Clustering Technique for Analyzing Adjustment Ability of Higher Secondary Students

Karim Ansary

Ph.D. Research Scholar, Department of Education
Sidho-Kanho-Birsha University, Purulia, India

ABSTRACT

The main purpose of this study is to compare the responses provided by the higher secondary school students of West Bengal on their adjustment ability. The study uses a two-step Cluster Analysis technique and a number of clusters are produced with the residence, gender, stream of study, family structure of the students serving as predictors of the clusters. The impact of the predictors on cluster formation is also examined. Each cluster has a different formation in relation to the predictors. The result showed that, whenever the number of clusters are increased, the number of predictorsis also increased. It was also found that gender becomes the most important predictor in cluster two and seven.When 3, 4 and 5 clusters are formed, stream of the study is determined as most important predictor. Lastly, different dimensions of adjustment ability have negligible contribution.

Keywords: Higher Secondary, Cluster Analysis, Predictors, Adjustment,Adjustment Ability

Introduction

Adjustment is a behavioural process by which human and other animals maintain equilibrium among their various needs or between their needs and the obstacles of their environments and the ability, which helps an individual to the adjustment, is called adjustment ability (Haldar et al. 2022; Khatun et al. 2022). Adhikari (2023a) said that adjustment is that state of an individual who is capable of adapting to changes in their physical and social environment. The hierarchical cluster technique is used to organize these recent observations. The two-step Cluster Analysis algorithm may predetermine the number of clusters for the formations of different clusters. The sub clusters are sorted into the required number of cluster during the grouping phase. That serves as the foundation for the analysis. Because there are fewer sub clusters than data, it is simple to apply traditional grouping technique. The accuracy of the technique rises with the number of sub clusters unlike the technique used in Mahalanobis Distance (Adhikari, 2023b; Sen et al, 2023; Mahato and Sen, 2021).

Literature Review

Review on Adjustment Ability

Paramanik, Saha and Mondal (2014) revealed that there is no significant difference between adjustments of students residing either at rural or urban areas. Kar, Saha and Mondal (2016) revealed that emotional intelligence affects home, school and peer adjustment. Kundu, Saha and Mondal (2015) revealed that male and female as well as science and humanities students of undergraduate students did not differ significantly with regards to their adjustment ability. Ansary and Saha (2023) said that the adjustment ability of the students is largely affected by some psychological factors. Ansary, Ansary and Adhikari (2020) revealed that there is no significant difference existing between male-female, rural-urban undergraduate students regarding their attitude towards social adjustment. Ansary (2023) concluded that a person's social attitudes are how they perceive social issues. Ansary and Saha (2023) developed and standardized an adjustment ability inventory. Saha and Adikari (2021) have also conducted a variety of research studies in this field.Kar and Saha (2021) revealed that adjustment ability was significantly correlated with leadership styles.

Review on Cluster Analysis

Adhikari et al. (2023) conducted a study on multi-dimensional data analysis n education. In this study the researcher concluded that cluster analysis can be a powerful data-mining tool for any organization that needs to different groups of psychological measures. Sen et al. (2023) analyzed the leadership style of the head of the institutions through the use of clustering technique. The researcher revealed that whenever the number of clusters was increased, the number of predictors also increased. Mohanta et al. (2023) in their research work Introspecting Institutional Commitment Using Cluster Analysis attempts to study the likeness of the responses given by secondary school teachers regarding Institutional Commitment. The study uses a two-step cluster

analysis technique, and various clusters are produced in relation to the gender of the teachers and the locations of the institutions. The impact of the Predictors on cluster formation is also examined. Mohanta et al. (2023) in their research work Perceptional Environment: A Study on Organizational Climate Using Cluster Analysis. The findings of this study showed that gender effects the conclusions about the institutional atmosphere. Gorainet al. (2022) in their research paper A Study on Relationship and Cluster Analysis among Internet Dependency, Social Isolation and Personality. Saha, Sen and Adhikari (2021) in their research paper analysis of attitude towards yoga among college students using clustering techniques discuss views regarding yoga practice and examined among college students in the Purulia, India. To conduct the research, a two-step cluster analysis is used to establish five clusters. Adhikari and Sen (2023), Ansary et al. (2023), Adhikari and Sen (2023) have also conducted a variety of research studies in this field.

Methodology

Method: Descriptive survey method is used in this research work.

