

AN ANALYTICAL STUDY ON PERSONALITY ASSESSMENT TOOLS IN HUMAN RESOURCE MANAGEMENT (HRM) USED BY IT COMPANIES

Ms. Asmita Gargote

Research Scholar, Commerce & Management, Sanjay Ghodawat University, Kolhapur, Maharashtra
gargote.asmita@gmail.com

Dr. Revati Deshpande

Associate Professor, Commerce & Management (faculty), Sanjay Ghodawat University, Kolhapur, Maharashtra
revati.deshpande@sanjayghodawatuniversity.ac.in

Abstract

A research entitled “An analytical study on personality assessment tools in human resource management (HRM) used by IT companies” was undertaken to analyze usage of personality assessment tools in HRM by IT companies. Before the main study was undertaken a pilot study was conducted to get a feel of issues encountered in data collection, to test the usage of the questionnaire, to test the hypotheses as per research methodology, and to test validity and reliability of questionnaire prepared for primary data collection. This report presents the results of the pilot study. There are multiple factors that influence the adoption of personality assessment tools in HRM Practices. The personality assessment tools used in HRM Practices are not effective. There are major challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies. There is awareness of graphology/graphotherapy as an HR tool. However, the usage of graphology/graphotherapy as an HR tool is low. The proposed framework will be effective.

Keywords: PA tools, Human Resource Management, Graphology, IT Companies

1. Introduction

A research entitled “An analytical study on personality assessment tools in human resource management (HRM) used by IT companies” was undertaken to analyze usage of personality assessment tools in HRM by IT companies. The objectives of the study were:

- i) To identify the types of personality assessment tools predominantly used by IT companies,
- ii) To investigate the factors influencing the adoption of personality assessment tools in HRM Practices of IT companies,
- iii) To evaluate the effectiveness of personality assessment tools in HRM Practices of IT employees,
- iv) To analyze the challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies,
- v) To explore awareness & usage of graphology/graphotherapy as an HR tool, and
- vi) To develop a framework for the effective utilization of personality assessment tools in HRM Practices of IT companies.

Before the main study was undertaken a pilot study was conducted to get a feel of issues encountered in data collection, to test the usage of the questionnaire, to test the hypotheses as per research methodology, and to test validity and reliability of questionnaire prepared for primary data collection. This report presents the results of the pilot study.

2. Literature Review

The literature review delves into existing studies on AI-driven personality assessments, their impact on HR decision-making, and their role in fostering innovation. Key areas of exploration include:

1. Theoretical frameworks underpinning personality assessments and creativity measurement (Robinson et al., 2019; Kim & Patel, 2021)
2. AI applications in HR and workforce analytics (Liang et al., 2022; Sharma & Gupta, 2020)
3. Case studies on organizations implementing AI-based assessments (Nguyen, 2021; Carlson, 2023)
4. Ethical concerns and biases in AI-driven HR tools (Singh & Mukherjee, 2020; Davis, 2022)
5. Future trends and advancements in AI for workforce development (Hernandez & Lopez, 2021)

3. Methodology

Population- 1,70,000 IT companies in India (Easyleadz.com, 2025). Assuming ten HR senior employee per company, the population was estimated to be 1.70 million employees.

Sample- As per Krejcie and Morgan (1970), at 95% confidence level and 5% confidence interval, sample size for a population of 1.70 million comes to 385, which was rounded off to 400. The sample size of 400 takes care of a much larger population as the sample size doesn't change much after the threshold of 20,000. The selection criterion for company was that it should have a minimum average turnover of Rs.100 crores.

Sampling unit and respondents: HR department employees were the sampling unit. Inclusion criteria were that they should be at least of the cadre of Officers.

Sampling Method: Convenience and Snowball sampling methods were used considering the practical constraints.

For the pilot study, 100 employees were selected as sample representing 25% of the main study sample.

Instrument for survey – A questionnaire was designed for the study. The questionnaire had six sections. Each section had ten statements and responses were sought on a 5-point Likert scale – Somewhat agree, Strongly agree, Neither agree nor disagree, Somewhat disagree, Strongly disagree. The questionnaire was tested for validity and reliability as under:

Test of validity – The instrument's face and content validity were validated by the guide and experts known to the researcher.

