STRATEGIES TO ENHANCE RESEARCH PRODUCTIVITY AND EVALUATION AT GOVERNMENT R&D ORGANIZATIONS

[1]Nitin Kumar Yadav, [2]Prof Gyan Prakash

Designation - Research Scholar
Department - Management
University - ABV-IIITM
Designation - Dean
Department - Managemt
University - ABV-IIITM
nitinnky1@gmail.com
gyanprakasha@yahoo.com

ABSTRACT

The present research explores the implementation of research assessment and evaluation practices in government R&D organizations. The study specifically examines the impact of assessment and evaluation on research quality improvement in India. A dataset comprising 450 data points was collected and analyzed to investigate assessment and evaluation activities in government R&D enterprises. The findings suggest that integrating assessment and evaluation with strategic initiatives within organizations holds significant potential for transforming the organization and benefiting society. The results indicate that aligning evaluation processes closely with an organization's R&D activities enhances resource utilization and leads to both social and economic benefits. This research emphasizes the importance of a well-designed assessment and evaluation framework that considers both profit generation and social value creation. By addressing social and economic aspects simultaneously, such a framework can yield positive outcomes for the organization and society. The planned research aims to provide insights into various aspects of assessment and evaluation practices, offering a deeper understanding of their multidimensional nature. This understanding will help government R&D organizations improve research quality and overall performance.

Keywords: *Research productivity, research assessment, government organization, R&D organizations*

Doi: 10.31838/ecb/2022.11.12.70

INTRODUCTION

Research serves as the cornerstone of societal progress and the advancement of civilization. The contributions made by individuals in expanding human understanding play a significant role in shaping the development of nations. However, the effectiveness with which researchers fulfill their responsibilities directly influences a country's success in addressing the needs of humanity. Therefore, conducting a comprehensive assessment of research performance has become an essential requirement for making informed decisions regarding future investments, scientific governance, and academic management. As a result, the assessment of research productivity has emerged as a vital and integral component of research and development institutions worldwide.

According to Ojanen and Vuola [1], prior research and development activities at the enterprise level were frequently regarded as a "black box" and an isolated function. This rendered the systematic monitoring and

control of these activities extremely difficult, if possible. The current models of R&D activities in research organizations [2, 3, 4] still need a comprehensive, systematic, and empirical approach, even though more research has been done on the subject of R&D productivity and efficiency over the past ten years. The Assessment of activities carried out in the public and private sectors is treated equally by the R&D structures that have been proposed. "The effects of internal and external variables, as well as their assessment, are not accorded due consideration."

Investing in research and development (R&D) and innovation performance is one of the primary goals for the expansion of governments and the competitiveness of businesses. "There is a direct relationship between R&D performance and innovation, so this is true." A diverse variety of research organizations were established due to the rapidly increasing demand for research and development. Despite the profusion of academic writing on how productively businesses should engage in R&D, research on the productivity or efficacy of R&D in research organizations remains uncommon. This is the case despite the existence of research organizations. Currently, there are numerous categories of research organizations; consequently, a standardized method that can compare and contrast the efficacy of these various research organizations is becoming increasingly necessary. Research and development (R&D) encompasses three primary subfields: fundamental research (BR), applied research (AR), and development research (DR). Before any of these R&D subfields can be considered complete, a unique set of requirements about the tools, processes, and outcomes that must be achieved must be met. The Assessment of the efficacy of research and development conducted by research organizations should therefore be differentiated based on the type of work the organisation covers.

In recent years, there has been a growing agreement that innovation is essential to a nation's growth and not only a vital core strategic method for preserving a competitive edge in the market. This is particularly true when considering the causal link between innovation and economic growth. Over the long run, innovative companies have been shown to outperform their less creative counterparts regarding market share and profitability. This has been true for some time now [5].

Performance measurement systems (PMS) are a crucial management tool, but they may require more work to put into practice effectively [6]. Management in the realm of research and development (R&D) is characterized by several unique traits, including (i) the importance of intangible factors like knowledge, creativity, and motivation; (ii) uncertainty in their business processes (regarding timing, budget, human resource commitment, etc.); and (iii) the unpredictable nature of actual outcomes. Because of these factors, developing a PMS for R & D takes much work. (ii) Uncertainty in their business practices, particularly regarding scheduling and finances [7, 8]. Managers frequently struggle when attempting to construct PMS that can effectively support their decision-making process in such situations. As a result, there needs to be more consensus among researchers and business members regarding the optimal method for evaluating the performance of R&D.

In the early stages of R&D organizations, companies commonly relied on a set of limited input-output key performance indicators during the first and second generations. These indicators typically included metrics such as the number of patents, R&D expenditure, and other comparable measures. Such metrics were considered the standard protocol for evaluating performance. However, with the evolving business landscape, companies are now embracing fifth-generation R&D management platforms. In the current competitive business climate, developing a performance management system (PMS) specifically tailored for research and development has become more challenging.

A. Research Objectives and Hypothesis

Objectives

- To study the implementation of Assessment and evaluation of research at government R&D organizations
- To examine the impact of Assessment and evaluation on research quality improvement in India

Hypothesis

- H01: Assessment and evaluation of research at government R&D organizations need to be implemented.
- H02: Assessment and evaluation of research at government R&D organizations is being implemented.
- H11: Assessment and evaluation has no significant impact on research quality improvement in India
- H12: Assessment and evaluation spending has a significant impact on quality improvement in India

I. REVIEW OF LITERATURE

According to Oliveira and Proenca [8], their article "aims to lay the groundwork for the development of a performance measurement system for the government R&D function" to better measure the government's R&D function's efficiency and effectiveness. This paper's goal is to provide the framework for creating a performance assessment system for the government's R&D function, assuming that this is not just another organizational unit but an independent function in and of itself. The goal of this paper is to set the stage for the creation of a government-wide performance monitoring system for the R&D sector. A comprehensive list of design principles with explicit definitions can be used as a reference for the development of performance measurement techniques for government R&D management. Managers and directors of government R&D teams can construct theory-based performance management systems and then modify them to meet their specific requirements. This is possible because it is feasible.