Sample: To undertake the research work a sample of 1000 undergraduate students were taken.

Sampling procedure: Stratified random sampling has been employed by the investigators to collect responses from the respondents.

Statistical techniques used: In order to classify the total sample into different cluster, two step clustering technique is used in the research work.

Result and Discussion

Table 1: Formation of 2 Clusters

Clusters

Input (Predictor) Importance
■ 1.0 ■ 0.8 ■ 0.6 ■ 0.4 □ 0.2 □ 0.0

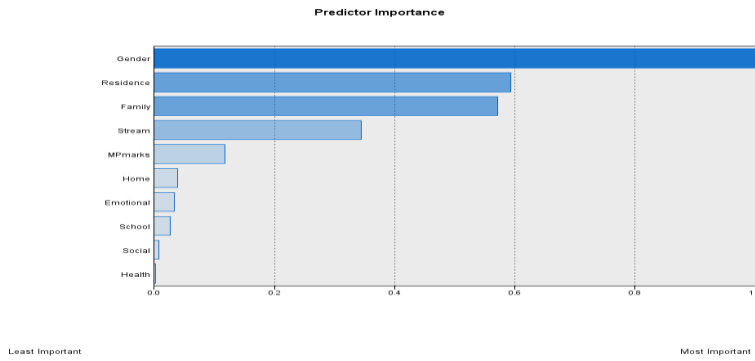| Cluster	2	1
Label		
Description		
Size	69.8% (698)	30.2% (302)
Inputs	Gender Male (59.3%)	Gender Female (100.0%)
	Residence Rural (58.0%)	Residence Rural (100.0%)
	Family Joint (59.2%)	Family Joint (100.0%)
	Stream Arts (72.6%)	Stream Arts (100.0%)
	MPmarks 376.33	MPmarks 330.65
	Home 47.95	Home 49.44
	Emotional 32.76	Emotional 31.75
	School 55.61	School 56.89
	Social 50.83	Social 50.32
	Health 40.35	Health 40.19

Figure 1: Predictor importance for the clusters described in Table 1

Table 1, represent the clusters formed by higher secondary students in which cluster 2 is the largest cluster consisting of rural areas students (100%), dominated by female higher secondary students (100%) and is 30.2% of the total sample size. Cluster 2 dominated by male higher secondary students (59.3%) and made up of 69.8% of total sample size, consisting of rural institutions of 58.0. From figure 1 it is clear that gender is major predictor of the cluster, where residence and family structure ismoderate predictor and stream, marks and all the dimensions of adjustment ability are very low predictors of the clusters mentioned in Table 1.
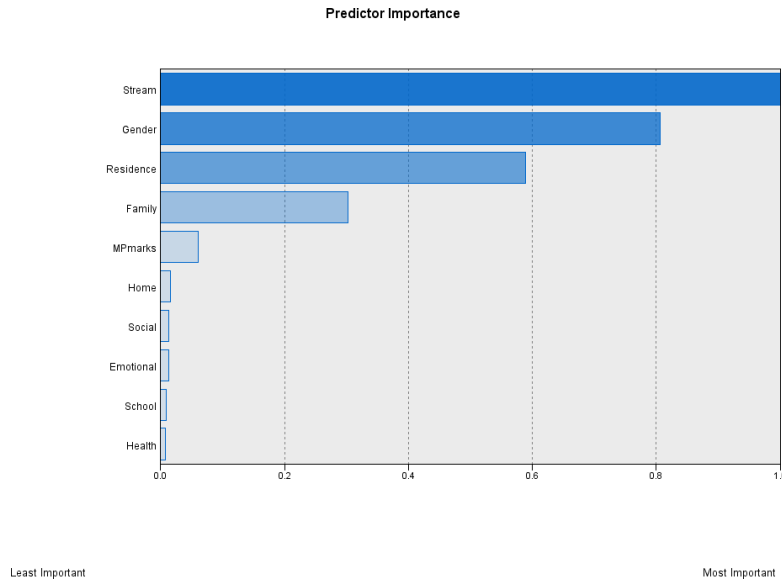
Table 2: Formation of 3 clusters

Figure 2: Predictor importance for the clusters described in Table 2

Table 3 represents the clusters formed by higher secondary school students in which cluster 2 is the largest cluster with arts stream students (100%), consisting of male students (81.1%) and is 43.4% of the total sample size and cluster 1is the second largest cluster formed byarts stream students (100%), consisting of female students (100%) and is 30.2% of the total sample size. and cluster 3 is dominated by science stream students 72.3% female students consisting of (76.5%) and 26.4% of total sample size. From Figure 2 it is clear that stream and gender are major predictors of the clusters, where residence is moderate predictors of the clusters and family, marks and dimensions of adjustment ability is low predictors of the cluster mentioned in Table 2.