Construct validity was checked by measuring convergent and discriminant validity through Pearson's correlation. Convergent and discriminant validity scores for the six sections of the questionnaires are given below:

Table 1: Convergent and Discriminant validity scores

Sr. No.	Section	Convergent validity	Discriminant validity
1	I. Factors influencing choice of personality assessment tools	0.65	-0.01
2	II. Effectiveness of personality assessment (PA) tools in HRM Practices	0.54	-0.01
3	III. Challenges faced in using personality assessment tools	0.52	-0.44
4	IV. Awareness of Graphology/Graphotherapy	0.50	0.36
5	V. Application of Graphology/Graphotherapy	0.57	-0.01
6	VI. Proposed framework for developing PA tools	0.92	-0.08

Convergent validity values were found to be above the rule of thumb of 0.50 (Nikolopoulou, 2022a). Similarly, the discriminant validity values were found to be lower than the rule of thumb of 0.85 (Nikolopoulou, 2022b).

Test of reliability – Cronbach's Alpha test was applied on the questionnaire using "Siegle Reliability Calculator" an excel program. The Cronbach's alpha scores are given in a table.

Table 2: Cronbach Alpha scores

Sr. No.	Section	Number of statements	Cronbach Alpha score
1	I. Factors influencing choice of personality assessment tools	10	0.94
2	II. Effectiveness of personality assessment (PA) tools in HRM Practices	10	0.86
3	III. Challenges faced in using personality assessment tools	10	0.90
4	IV. Awareness of Graphology/Graphotherapy	10	0.88
5	V. Application of Graphology/Graphotherapy	10	0.92
6	VI. Proposed framework for developing PA tools	10	0.98

As the Cronbach's alpha scores were more than 0.70, the questionnaire was considered as reliable.

Hypotheses formulation

The hypotheses formulation is presented below:

Ho1: There are few factors that influence the adoption of personality assessment tools in HRM Practices

Ha1: There are multiple factors that influence the adoption of personality assessment tools in HRM Practices

Ho2: The personality assessment tools used in HRM Practices are effective

Ha2: The personality assessment tools used in HRM Practices are not effective

Ho3: There are no major challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies

Ha3: There are major challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies

Ho4: The awareness of graphology/graphotherapy as an HR tool is not there

Ha4: There is awareness of graphology/graphotherapy as an HR tool

Ho5: The usage of graphology/graphotherapy as an HR tool is high

Ha5: The usage of graphology/graphotherapy as an HR tool is low

Ho6: The proposed framework will not be effective

Ha6: The proposed framework will be effective

Scheme formed for testing of hypotheses

- A survey questionnaire was designed to collect primary data in order to test the hypotheses as stated earlier.
- The questionnaire was administered to HRM employees of IT across India.
- The questionnaire had VI sections in addition to the Profile section. Each section had ten statements.
- Responses to these statements were taken on 5-point Likert scale of agree/disagree.
- For the hypotheses from H1, H2, H3-H6 a t-test was used.
- Average agreement/disagreement scores for each of the sections were calculated for all the 10 sub-responses under each of them for the 100 respondents.
- Weights of 2 were used to value extreme (strongly agree and strongly disagree) responses and distinguish them from moderate (somewhat agree and somewhat disagree) responses which were valued at 1.
- Using these weights two summations were derived for each statement adding the strongly agree and somewhat agree responses and somewhat disagree and strongly disagree responses.
- Based on the summations, percentages of agreement and disagreement were worked out for each of the statement.
- Using a t-test, the higher average agreement/disagreement scores (average of 10 sub-responses) were compared with a hypothesized population mean of 50% agreement/disagreement, connoting an event by chance.
- A t-test was used since the standard deviation of the population was unknown (Had the standard deviation of the population been known a Z-test would have been used).
- In case of H3, regression analysis was used. Challenges in usage of tools were taken as the independent variable. Effective usage of tools was taken as the dependent variable.
- Responses to Section II and III for the purpose of regression analysis were valued as 0 for Neither agree no disagree, 1 for Somewhat agree, 2 for Strongly agree, -1 for Somewhat disagree, and -2 for Strongly disagree.
- Taking these values into consideration average scores were calculated for each of the 100 respondents. R^2 , r , and p -values were calculated.
- P -values were calculated and the null hypotheses were tested for rejection or non-rejection at 95% confidence level.