Krapels and Grant [9] used an exploratory framework to evaluate the effectiveness, efficiency, and equity (3e's) of research and research assessment regarding scholarly and extra-scholarly outcomes. We further contend that instruments must be available to evaluate research for its efficiency and equity systematically. Therefore, most evaluations concentrate only on the study's effectiveness. Effectiveness, efficiency, and equity (3e's) were evaluated by Krapels and Grant [9] using an experimental approach.

Guidi [10] identified the primary reasons for the failure of existing measurement programs and the incapacity of businesses to fully reap the benefits of implementing product development performance measures. These factors make it challenging for businesses to fully realize the benefits, thereby contributing to the failure of existing measurement programs. PRTM's structured implementation strategy, detailed in conclusion, may facilitate the development of an effective metrics program.

Yakovlev et al. [11] research revealed that the previously described strategy must be modified to apply to projects of all sizes, including micro, meso, and macro projects. According to the preliminary findings of the research, there should be a common methodological strategy to support the financing of initiatives under government contracts within budget and stock financing constraints. This is implied by the notion that there

should be a conventional methodological strategy. This is evidenced by the need for a methodologically standardized strategy.

Moldashev et al. [12] provide a more comprehensive understanding of how training and development techniques can theoretically increase research self-efficacy, supporting faculty research productivity.

Hosseini et al. [13] aimed to provide a unified framework for assessing the efficiency of public-sector R&D programs. According to the results of this study, the DEA-ANP model is a valid tool for assessing the effectiveness of public R&D agencies.

Jonkers and Zacharewicz [14] provided a condensed summary of the ongoing discussion regarding the advantages and disadvantages of peer review and the available bibliometric assessment techniques. The RPBF runs the risk of creating ineffectual incentives, despite the fact that it was designed to improve the quality of research findings. The costs associated with implementing the various forms of assessments must be considered.

By introducing an assessment framework based on maturity levels, Baggett [15] made a valuable contribution. He modified the Capability Maturity Model to accommodate the theoretically derived operational characteristics. This was accomplished as part of the overall assessment procedure. Practitioners can assess the status of their PM Supplementation by utilizing the system-based government R&D PM S implementation assessment framework, which also provides them with the direction they need to enhance their PMS. With this information, practitioners can determine how to improve their PMS. These two advantages are designed to assist practitioners in enhancing their PMS proficiency.

II. RESEARCH METHODOLOGY

For the analysis of assessment and evaluation activities in government R&D enterprises, a comprehensive dataset comprising 450 data points was collected. The findings of this study will contribute to a deeper understanding of various aspects of assessment and evaluation. Specifically, the outcomes will shed light on the allocation of resources towards research quality development through assessment and evaluation.

To gather data from respondents, a survey questionnaire consisting of 24 questions, including subcategories, was utilized as the primary data collection tool. A total of 450 questionnaires were distributed among the participants. The collected data was then entered into Microsoft Excel and subjected to accuracy checks using scale reliability techniques.

The questionnaire items were designed using a five-point Likert scale, and responses were digitized and measured accordingly. The reliability of the scale was assessed using Cronbach's alpha, which indicated a global alpha value of 0.725. This value exceeds the threshold of 0.70, indicating satisfactory reliability for scientific studies.

The collected information was used to test two hypotheses, each assessed using a subset of questions with scores ranging from 1 (least significant) to 5 (most significant). The responses to the 24 questions were aggregated, averaged, and presented on a graph, providing a comprehensive overview of the range of responses. Statistical significance was determined through the use of Cronbach's alpha, independent t-tests, and crosstab comparisons.

In summary, the study utilized a dataset of 450 data points to analyze assessment and evaluation activities in government R&D organizations. The findings will enhance our understanding of different dimensions of assessment and evaluation practices, particularly their impact on research quality development. The

questionnaire-based approach, combined with statistical analyses, allowed for comprehensive data analysis and hypothesis testing.

A. Data Tabulation and Analysis

In all, 450 pieces of information have been collected for this research on government R&D firms' assessment and evaluation efforts. The planned study's findings will contribute much to our knowledge of Assessment and evaluation in its many forms. The findings will show how much money the government has invested in research development and how much may be attributed to Assessment and evaluation. The major tool for gathering data on the respondents has been a survey questionnaire with 24 questions (including subcategories of the questions). Throughout the research, 450 questionnaires were distributed. After collecting data was entered into Microsoft Excel and then subjected to scale reliability testing to ensure accuracy. The established statements/items are then rated on a 5-point Like a scale. The finished surveys were scanned in and then weighted on an accurate scale. For this, we used Cronbach's alpha as a measure of reliability. We analyzed the items and their dependability on a scale. The total value of Cronbach's alpha was calculated to be 0.725. An Alpha of 0.70 or above is considered adequate for scientific investigation. Two hypotheses will be tested using the obtained information. Each hypothesis was tested by posing a series of questions that were given numerical ratings from 1 to 5. For this question, "never" is 1, and "always" is 5. Then, responses to 24 questions were then collected, organized, and plotted graphically, complete with average and standard deviation information. Chi-square, t-test, and Cronbach's Alpha were then used to establish statistical significance.