Table 3: Formation of 4 clusters

| Cluster	1	3	2	4
Label				
Description				
Size	30.2% (302)	26.4% (264)	25.7% (257)	17.7% (177)
Inputs	Stream Arts (100.0%)	Stream Science (72.3%)	Stream Arts (100.0%)	Stream Arts (100.0%)
	Gender Female (100.0%)	Gender Female (76.5%)	Gender Male (100.0%)	Gender Male (53.7%)
	Family Joint (100.0%)	Family Joint (70.5%)	Family Joint (88.3%)	Family Nuclear (100.0%)
	Residence Rural (100.0%)	Residence Urban (73.9%)	Residence Rural (61.9%)	Residence Rural (100.0%)
	MPmarks 330.65	MPmarks 391.42	MPmarks 385.00	MPmarks 341.22
	Home 49.44	Home 48.33	Home 47.39	Home 48.21
	Social 50.32	Social 49.91	Social 51.84	Social 50.73
	Health 40.19	Health 39.73	Health 41.29	Health 39.92
	Emotional 31.75	Emotional 32.61	Emotional 32.98	Emotional 32.67
	School 56.89	School 55.88	School 55.79	School 54.93
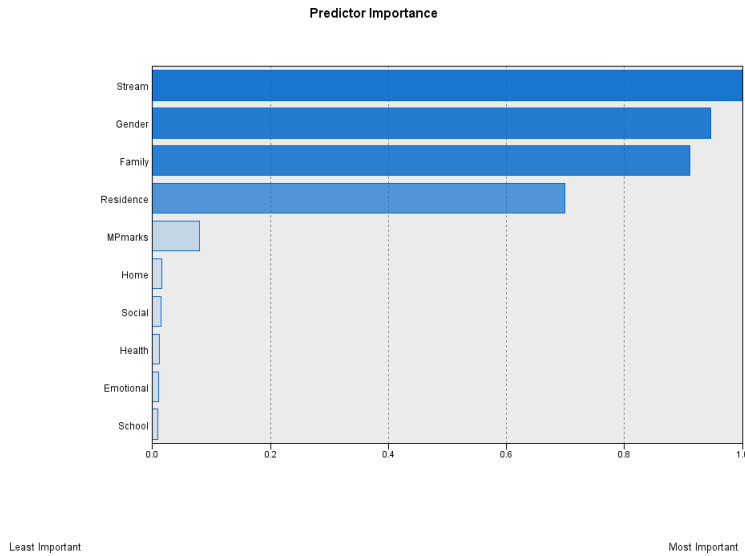
Figure 3: Predictor importance for the clusters described in Table 3

Table 3 represents the clusters formed by higher secondary students in which cluster 4 is the largest cluster consisting of arts stream students (100%) of female students (100%) and is 30.2% of the total sample size. Cluster 1 (dominated by science stream 72.3%) and cluster 2 (dominated by arts 100%) consist of 26.4% and 25.7% of total sample size respectively with female students (76.5%) male (100%) for each cluster. Cluster 4(consists of arts students 100%) is the smallest cluster consisting of 17.7% of the total sample size with a majority of male (53.7%) higher secondary students. From figure 3 it is clear that stream, gender, family and residence are high predictors where, marks is recognized as low predictor and dimensions of adjustment ability is negligible predictor of the clusters mentioned in Table 3.

