta-analysis)	Challenges: Curriculum alignment with industry needs in evolving vocational education.

Kuleto, V., Ilić, M., Dumangiu, M., Ranković, M., Martins, O. M. D., Păun, D., &Mihoreanu, L. (2023)	Serbia	103 students	Literature review, content analysis, survey, correlation matrix, composite reliability, regression analysis	Challenges: Moderate student knowledge of AI/ML and some challenges in its adoption within HEIs.
Kovalchuk, V., Maslich, S., Tkachenko, N., Shevchuk, S., &Shchypska, T. (2022)	Ukraine	695 institutions	Literature review, legislative analysis, trend watching	Challenges: Impact of COVID-19 and martial law on vocational education; need for teacher training, infrastructure upgrades, and alignment with digital skills and lifelong learning.
Khahro, S. H., & Javed, Y. (2022)	Pakistan & Malaysia	172 (out of 210 distributed)	Literature review, expert feedback, descriptive and formative analysis (SPSS 24.0)	Challenges: Enrollment, finance, student support, and transitioning to virtual learning in 21st-century education.
Shahmoradi, L., Changizi, V., Mehraeen, E., Bashiri, A., Jannat, B., & Hosseini, M. (2018)	Iran	300 students	Descriptive, cross-sectional survey (stratified random sampling, SPSS)	Challenges: Technology access (40%), lack of preparedness for E-learning (73.6%), skill and cultural barriers to E-learning.

Mahdi, O. R., Nassar, I. A., &Almsafir, M. K. (2018)	Iraq	525 academic leaders (44 private universities)	Structural Equation Modelling (SEM), quantitative survey	While the study focused on the positive impact of KMP on SCA, potential challenges in effectively implementing these processes within universities could be inferred.
Adhikari, D. R. (2010)	Nepal	Not applicable	Conceptual and descriptive (seminar feedback)	Challenges: Lack of awareness, tools, and practices related to knowledge management among Nepalese academic leaders in achieving quality education.

(Source: Review of Literature)

IV. RESEARCH METHODOLOGY

This study aims to compare the knowledge management challenges faced by students in Industrial Training Institutes (ITIs) in Haryana based on demographic variables. To achieve this objective, a quantitative research design employing a survey method was adopted.

- Participants and Sampling: The target population for this study comprised all students enrolled in ITIs across the state of Haryana. A structured questionnaire was distributed to a sample of 600 ITI students using a convenient sampling technique to ensure broad representation across different institutes and trades. Out of the distributed questionnaires, 509 complete and usable responses were received, yielding a response rate of approximately 84.8%.
- Data Collection Instrument:A structured questionnaire was developed to gather data on the perceived knowledge

management challenges faced by the ITI students. The questionnaire consisted of items designed to assess various aspects of knowledge acquisition, sharing, utilization, and retention. These items were based on a review of relevant literature on knowledge management challenges in educational settings and were adapted to the specific context of vocational training in ITIs. The questionnaire also included a section to collect demographic information, including gender (male/female), course type (engineering/non-engineering trades), and area of residence (rural/urban). The questionnaire utilized a Likert scale to measure the extent to which students agreed with statements related to knowledge management challenges.

V. DATA ANALYSIS

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize the demographic characteristics of the respondents and the overall levels of perceived knowledge management challenges. To compare the knowledge management challenges across the different demographic groups, Independent Samples t-tests were employed. Specifically, the t-tests were conducted to examine the significant differences in the mean scores of the knowledge management challenges scale between:

- Male and female students.
- Students enrolled in engineering and non-engineering trades.
- Students residing in rural and urban areas.

Demographics Variables:

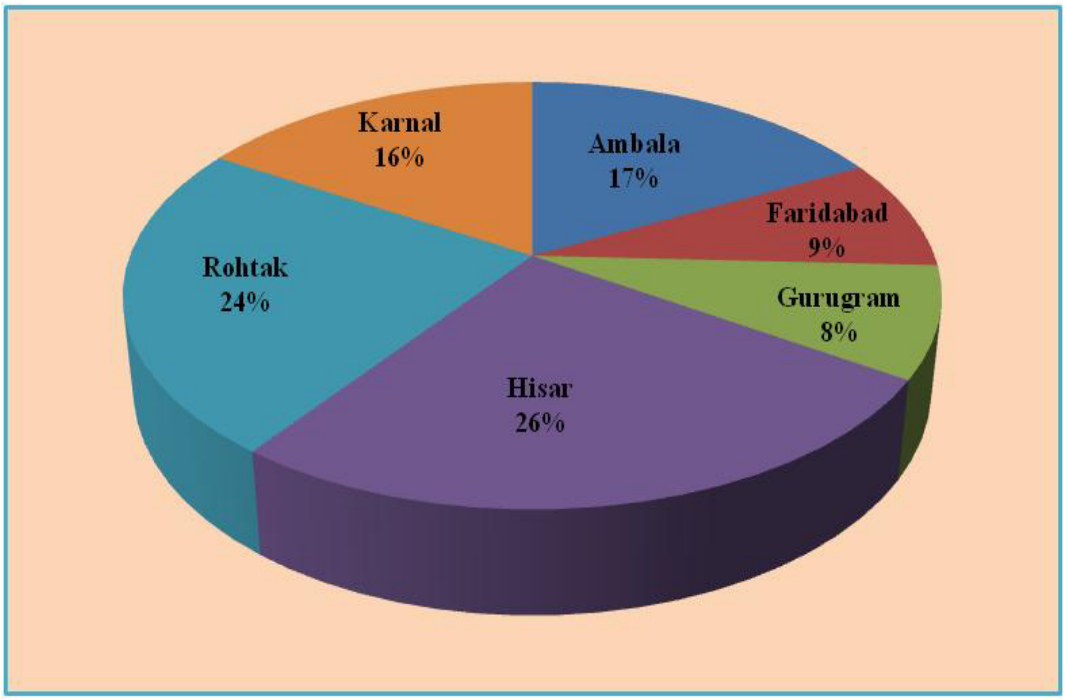

Figure 1. % of Respondents According to the Selected District

Table2. Demographics Variables

Variables	Description	%	Total Frequency
Residential	Rural	55%	280
	Urban	45%	229
Gender	Male	54%	257
	Female	46%	234
Course	Engineering	68.9%	351
	Non- Eng.	31.1%	158

(Source: Calculation by SPSS)

Independent Sample t-test for Knowledge Management Challenges

Analyzing perceived knowledge management challenges between different demographics groups

Hypothesis testing is used in conjunction with inferential statistical analysis to produce results of comparison of opinion of male & female, engineering & non-engineering students and rural & urban students about facing knowledge management challenges. To evaluate the research hypothesis for the comparison, the statistical independent t-test is employed.

An independent t-test between two groups of students of selected ITIs is computed at a significance level of 5% in order to assess the hypothesis. It is used to ascertain whether there is no difference in the mean score between the two categories of observations, or whether the mean difference between the two categories of observations is zero. Responses from the different category of students are measured in an independent t-test, allowing for the independent t-test requires the accomplishment of a few fundamental presumptions before it can be used. The t-test's underlying assumptions are as follows (Kirti, 2024):

- Continuous scale measurement: The first and most crucial premise is that data (the dependent variable) should be on a ratio or interval scale. This condition is fulfilled as the data collected for the comparison is on a five-point Likert scale.
- Independent observation of each category: The population should be independent of each other. One category's measurement does not influence another category's measurement. Here, male and female students' opinion is independent from each other.
- The measurement from the same dependent variable: The measuring instrument needs to be gathered from the same variable. The same variable of this study, i.e., knowledge management challenges variables.
- No outliers: Outliers are unusual values far from most of the data. There is no outlier found in the primary data.
- Test of Normality: Normality of data is already measured with the help of skewness, Kurtosis in descriptive statistics table 4.9, Q-Q plot (figure 4.28) and K-S & S-W (table 4.30) test in the first objective.
- Homogeneity of Variance: Each group's outcome variable variance should be the

same. Using Levene's test, the assumption of homogeneity of variance can be examined in SPSS Statistics. Variance is the square of the standard deviation, which tells whether to apply a t-test. The best way to check the homogeneity of variance is Levene's test. If the significance p-value of Levene's statistics is more significant than 0.05, then it shows an equal variance between all the groups. After confirming the normality of data, it is necessary to check the homogeneity of variance.

Table 3. Homogeneity of Variance

Test of Homogeneity of Variances			
Mean of Knowledge Management Challenges			
Levene Statistic	df1	df2	Sig.
2.642	1	507	.107

(Source: SPSS Output)

As shown in Table above, equal variance is assumed, where the sig p-value is 0.107, which is more than 0.05.

When all the assumptions are fulfilled, the statistically independent two-sample t-test is applied to know any significant difference in the in the mean level of perceived knowledge management challenges between males and females students.

- Hypothesis Testing for Gender wise, course wise and area wise

1st Hypothesis- H_0:There is no significant difference in the mean level of perceived knowledge management challenges between males and females students.

H_1:There is a significant difference in the mean level of perceived knowledge management challenges between males and females students.

2nd Hypothesis- H_0:There is no significant difference in the mean level of perceived knowledge management challenges between rural and urban students.

H_1:There is a significant difference in the mean level of perceived knowledge management challenges between rural and urban students.

3rd Hypothesis- H_0:There is no significant difference in the mean level of perceived knowledge management challenges between engineering and non-engineering students.

H_1:There is a significant difference in the mean level of perceived knowledge management challenges between engineering and non-engineering students.