INTERPRETATION	
THE MEANING OF ALPHA ON A LIKERT OR DICHOTOMOUS SCALE	
CHRONBACH'S α	INTERNAL CONSISTENCY
ABOVE 0.90	EXCELLENT
0.80-.0.89	GOOD
0.70-0.79	ACCEPTABLE
0.60-0.69	QUESTIONABLE
0.50-0.59	POOR
BELOW 0.50	UNACCEPTABLE

Case Processing Summary

	organization	Cases					
		Valid		Missing		Total	
		N	Per cent	N	Per cent	N	Per cent
assessment and evaluation of spending	organization 1	234	100.0%	0	0.0%	234	100.0%
	organization 2	216	100.0%	0	0.0%	216	100.0%

Descriptive					
	organization			**Statistic**	**Std. Error**
assessment and evaluation of spending	organization 1	Mean		4.4991	.01529
		95% Confidence Interval for Mean	Lower Bound	4.4690	
			Upper Bound	4.5292	
		5% Trimmed Mean		4.5031	
		Median		4.5500	
		Variance		.055	
		Std. Deviation		.23384	
		Minimum		3.82	
		Maximum		5.00	
		Range		1.18	
		Interquartile Range		.28	
		Skewness		-.312	.159
		Kurtosis		.179	.317
	TATA Group	Mean		4.4917	.01634
		95% Confidence Interval for Mean	Lower Bound	4.4595	
			Upper Bound	4.5239	
		5% Trimmed Mean		4.4931	
		Median		4.5000	
		Variance		.058	
		Std. Deviation		.24017	
		Minimum		3.82	
		Maximum		5.00	
		Range		1.18	
		Interquartile Range		.28	
		Skewness		-.176	.166
		Kurtosis		.248	.330

1) Hypothesis

Null Hypothesis: Given Assessment and evaluation, spending Data is Normal

Null Hypothesis: Given Assessment and evaluation, spending Data is non-Normal

Tests of Normality

	organization	**Kolmogorov-Smirnov[a]**			**Shapiro-Wilk**		
		Statistic	df	Sig.	Statistic	df	Sig.
assessment and evaluation of spending	organization 1	.112	234	.000	.970	234	.000
	organization 2	.116	216	.000	.970	216	.000

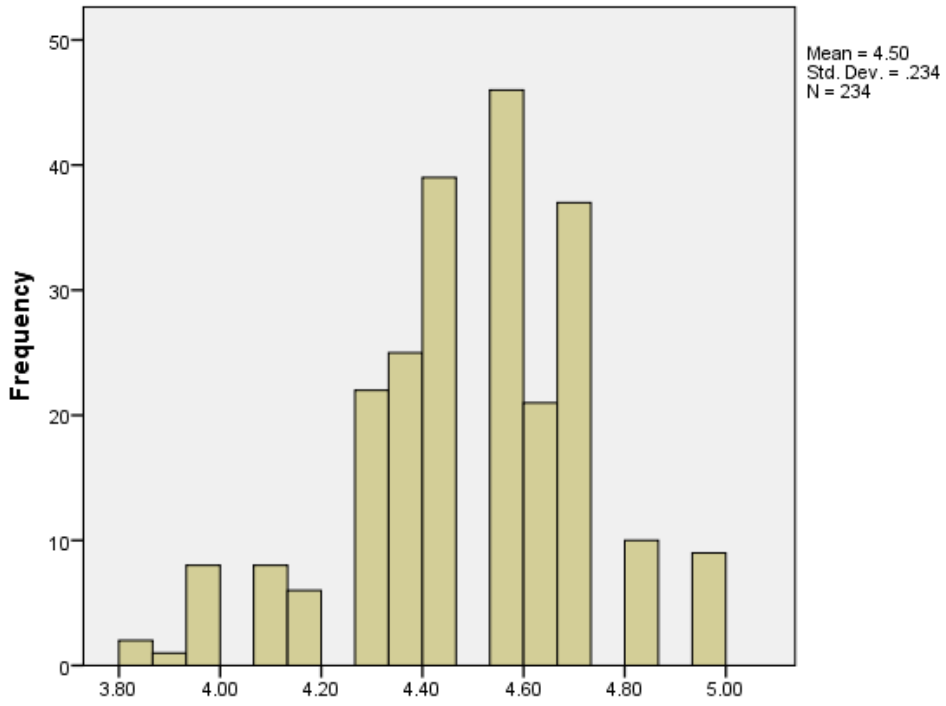
a. Lilliefors Significance Correction

Conclusion:

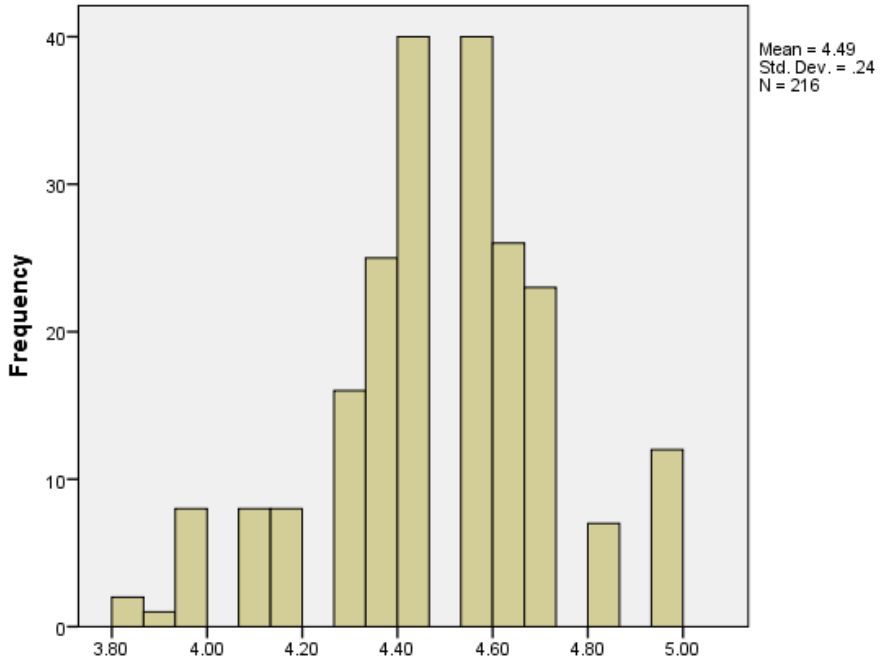
By using the Test of Normality Shapiro-Wilk Test P- value=0.000<0.05