Table 4: Formation of 5 clusters

Clusters

Input (Predictor) Importance
■1.0 ■0.8 ■0.6 ■0.4 □0.2 □0.0

| Cluster	1	2	5	3	4
Label					
Description					
Size	30.2% (302)	25.7% (257)	17.7% (177)	16.8% (168)	9.6% (96)
Inputs	Stream Arts (100.0%)	Stream Arts (100.0%)	Stream Arts (100.0%)	Stream Science (56.5%)	Stream Science (100.0%)
	Gender Female (100.0%)	Gender Male (100.0%)	Gender Male (53.7%)	Gender Female (100.0%)	Gender Male (64.6%)
	Residence Rural (100.0%)	Residence Rural (61.9%)	Residence Rural (100.0%)	Residence Urban (100.0%)	Residence Rural (71.9%)
	Family Joint (100.0%)	Family Joint (88.3%)	Family Nuclear (100.0%)	Family Joint (77.4%)	Family Joint (58.3%)
	MPmarks 330.65	MPmarks 385.00	MPmarks 341.22	MPmarks 359.19	MPmarks 447.81
	School 56.89	School 55.79	School 54.93	School 57.00	School 53.93
	Home 49.44	Home 47.39	Home 48.21	Home 49.01	Home 47.14
	Social 50.32	Social 51.84	Social 50.73	Social 50.38	Social 49.09
	Health 40.19	Health 41.29	Health 39.92	Health 39.75	Health 39.71
	Emotional 31.75	Emotional 32.98	Emotional 32.67	Emotional 32.58	Emotional 32.65

Predictor Importance
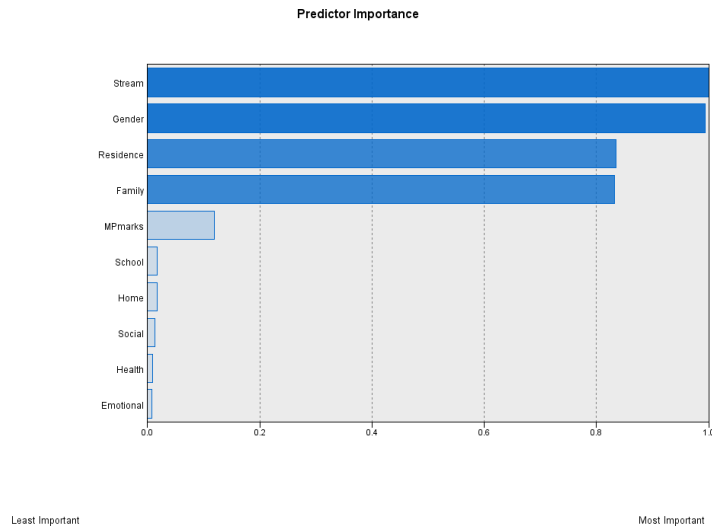
Figure 4: Predictor importance for the clusters described in Table 4

Table 4 represent the clusters formed by higher secondary school students in which cluster 1 is the largest cluster consisting of arts stream higher secondary students (100%) of female students (100%) and is 30.2% of the total sample size.Cluster 2 is the second largest cluster consisting of arts (100%) of male students (100%) and is 25.7% of total sample size. Cluster 5 (arts students 100%) consist of male 53.7% male with sample size 17.7% of total sample size. Cluster 3 is dominated by science students 56.5% consist of female (100%) with sample size 16.8% of total sample size. Cluster 4 formed by 100% science studentsis the smallest cluster consist of male (64.4%) with sample size 9.6% of total sample size. From figure 4 it is clear that stream, gender, residence and family structure are high predictors. Where, mark is low predictorsand dimensions of adjustment ability is negligible predictor of the clusters mentioned in Table 4.