4. Data analysis

a. Descriptive analysis – Profile of the sample

Table 3: Profile of sample for pilot study (n=100)

Variable	Category	Count	%
Zone	North	12	12
	East	19	19
	West	40	40
	South	29	29
Business area	Software	37	37
	Hardware	19	19
	ITES	19	19
	Mix	25	25
Standing of the Company	<5 years	3	3
	5-10 years	32	32
	11-15 years	36	36
	>15 years	29	29
Turnover	Rs.100-500 crores	34	34
	Rs.500-1000 crores	39	39
	>Rs.1000 crores	37	37
Gender	Male	54	54
	Female	44	44
	Prefer not to say	2	2
Designation	Officer	45	45
	Manager	51	51
	Director	4	4
Age of employee	<30 years	23	23
	30-39 years	51	51
	40-49 years	23	23
	>=50 years	3	3
Total work experience	<5 years	11	11
	5-10 years	35	35
	11-20 years	38	38
	>20 years	16	16
Educational qualification	Graduate	44	44
	PG	53	53
	Doctorate	3	3
PA tool used	Graphology	9	9
	MBTI	3	3
	DISC PA	7	7
	HPI	1	1
	Big 5	6	6
	16 PF	4	4
	Psychometric Interview	43	43

	Caliper-Profile	10	10
	TKI	4	4
	AI Based tools	4	4
	Other	6	6
	Mix of above	3	3

b. Inferential analysis (Testing of hypotheses)

To find out the predominant PA tool used, the highest percentage was compared with the second highest percentage, and the difference between the two was found and was ascertained if it is of statistical significance at 95% confidence level.

Table 4: Predominant PA tool used

Parameter	Value
Highest usage (Psychometric Interview)	43%
SD (Standard Deviation of sample)	1.33
Second highest usage (Caliper-Profile)	10%
n (Sample Size)	100
t-value (Ho-H1) / ((SD) / $\sqrt{n}$)	1.19
p-value	0.1181

Table 5: Summary of responses to Section I of the questionnaire

Qstn.	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	Average
Agree %	76%	82%	76%	70%	81%	75%	78%	67%	87%	86%	78%

The average agreement of the sample was compared with a hypothesized population mean of 50% agreement connoting an event by chance using a t-test and the results are given below:

Table 6: Testing of H1

Parameter	Value
Average = Ho (Sample mean)	78%
SD (Standard Deviation of sample)	1.31
H1 (Hypothesized mean of population)	50%
n (Sample Size)	100
t-value (Ho-H1) / ((SD) / $\sqrt{n}$)	2.13
p-value	0.02

Table 7: Summary of responses to Section II of the questionnaire

Qstn.	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	Average
Disagree %	89%	91%	93%	85%	62%	93%	95%	94%	95%	93%	89%

The average disagreement of the sample was compared with a hypothesized population mean of 50% disagreement connoting an event by chance using a t-test and the results are given below:

Table 8: Testing of H2

Parameter	Value
Average = Ho (Sample mean)	89%
SD (Standard Deviation of sample)	1.189
H1 (Hypothesized mean of population)	50%
n (Sample Size)	100
t-value (Ho-H1) / ((SD) / $\sqrt{n}$)	3.28
p-value	<0.0001

As the p-value of 0.1181 is >0.05, the predominance in terms of statistical significance could not be established. However, in general, it can be inferred that Psychometric Interview is the predominant PA tool used in the IT sector.

Ho1: There are few factors that influence the adoption of personality assessment tools in HRM Practices

Ha1: There are multiple factors that influence the adoption of personality assessment tools in HRM Practices

The hypothesis was tested based on average responses to Section I of the questionnaire. Summary of the average responses to the ten statements of the said section is given below:

Since, the p-value of 0.02 is <0.05, the null hypothesis, there are few factors that influence the adoption of personality assessment tools in HRM Practices, was rejected in favor of its alternate, there are multiple factors that influence the adoption of personality assessment tools in HRM Practices.

Ho2: The personality assessment tools used in HRM Practices are effective

Ha2: The personality assessment tools used in HRM Practices are not effective

The hypothesis was tested based on average responses to Section II of the questionnaire. Summary of the average responses to the ten statements of the said section is given below:

Since, the p-value of <0.0001 is <0.05 , the null hypothesis, the personality assessment tools used in HRM Practices are effective, was rejected in favor of its alternate, the personality assessment tools used in HRM Practices are not effective.

Ho3: There are no major challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies

Ha3: There are major challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies

In case of H3, regression analysis was used. Challenges in usage of tools were taken as the

independent variable. Effective usage of tools was taken as the dependent variable.