So, Reject the Null Hypothesis

given assessment and evaluation spending Data Both Group (organization 1 And organization 2 group) is non-Normal

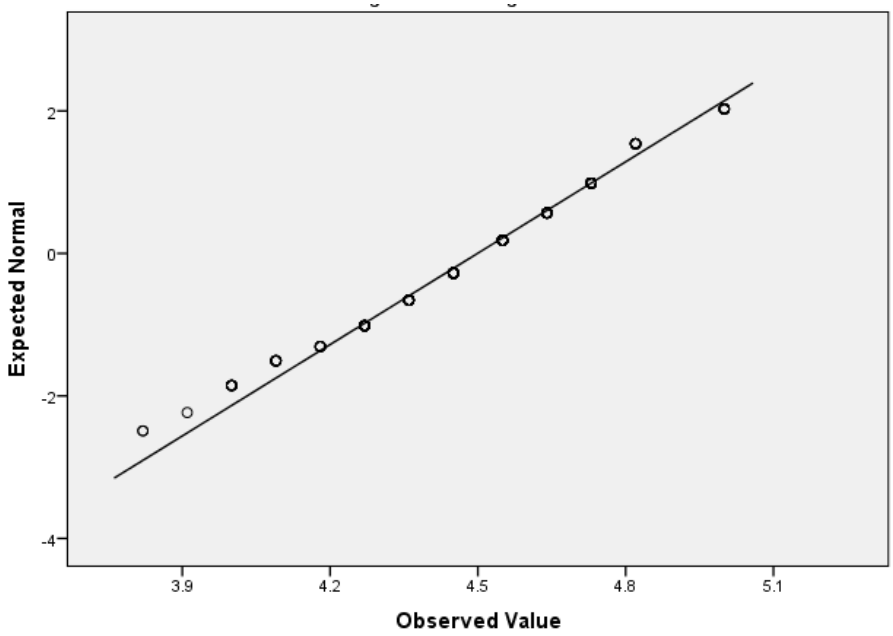


Histogram for Organization 1

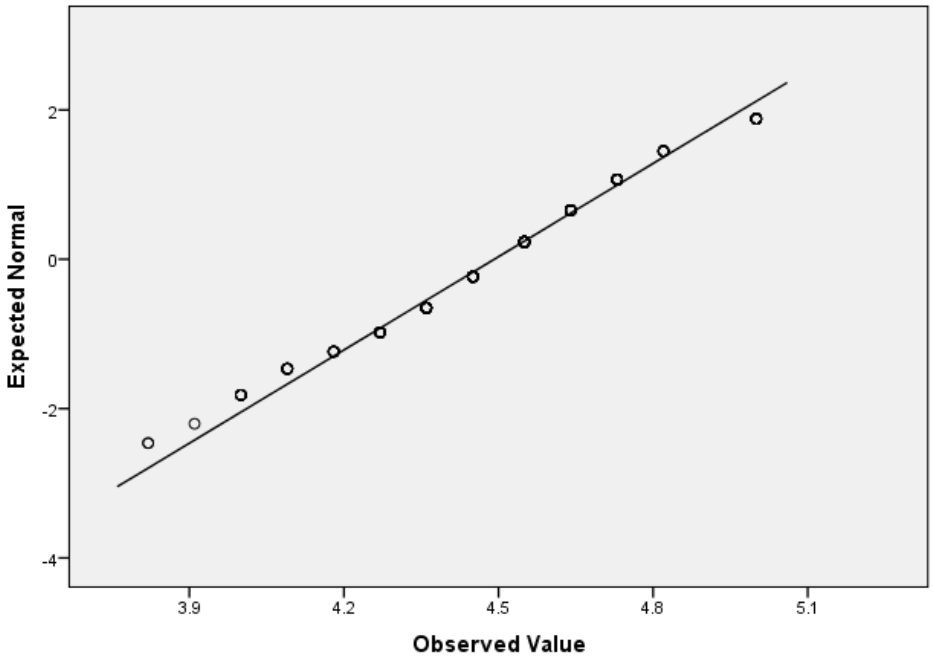


Histogram for Organization 2

Normal Q-Q Plots



Standard Q-Q plot for evaluation process for organization 1



Standard Q-Q plot for evaluation process for organization 1

Conclusions from Case Processing

	Organization 1	Cases					
		Valid		Missing		Total	
		N	Per cent	N	Per cent	N	Per cent
Evaluation	1	234	100.0%	0	0.0%	234	100.0%

	Organization 2	216	100.0%	0	0.0%	216	100.0%

Descriptive

	organization			Statistic	Std. Error
Evaluation and Assessment	Organization 1	Mean		4.4488	.01843
		95% Confidence Interval for Mean	Lower Bound	4.4125	
			Upper Bound	4.4852	
		5% Trimmed Mean		4.4510	
		Median		4.3300	
		Variance		.079	
		Std. Deviation		.28190	
		Minimum		3.67	
		Maximum		5.00	
		Range		1.33	
		Interquartile Range		.34	
		Skewness		-.404	.159
		Kurtosis		.010	.317
	Organization 2	Mean		4.4334	.01926
		95% Confidence Interval for Mean	Lower Bound	4.3954	
			Upper Bound	4.4713	
		5% Trimmed Mean		4.4277	
		Median		4.3300	
		Variance		.080	
		Std. Deviation		.28301	
		Minimum		3.67	
		Maximum		5.00	
		Range		1.33	
		Interquartile Range		.34	
		Skewness		.046	.166
		Kurtosis		-.511	.330