Table 5: Formation of 7 clusters

Clusters

Input (Predictor) Importance
■1.0 ■0.8 ■0.6 ■0.4 ■0.2 □0.0

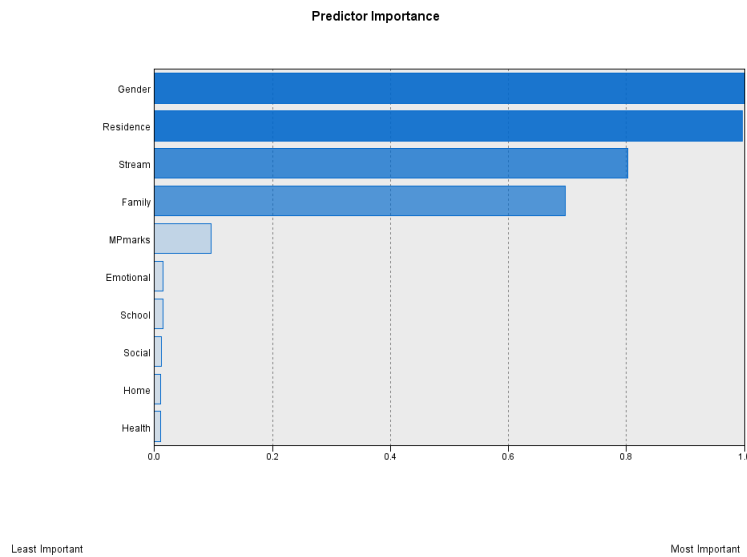| Cluster	1	3	2	4	5	6	7
Label							
Description							
Size	30.2% (302)	16.8% (168)	15.9% (159)	9.8% (98)	9.6% (96)	9.5% (95)	8.2% (82)
Inputs	Gender Female (100.0%)	Gender Female (100.0%)	Gender Male (100.0%)	Gender Male (100.0%)	Gender Male (64.6%)	Gender Male (100.0%)	Gender Female (100.0%)
	Residence Rural (100.0%)	Residence Urban (100.0%)	Residence Rural (100.0%)	Residence Urban (100.0%)	Residence Rural (71.9%)	Residence Rural (100.0%)	Residence Rural (100.0%)
	Stream Arts (100.0%)	Stream Science (56.5%)	Stream Arts (100.0%)	Stream Arts (100.0%)	Stream Science (100.0%)	Stream Arts (100.0%)	Stream Arts (100.0%)
	Family Joint (100.0%)	Family Joint (77.4%)	Family Joint (100.0%)	Family Joint (69.4%)	Family Joint (58.3%)	Family Nuclear (100.0%)	Family Nuclear (100.0%)
	MPmarks 330.65	MPmarks 359.19	MPmarks 375.48	MPmarks 400.45	MPmarks 447.81	MPmarks 354.57	MPmarks 325.76
	Emotional 31.75	Emotional 32.58	Emotional 32.25	Emotional 34.17	Emotional 32.65	Emotional 33.39	Emotional 31.83
	School 56.89	School 57.00	School 55.08	School 56.95	School 53.93	School 54.85	School 55.02
	Social 50.32	Social 50.38	Social 51.14	Social 52.99	Social 49.09	Social 50.96	Social 50.46
	Home 49.44	Home 49.01	Home 47.21	Home 47.67	Home 47.14	Home 48.05	Home 48.39
	Health 40.19	Health 39.75	Health 40.53	Health 42.52	Health 39.71	Health 39.97	Health 39.85

Figure 5: Predictor importance for the clusters described in Table 5

Table 5 represent the seven clusters formed by higher secondary school students in which cluster 1 is the largest cluster consisting of female higher secondary students (100%) of rural students (100%) and is 30.2% of the total sample size. Cluster 3 is the second largest cluster consisting of female (100%) of urban students (100%) and is 16.8% of total sample size. Cluster 2 (male 100%) students consist of rural (100%) with sample size 15.9% of total sample size. Cluster 4 (male 100%) consist of urban students (100%) with sample size 9.8% of total sample size. Cluster 5 (male 64.6%) consist of (rural 71.9) with sample size 9.6% of total sample size. Cluster 7 is the smallest cluster consists of female (100%) of rural (100%) with sample size 8.2% of total sample size. From figure 5 it is clear that gender, residence, stream and family structure are high predictors. Where, mark is low predictors and dimensions of adjustment ability is negligible predictor of the clusters mentioned in Table 5.

Conclusion

From the above analysis it isfound that when there are two clusters, gender is the only important predictor of the clusters and when the number of cluster increases three than the important of predictors of the cluster are also increased. With increase of one more cluster, stream and gender become two important predictors but when the number of cluster are increased four, five or seven then predictors like stream, gender, family structure and residence become important predictors. Therefore, to summarize, whenever the number of clusters are increased, the number of predictors also increase. Another finding of this study also revealed that the components of adjustment ability, home, emotional, physical, social and educational adjustment becomes the negligible predictors in every cluster.

References

1. Adhikari, A. (2023a). Socio-educational perspectives: A study on human adjustment. *EPRA International Journal of Research & Development (IJRD), 8*(1), 97-101.

2. Adhikari, A. (2023ba). Application of Mahalanobis distance in education and educational psychology: A Mini Review. *Innovare Journal of Education. 11* (4), 5-7.

3. Adhikari, A., & Sen, S. (2023). Cluster analysis on institutional commitment and organizational climate. International Journal of Research Publication and Reviews, 4(5), 4974-4988

4. Adhikari, A., & Sen, S. (2023). Recent trends of cluster analysis in education. *International Research Journal of Modernization in Engineering Technology and Science, 05*(08), 1858-1861.