Responses to Section II and III for the purpose of regression analysis were valued as 0 for Cannot say, 1 for Agree, 2 for Strongly agree, -1 for Disagree, and -2 for Strongly disagree. Summary of the regression analysis are given below:

Table 9: Regression statistics – H3

Regression Statistics	
R Squared	0.790
Adjusted R Square	0.788
r (Pearsons correlation)	-0.89
Observations	100

Table 10: Hypothesis testing – H3

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Regression	1.000	39.899	39.899	368.139	<0.0001
Residual	98.000	10.621	0.108		
Total	99.000	50.520			

Going by the values of R^2 (0.790), r (-0.89), and p -value (<0.0001), it was inferred that the challenges have a significant negative impact on effectiveness of usage of PA tools. The null hypothesis, there are no major challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies, was rejected in favor of its alternate, there are major challenges faced by HR professionals in using personality assessment tools

for recruitment, selection, and employee development in IT Companies.

Ho4: The awareness of graphology/graphotherapy as an HR tool is not there

Ha4: There is awareness of graphology/graphotherapy as an HR tool

The hypothesis was tested based on average responses to Section IV of the questionnaire. Summary of the average responses to the ten statements of the said section is given below:

Table 11: Summary of responses to Section IV of the questionnaire

Qstn.	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.10	Average
Agree%	78%	86%	89%	81%	74%	73%	93%	91%	85%	88%	84%

The average agreement of the sample was compared with a hypothesized population mean of 50% agreement connoting an event by chance using a t-test and the results are given below:

Table 12: Testing of H4

Parameter	Value
Average = Ho (Sample mean)	84%
SD (Standard Deviation of sample)	1.23
H1 (Hypothesized mean of population)	50%
n (Sample Size)	100
t-value (Ho-H1) / ((SD) / $\sqrt{n}$)	2.79
p-value	0.003

Since, the p-value of 0.003 is <0.05 , the null hypothesis, the awareness of

graphology/graphotherapy as an HR tool is not there, was rejected in favor of its alternate, there is awareness of graphology/graphotherapy as an HR tool.

Ho5: The usage of graphology/graphotherapy as an HR tool is high

Ha5: The usage of graphology/graphotherapy as an HR tool is low

The hypothesis was tested based on average responses to Section V of the questionnaire. Summary of the average responses to the ten statements of the said section is given below:

Table 13: Summary of responses to Section V of the questionnaire

Qstn.	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	5.10	Average
D.Agree%	71%	78%	68%	71%	78%	74%	68%	74%	80%	79%	74%

The average disagreement of the sample was compared with a hypothesized population mean of 50% disagreement connoting an event by chance using a t-test and the results are given below:

Table 14: Testing of H5

Parameter	Value
Average = Ho (Sample mean)	74%
SD (Standard Deviation of sample)	1.27
H1 (Hypothesized mean of population)	50%
n (Sample Size)	100
t-value (Ho-H1) / ((SD) / $\sqrt{n}$)	1.90
p-value	0.03

Since, the p-value of 0.03 is <0.05 , the null hypothesis, the usage of graphology/graphotherapy as an HR tool is high, was rejected in favor of its alternate, the usage of graphology/graphotherapy as an HR tool is low.

Ho6: The proposed framework will not be effective

Ha6: The proposed framework will be effective

The hypothesis was tested based on average responses to Section VI of the questionnaire. Summary of the average responses to the ten statements of the said section is given below:

Table 15: Summary of responses to Section VI of the questionnaire

Qstn.	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	6.10	Average
Agree %	83%	84%	85%	82%	82%	84%	86%	85%	86%	86%	84%

The average agreement of the sample was compared with a hypothesized population mean of 50% agreement connoting an event by chance using a t-test and the results are given below:

Table 16: Testing of H6

Parameter	Value
Average = Ho (Sample mean)	84%
SD (Standard Deviation of sample)	1.23
H1 (Hypothesized mean of population)	50%
n (Sample Size)	100
t-value (Ho-H1) / ((SD) / $\sqrt{n}$)	2.80
p-value	0.003

Since, the p-value of 0.003 is <0.05 , the null hypothesis, the proposed framework will not be effective, was rejected in favor of its alternate, the proposed framework will be effective.

Summary of inferential analysis

Summary of the testing of all the six hypotheses along with their interpretation is given below:

Table 17: Summary of inferential analysis

Sr. No.	Data Analysis	Actual Outcome	Interpretation
1	Predominant tools used	Highest percentage compared with the second highest	Highest percentage, 43% for psychometric interview. Second highest percentage, 10% for Caliper-Profile. P-value of 0.1181 is >0.05 , the predominance in terms of statistical significance could not be established. However, in general, it can be inferred that Psychometric Interview is the predominant PA tool used in the IT sector.
2	Factors impacting choice of PA tools	Average agreement for Section I 78% and p-value 0.020	As the mean score of the sample and the hypothesized population mean differ significantly as indicated by p-value, rejected the null hypothesis, there are few factors that influence the adoption of personality assessment tools in HRM Practices.
3	Effectiveness in usage of PA tools	Average disagreement for Section II 89% and p-value <0.0001	As the mean score of the sample and the hypothesized population mean differ significantly as indicated by p-value, rejected the null hypothesis, the personality assessment tools used in HRM Practices are effective.
4	Impact of challenges on effectiveness	R^2 (0.790), r (-0.89), and p-value (<0.0001).	As the R^2 read along with the p-value is statistically significant, and the correlation (r) is negative, rejected the null hypothesis, there are no major challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies.
5	Awareness of graphology/graphotherapy	Average agreement to section IV 84% and p-value 0.003	As the mean score of the sample and the hypothesized population mean differ significantly as indicated by p-value, rejected the null hypothesis, the awareness of graphology/graphotherapy as an HR tool is not there.

6	Usage of graphology/graphotherapy	Average disagreement for Section V 74% and p-value 0.03	As the mean score of the sample and the hypothesized population mean differ significantly as indicated by p-value, rejected the null hypothesis, the usage of graphology/graphotherapy as an HR tool is high.
7	Effectiveness of proposed framework	Average agreement for Section VI 84% and p-value 0.003	As the mean score of the sample and the hypothesized population mean differ significantly as indicated by p-value, rejected the null hypothesis, the proposed framework will be effective.

5. Conclusions

There are multiple factors that influence the adoption of personality assessment tools in HRM Practices. The personality assessment tools used in HRM Practices are not effective. There are major challenges faced by HR professionals in using personality assessment tools for recruitment, selection, and employee development in IT Companies. There is awareness of graphology/graphotherapy as an HR tool. However, the usage of graphology/graphotherapy as an HR tool is low. The proposed framework will be effective.

Overall it can be concluded that while multiple PA tools are used in HRM by the IT industry, challenges in usage is hampering its effectiveness. Despite awareness of graphology, its usage is not up to the expected level. The proposed framework if implemented can lead to better results.

From the pilot study, we got these results:

- Collecting data is doable with some ease.
- It is possible to change the data into variables needed for analysis.
- We can test the hypotheses using the research methods.

The questionnaire made for gathering primary data shows good validity and reliability. But, the respondents wanted their information to be kept confidential.

References

- Carlson, P. (2023). Case Studies in AI-Driven Talent Management. *AI in HR Review*, 16(1), 112-129.
- Davis, N. (2022). Ethical Concerns in AI-Assisted HR Systems. *International Journal of AI Ethics*, 25(2), 74-88.
- Hernandez, D., & Lopez, C. (2021). AI and the Future of Workforce Development. *HR Management Journal*, 21(3), 187-205.
- Kim, S., & Patel, D. (2021). Theoretical Foundations of Personality and Creativity Assessments. *Creativity in HR*, 9(2), 58-73.
- Krejcie, R. V., and Morgan, D. W. (1970), "Determining sample size for research activities", Educational and psychological measurement, Vol. 30 No.3, pp.607-610, doi:10.1177/001316447003000308
- Liang, W., et al. (2022). AI Applications in HR and Workforce Analytics. *Journal of Workforce Analytics*, 15(4), 45-65.
- Nguyen, D. (2021). Case Study on AI-Driven HR Systems: A Deep Dive. *Business and AI Journal*, 11(2), 95-107.
- Nikolopoulou, K. (2022a), "What Is Convergent Validity? Definitions and Examples", available at: www.scribbr.com/methodology/convergent-validity/ (accessed 31 August 2024).
- Nikolopoulou, K. (2022b), "What Is Discriminant Validity? Definitions and Examples", available at: [doi://www.scribbr.com/methodology/discriminant-validity/#:~:text=Although%20there%20is%20no%20consensus,r%20%3D%200.85%20are%20considered%20high](https://www.scribbr.com/methodology/discriminant-validity/#:~:text=Although%20there%20is%20no%20consensus,r%20%3D%200.85%20are%20considered%20high) (accessed 31 August 2024).
- Robinson, J., et al. (2019). Frameworks for Personality Assessments in Creative Contexts. *Journal of Creative HR Practices*, 8(1), 15-27.
- Sharma, P., & Gupta, K. (2020). AI and HR Analytics: A Strategic Approach. *AI and HR Review*, 9(3), 112-129.
- Singh, A., & Mukherjee, R. (2020). Addressing Bias in AI-Driven HR Tools. *AI Ethics Review*, 16(3), 134-146.
- Topleadz.com (2025). Top IT companies in India. Available at www.easyleadz.com