1) Hypothesis

Null Hypothesis: given Evaluation Data is Normal

Null Hypothesis: Given that Evaluation Data is Non-Normal

Tests of Normality

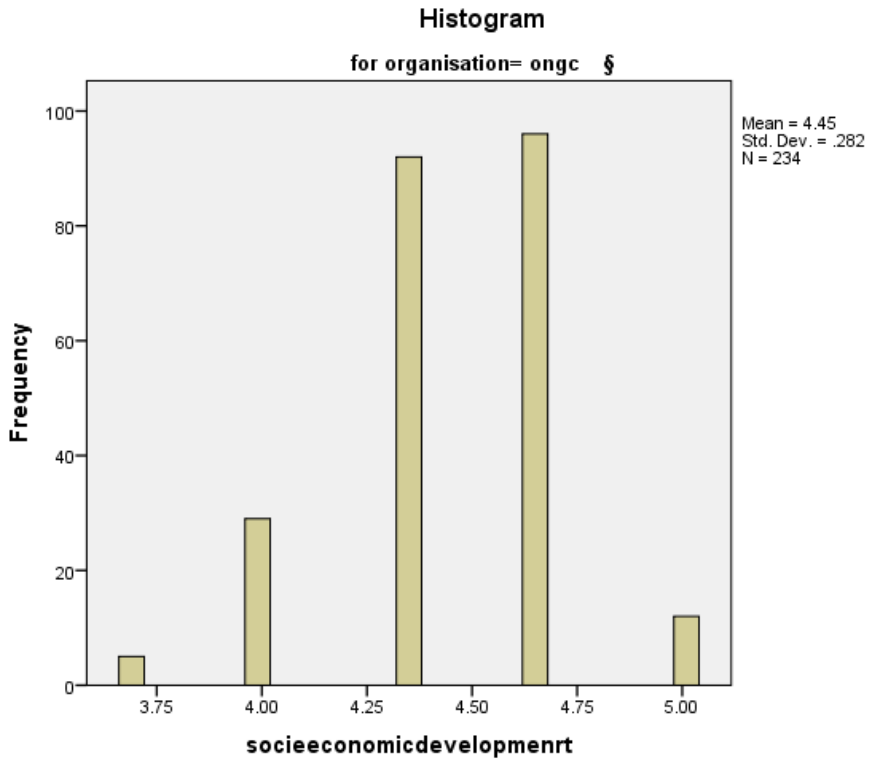
	organization	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Evaluation and Assessment	organization 1	.245	234	.000	.867	234	.000
	organization 2	.235	216	.000	.877	216	.000

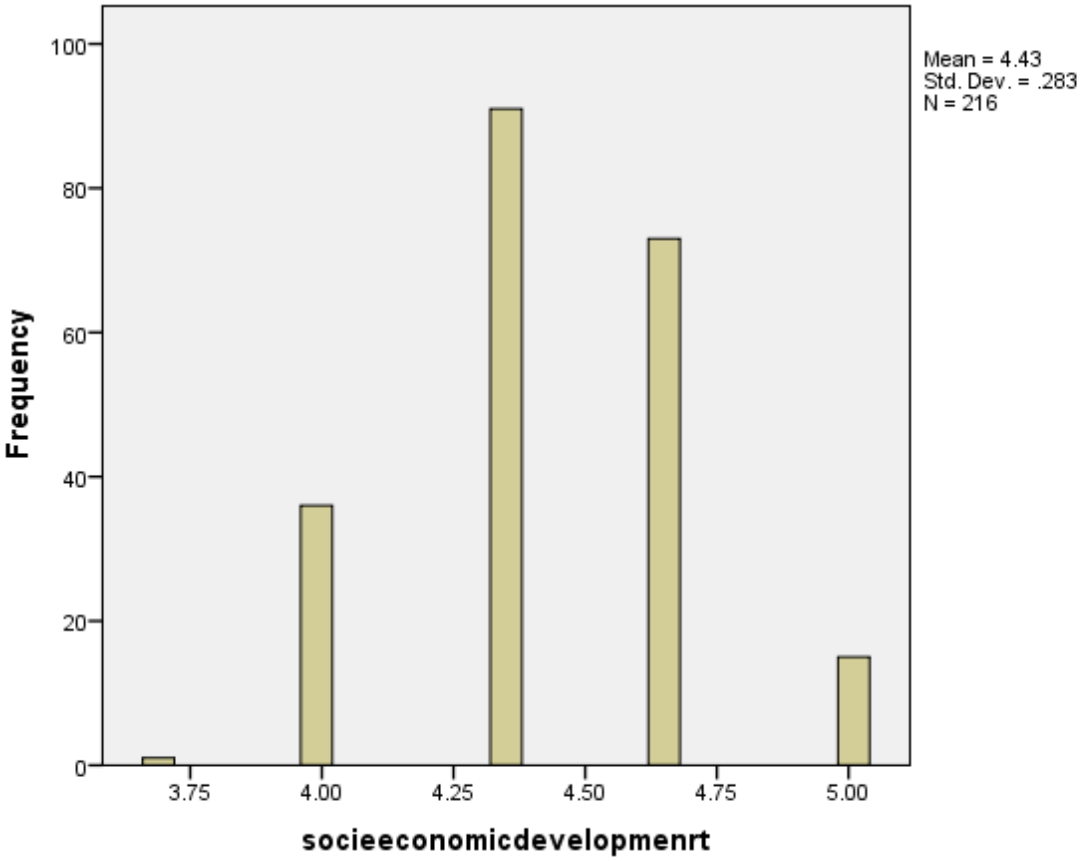
a. Lilliefors Significance Correction

Conclusion:

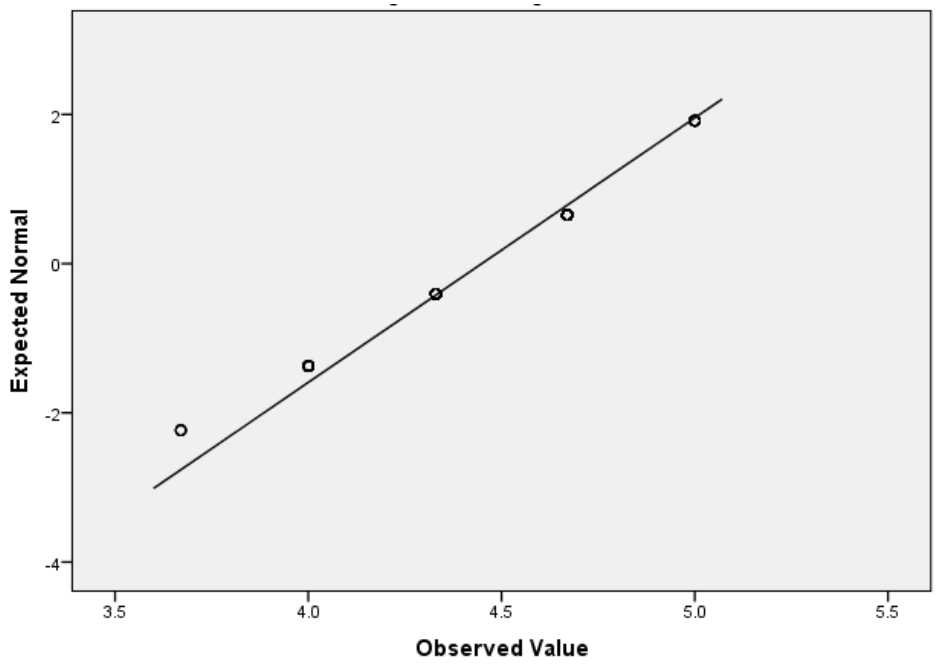
By using the Test of Normality, both Groups (organization one and Organization 2)
Shapiro-Wilk Test P-value=0.000<0.05, So Reject the Null Hypothesis
Given Evaluation Data Both Groups (organization one and TATA group)is non-Normal

Evaluation and Assessment

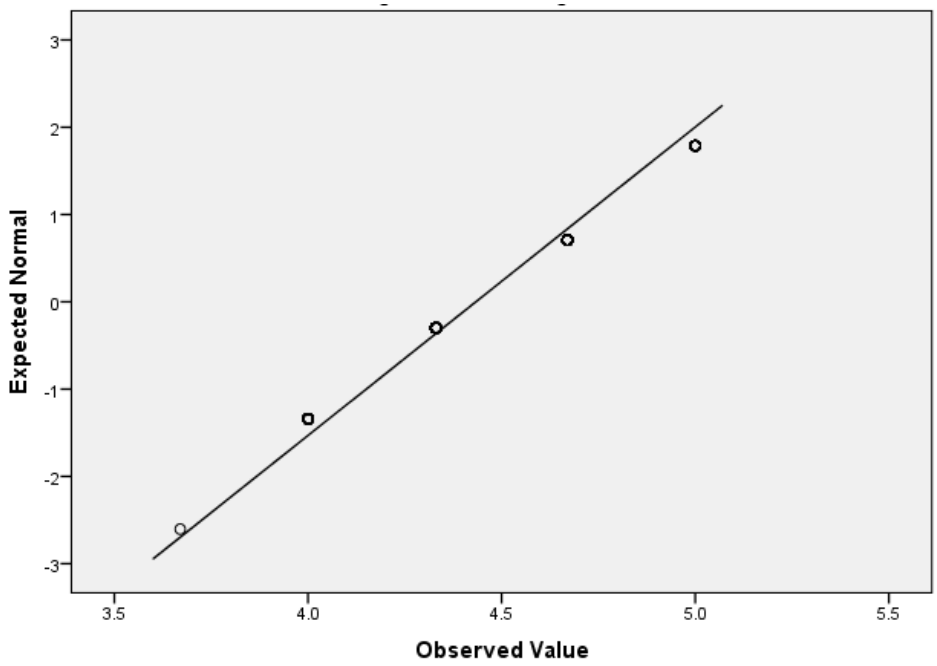




Assessment and Evaluation for Organization 2



Assessment and Evaluation Organization 2



RELIABILITY OF DATA:

Cronbach's alpha has generally shown moderate findings on scales for all parameters; however, for the complete set of values, we find 0.725 rather than 0.70. As a result, the data is trustworthy and valuable for our purposes.

Case Management Synopsis

		N	%
Cases	Valid	450	100.0
	Excluded	0	.0
	Total	450	100.0

a. Removing each variable in a list-like fashion.

Reliability Statistics

Cronbach's Alpha	N of Items
.725	24

For a sample size of 450, the mean values for all parameters are about 4.35, and the standard deviation is just 0.498.

Item Statistics

	Mean	Std. Deviation	N
Evaluation and Assessment help to improve the image of Government government R&D companies in a globalised world	4.5778	.49446	450
Evaluating and assessing a society's progress is important.	4.6622	.47348	450
The financing clause should contain a punishment provision.	4.3000	.45877	450
Setting aside money just for checking in and taking stock is a good idea.	4.4578	.58125	450
Evaluation and Assessment help in good Government government R&D companies governance	4.5467	.49837	450
Evaluation and Assessment try to help protect the protection of cost	4.0711	.25730	450
there is a lack of awareness in the organizations about Evaluation and Assessment	4.5556	.69537	450
Evaluation and Assessment must be embedded in the DNA of the organizations for their effective implementation	4.0578	.23358	450
the government should encourage Government government R&D company's social responsibility expenditure for tax benefit	4.9800	.14016	450
Organizational evaluation and Assessment should be done voluntarily.	4.1444	.51613	450
The project's evaluation and Assessment should focus on the areas most crucial to the project's success.	4.4689	.55852	450
Priority areas for evaluation and Assessment should focus on benchmarking.	4.1778	.62569	450
The end product of a project may be improved with the help of evaluation and Assessment.	4.5911	.55190	450
the new Evaluation and Assessment policy is a good initiative for research success	4.3578	.54097	450
enhancing Government government R&D company's reputation is the main benefit for Government government R&D companies	3.6689	.94582	450
The evaluation and Assessment initiative is a regular running event by your organization	4.9800	.14016	450