5. Adhikari, A., Gayen, P., Mahato, R. C., Pal, I., & Sen, S. (2023). Multi-Dimensional Data Analysis in Education: Accumulation and Comparison among Variables. *International Journal of Research Publication and Reviews, 4*(5), 2243-2245.

6. Ansary, K. (2023). Social attitude and adjustment: A critical review. *Galore International Journal of Applied Sciences and Humanities, 7*(1), 26-32.

7. Ansary, K., & Saha, B. (2023). A critical review on adjustment ability of the students. *International Journal of All Research Education and Scientific Methods (IJARESM), 11*(5), 2040-2044.

8. Ansary, K., & Saha, B. (2023). Construction and standardization of adjustment ability inventory. *International Journal of Creative Research Thoughts (IJCRT), 11*(3), h559-h567.

9. Ansary, S., Ansary, K., & Adhikari, A. (2022). Attitude towards social adjustment among the undergraduate students of Purulia District. *EPRA International Journal of Research & Development (IJRD),7*(12), 21-26.

10. Gorain, S. C., Saha, B., Maji, S., & Sen, S. (2022). A study on relationship and cluster analysis among internet dependency, social isolation and personality. International Journal of Research Publication and Reviews, 3(1), 884-888.

11. Haldar, P., Roy, S., Gorain, S.C., Adhikari, A. & Saha, B. (2022). Measuring Attitude towards Sustainable Development among Trainee Teachers in Purulia District of West Bengal. *American Journal of Educational Research. 10*(12), 682-696.

12. Kar, D., & Saha, B. (2021). Leadership style and Adjustment Ability among Undergraduate Students: A Correlational Study. International Journal of Creative Research Thoughts, 9(9), d148-d151.

13. Kar, D., Saha, B., & Mondal, B. C. (2016). Emotional intelligence and adjustment ability among higher secondary school students: A Correlational study. *American Journal of Social Sciences, 4*(4), 34-37.

14. Khatun, S., Ansary, K. & Adhikari, A. (2022). Attitude towards yoga education among undergraduate students. *EPRA International Journal of Multidisciplinary Research (IJMR). 8*(12), 9-13.

15. Kundu, M., Saha, B., & Mondal, B. C. (2015). Adjustment of undergraduate students in relation to their social intelligence. *American Journal of Educational Research, 3*(11), 1398-1401.

16. Mahato, R. C. & Sen, S. (2021). Application of Mahalanobis Distance to Determine the Dynamical Nature of Academic Stress, Self-efficacy in Mathematics and Anxiety in Mathematics. *International Journal of Advances in Engineering and Management (IJAEM). 3*(5). 1398-1401.

17. Mohanta, R., Adhikari, A., Pal, I., & Sen, S. (2023). Introspecting Institutional Commitment Using Cluster Analysis. *International Research Journal of Education and Technology, 5*(4), 198-217.

18. Mohanta, R., Sen, S., Adhikari, A., & Pal, I. (2023). Perceptional Environment: A Study on Organizational Climate Using Cluster Analysis. *International Journal of Research Publication and Review, 4*(4), 1336-1346.

19. Paramanik, J., Saha, B., & Mondal, B. C. (2014). Adjustment of secondary school students with respect to gender and residence. *American Journal of Educational Research, 2*(12), 1138-1143.

20. Saha, B. Sen, S & Adhikari, A. (2021). Analysis of Attitude towards Yoga among College Students Using Clustering Techniques. *EPRA International Journal of Multidisciplinary Research (IJMR), 7*(9), 308-314. DOI: https://doi.org/10.36713/epra8552

21. Saha, B., & Adhikari, A. (2021). Measuring social relationship of undergraduate college students of West Bengal. *Education India Journal: A Quarterly Refereed Journal of Dilogues on Education, 10*(4), 261-269.

22. Sen, S., Adhikari, A., Ansary, K., Roy, S. & Pal, I. (2023). Clustering Technique for Analyzing Leadership Style of the Head of the Institutions. *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), 3*(3), 220-228.

23. Sen, S., Gayen, P., Pal, I., Sutradhar, A., Ansary, K., Mahato, R.C., Adhikari, A. (2023). Comparison among Different Leadership Styles of Head of the Institution of West Bengal by Mahalanobis Distance. *International Research Journal of Modernization in Engineering Technologyand Science. 5*(4). 5005-5010.