Table 4. Group Statistics for Knowledge Management Challenges

Demographic	Group	N	Mean	Std. Deviation	Std. Error Mean
Gender	Male	275	4.05	0.257	0.050
	Female	234	4.38	0.072	0.067
Area	Rural	280	4.552	0.170	0.055
	Urban	229	4.003	0.197	0.047
Course Type	Engineering	351	4.102	0.126	0.048
	Non-Engineering	158	4.485	0.118	0.056

The analysis of mean scores reveals notable differences in students' opinions on knowledge management challenges across gender, area, and course type. Female students reported a higher mean score (M = 4.38) compared to male students (M = 4.05), indicating a greater perception of knowledge management challenges among females. Similarly, rural students exhibited a higher mean score (M = 4.552) than their urban counterparts (M = 4.003), suggesting that students from rural areas face or perceive more challenges in managing knowledge. In terms of course stream, non-engineering students reported a higher mean score (M = 4.485) compared to engineering students (M = 4.102), reflecting a stronger awareness or experience of knowledge-related difficulties among non-engineering students. These differences highlight the varying levels of exposure and sensitivity to knowledge management issues based on demographic and academic backgrounds.

Table 5. Independent Samples t-Test Results

Variable	Levene's F	Sig.	t	df	Sig. (2-tailed)	95% CI of the Difference
Gender (Male vs Female)	2.107	0.095	3.814	507	0.000	0.153 to 0.478
Area (Rural vs Urban)	2.131	0.144	-2.211	507	0.025	-0.32033 to -0.01872
Course Type (Engg. vs Non-Engg.)	2.335	0.118	-2.253	507	0.026	-0.323 to -0.021

VI. FINDINGS & RESULT DISCUSSION

Based on the findings, the statistical analysis revealed a significant difference in the perceived knowledge management challenges among the student groups when compared across the demographic variables of gender, course type, and area of residence. Consequently, the null hypothesis, which likely stated that there is no significant difference in knowledge management challenges across these groups, has been rejected. This indicates that a student's gender, the type of course they are enrolled in, and whether they reside in a rural or urban area are factors that

significantly influence the extent of knowledge management challenges they experience. The specifics of these differences are detailed in the subsequent table data.

Table 6.Hypothesis (t test) Testing Results of Demographic Variables on KM Challenges

S. No.	Null Hypothesis (H□)	Mean (Group 1)	Mean (Group 2)	Sig. (p-value)	Remarks
1.	No significant difference in the mean level of perceived knowledge management challenges between males and females students.	4.05 (Male)	4.38 (Female)	0.000 < 0.05	H□ Rejected
2.	No significant difference in the mean level of perceived knowledge management challenges between rural and urban students.	4.552 (Rural)	4.003 (Urban)	0.025 < 0.05	H□ Rejected
3.	No significant difference in the mean level of perceived knowledge management challenges between engineering and non-engineering students.	4.102 (Engineering)	4.485 (Non-Engg.)	0.026 < 0.05	H□ Rejected

The t-test results indicate statistically significant differences in the perception of knowledge management challenges across all three demographic variables. Female students (M = 4.38) reported significantly higher challenges compared to male students (M = 4.05), suggesting gender-based variation in KM experiences. Rural students (M = 4.552) perceived more challenges than urban students (M = 4.003), possibly due to

limited access to KM resources in rural areas. Similarly, non-engineering students (M = 4.485) reported higher challenges compared to engineering students (M = 4.102), reflecting potential differences in This study investigated the knowledge management challenges faced by ITI students in Haryana and examined how these challenges vary across key demographic factors: gender, area of residence, and course type. The findings, based on the analysis of 509 student responses and the application of independent samples t-tests, reveal statistically significant differences in the perception of knowledge management challenges across all three demographic variables. Specifically, female students reported experiencing greater challenges compared to their male counterparts. Similarly, students residing in rural areas perceived more significant knowledge management obstacles than those from urban areas. Furthermore, non-engineering students indicated facing a higher degree of knowledge management challenges compared to students enrolled in engineering trades. These significant differences necessitate the rejection of the null hypotheses, underscoring the substantial influence of demographic and academic curriculum exposure or institutional support. In all cases, the null hypotheses were rejected, indicating meaningful demographic influences on KM perceptions.

Backgrounds on students' experiences with knowledge management within Haryana's ITIs. The implications of these findings highlight the need for targeted interventions and the development of tailored strategies to address the specific knowledge management challenges faced by these identified student groups to ultimately enhance their learning processes and improve their preparedness for future employment.

VII. CONCLUSION

The significant disparities in perceived knowledge management challenges based on gender, area, and course type necessitate targeted interventions within Haryana's ITIs. To address the higher challenges faced by female students, institutions should implement gender-sensitive knowledge sharing platforms and support systems that cater to their specific needs and learning styles. For rural students, efforts should focus on improving access to digital resources, establishing knowledge hubs or community learning centers, and leveraging technology to bridge the urban-rural divide in knowledge accessibility. Furthermore,

tailoring knowledge management strategies to the specific needs of non-engineering trades, potentially through more structured knowledge transfer mechanisms and practical application-focused resources, could mitigate the challenges reported by these students. Overall, these findings underscore the importance of a differentiated approach to knowledge management in vocational training, emphasizing the need for ITIs in Haryana to develop and implement inclusive and equitable strategies that consider the diverse demographic backgrounds of their student population to foster effective learning and enhance future employability for all.

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