research success motivates your organizations to undertake Evaluation and Assessment activity	4.4889	.50043	450
Evaluation and Assessment activities are more organised and more popular in the private sector than public sector	4.7933	.40536	450
lack of specific legislation is a constraint in implementing the Evaluation and Assessment initiatives by your organization	4.1244	.57612	450
the most important reason for your organization to invest in the Evaluation and Assessment activity is to enhance goodwill and branding	3.6289	1.00003	450
the organisation avoids undertaking Evaluation and Assessment activity due to unnecessary burdens to the organisation	3.8667	.65392	450
The government is shifting the responsibility for research activities into the hands of private players through Evaluation and Assessment	4.4867	.55121	450
private government R&D companies are more transparent, accountable and ethical than public sector	4.7533	.48958	450
public, and private partnerships for overall research development through Evaluation and Assessment should be encouraged by the government	4.7533	.48958	450

The ANOVA with Cochran test results is plainly significant (P-Value 0.05), indicating that the data utilized in this study is trustworthy and appropriate for further analysis at a 95% confidence level, with a mean of 105.4933 and a standard deviation of 4.898.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
105.4933	23.992	4.89818	24

Table 4.1: NOVA with Cochran's Test

		Sum of Squares	df	Mean Square	Cochran's Q	Sig
Between People		448.853	449	1.000		
Within People	Between Items	1405.840	23	61.123	3425.783	.000

	Residual	2841.493	10327	.275		
	Total	4247.333	10350	.410		
Total		4696.187	10799	.435		

Grand Mean = 4.3956

DEMOGRAPHICS OF THE COLLECTED DATA:

According to the data where 450 respondents responded to the questions asked in the questionnaire. The Means score for all the parameters is approximately 4.55, and the mean, standard deviation is 0.498. The maximum value of the data is 5, and the Minimum value is 4 for all ten attributes and 3 for all eleven attributes. The remaining three attributes have two as the minimum value.

	assessment and evaluation 1	assessment and evaluation 2	assessment and evaluation 3	assessment and evaluation 4	assessment and evaluation 5	assessment and evaluation 6	assessment and evaluation 7	assessment and evaluation 8	assessment and evaluation 9	assessment and evaluation10
N Valid	450	450	450	450	450	450	450	450	450	450
Missing	0	0	0	0	0	0	0	0	0	0
Mean	4.5778	4.6622	4.3000	4.4578	4.5467	4.0711	4.5556	4.0578	4.9800	4.1444
Std. Error of Mean	.02331	.02232	.02163	.02740	.02349	.01213	.03278	.01101	.00661	.02433
Std. Deviation	.49446	.47348	.45877	.58125	.49837	.25730	.69537	.23358	.14016	.51613
Skewness	-.316	-.688	.876	-.518	-.188	3.349	-1.258	3.803	-6.880	.192
Std. Error of Skewness	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115
Kurtosis	-1.909	-1.533	-1.239	-.671	-1.973	9.255	.176	12.521	45.538	.383
Std. Error of Kurtosis	.230	.230	.230	.230	.230	.230	.230	.230	.230	.230
Range	1.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00
Minimum	4.00	4.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	3.00
Maximum	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Sum	2060.00	2098.00	1935.00	2006.00	2046.00	1832.00	2050.00	1826.00	2241.00	1865.00

assessm	assessme	assessme	assessme	assessme	assessme	assessme	assessme	assessm	assessme

ent and evaluation11	nt and evaluation12	nt and evaluation13	nt and evaluation14	nt and evaluation15	nt and evaluation16	nt and evaluation17	nt and evaluation18	ent and evaluation19	nt and evaluation20
450	450	450	450	450	450	450	450	450	450
0	0	0	0	0	0	0	0	0	0
4.4689	4.1778	4.5911	4.3578	3.6689	4.9800	4.4889	4.7933	4.1244	3.6289
.02633	.02950	.02602	.02550	.04459	.00661	.02359	.01911	.02716	.04714
.55852	.62569	.55190	.54097	.94582	.14016	.50043	.40536	.57612	1.00003
-.416	-.149	-.925	-.009	-.597	-6.880	.045	-1.454	-.006	-.667
.115	.115	.115	.115	.115	.115	.115	.115	.115	.115
-.857	-.549	-.183	-.869	-.576	45.538	-2.007	.114	-.105	-.770
.230	.230	.230	.230	.230	.230	.230	.230	.230	.230
2.00	2.00	2.00	2.00	3.00	1.00	1.00	1.00	2.00	3.00
3.00	3.00	3.00	3.00	2.00	4.00	4.00	4.00	3.00	2.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
2011.00	1880.00	2066.00	1961.00	1651.00	2241.00	2020.00	2157.00	1856.00	1633.00

assessment and evaluation21	assessment and evaluation22	assessment and evaluation23	assessment and evaluation24
450	450	450	450
0	0	0	0
3.8667	4.4867	4.7533	4.7533
.03083	.02598	.02308	.02308
.65392	.55121	.48958	.48958
-1.057	-.428	-1.842	-1.842
.115	.115	.115	.115
2.027	-.911	2.587	2.587
.230	.230	.230	.230
3.00	2.00	2.00	2.00
2.00	3.00	3.00	3.00
5.00	5.00	5.00	5.00
1740.00	2019.00	2139.00	2139.00

HYPOTHESIS:

H01: Assessment and evaluation of research at government R&D organizations need to be implemented.

H11: Assessment and evaluation of research at government R&D organizations is being implemented.

In the hypothesis of finding Assessment and evaluation of research at government R&D organizations is not being implemented, the mean values of the attributes like Assessment and evaluation are combined as Assessment and evaluation spending variable, and "to analyze organizations' t-test has been done on the collected data at 95% confidence level." All characteristics have a minimum value of 1 and a maximum value of 5 in the data set.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Evaluation and Assessment_	450	4.4954	.23512	.01108

One-Sample Test

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Evaluation and Assessment_	405.588	449	.000	4.49535	4.4736	4.5171

Result of the t-test:

The p-value (0.000) is much lower than the 5% threshold set by the experiment. We thus reject the null hypothesis, with 95% confidence, that government R&D organizations in the private R&D sector are not implementing Assessment and evaluation of research**.**

Inference: The result of one sample t-test from the collected data of 450 respondents for testing the hypothesis assessment and evaluation of research at government R&D organizations government R&D sector enterprises needs to be implemented; the statement of hypothesis is found invalid. Hence the null hypothesis of Assessment and evaluation of research at government R&D organizations government R&D sector enterprises is not being implemented is rejected, and accept the hypothesis that Assessment and evaluation of research at government R&D organizations government R&D sector enterprises are being implemented.

H02: Assessment and evaluation has no significant impact on research quality improvement in India
H12: Assessment and evaluation spending has a significant impact on quality improvement in India

The mean values of attributes like upliftment are combined as a socioeconomic development variable, and a student's t-test has been performed on the collected data at the 95% confidence level to test the hypothesis that assessment and evaluation spending has no significant impact on the development of research quality in India. All characteristics have a minimum value of 1 and a maximum value of 5 in the data set.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Research qaulity_development	450	4.4415	.28080	.01324

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Research quality development	335.532	449	.000	4.44148	4.4155	4.4675

Result of the t-test:

The p-value (0.000) is much lower than the 5% threshold set by the experiment. Therefore, we cannot accept the null hypothesis that expenditure on Assessment and evaluation has no substantial effect on the quality of research in the Indian government's R&D initiatives at the 95% confidence level**.**

Inference: The result of one sample t-test from the collected data of 450 respondents for testing the hypothesis that assessment and evaluation spending has no significant impact on research quality development in India; the statement of hypothesis is found to be invalid. Hence the null hypothesis of assessment and evaluation spending having no significant impact on the quality of research at government R&D development in India is rejected, and accepts the hypothesis that assessment and evaluation spending has a significant impact on the quality of research at government R&D development in India.

III. CONCLUSION

The first hypothesis examined the need for implementing assessment and research evaluation practices in government R&D organizations and government R&D sector enterprises (H1). The results, obtained with a 95% confidence level, indicate that the null hypothesis, which suggests no need for assessment and evaluation of research in government R&D organizations, is rejected. This aligns with the existing literature, where we drew inspiration from Hohnen's (2007) CRS implementation framework and expanded upon it based on other theoretical reviews, considering relevant areas.

The second hypothesis explored the impact of assessment and evaluation spending on research quality development in India (H2). With a 95% confidence level, the results indicate that the null hypothesis, proposing no significant impact of assessment and evaluation spending on research quality at government R&D organizations in India, is rejected. Therefore, this research highlights the importance of selecting assessment and evaluation projects that are closely aligned with the fundamental principles of government R&D companies. The findings suggest that integrating assessment and evaluation with organizational strategy can significantly influence both the organization itself and society at large. Moreover, the results emphasize that evaluation closely tied to an organization's R&D activities provides greater opportunities for leveraging resources and benefiting society.

Overall, the study underscores the crucial role of a well-designed assessment and evaluation strategy, which generates simultaneous benefits in social and economic domains while aiming to achieve both profits and social benefits

IV. REFERENCES

[1]. Ojanen, V. & Vuola, O. (2003). Categorizing the measures and evaluation methods of R&D performance: A state-of-the-art review on R&D performance analysis. The Lappeenranta University of Technology.

[2]. Lin, M. W. & Bozeman, B. (2006). Researchers' Industry Experience and Productivity in University–Industry Research Centers: A "Scientific and Technical Human Capital". Explanation. Journal of Technology Transfer, 31, 269–290. doi 10.1007/s10961-005-6111-2.

[3]. Cincera, M., Czarnitzki, D. & Thorwarth, S. (2008). Efficiency of Public Spending in Support of R&D Activities. Workshop on assessing the socioeconomic impacts of public R&D investment, 11 (June), OECD

[4]. Paul, S. M., Mytelka, D. S., Dunwiddie, Ch. T., Persinger, Ch. C., Munos, B. H., Lindborg, S. R. & Schacht, A. L. (2010). How to improve R&D productivity: the pharmaceutical industry's grand challenge. Nature Reviews, 9, 203-214.

[5]. Boston Consulting Group (2006), Senior Management Survey. The Boston Consulting Group.

[6]. Neely, A. (1999), "The performance measurement revolution: Why now and what next?" International Journal of Operations & Production Management, Vol. 19, No. 2, pp. 205-228.

[7]. Kerssens-Van Drongelen, I.; Nixon, B.; Pearson, A. (2000), "Performance measurement in Industrial R&D", International Journal of Management Reviews, Vol.2, Nº. 2, pp. 111-143.

[8]. Tidd, J.; Bessant, J. et al., (2005), Managing Innovation: Integrating Technological, Market and Organizational Change, 3rd edition, Willey, England.

[9]. Hinrichs-Krapels S and Grant J (2016) Exploring the effectiveness, efficiency and equity (3e's) of research and impact assessment. *Palgrave Communications*. 2:16090

[10]. Guidi, G.-C. (2003). government R&D performance measurement and benchmarking. Paper presented at PMI® Global Congress 2003—EMEA, The Hague, South Holland, The Netherlands. Newtown Square, PA: Project Management Institute.

[11]. D Yakovlev1, E Yushkov1, A Pryakhin1 and M Bogatyreova1 2017 J. Phys.: Conf. Ser. 781 012057

[12]. Moldashev, Kairat & Kozhakhmet, Sanat & Nurgabdeshov, Assylbek. (2020). How training and development practices contribute to research productivity: a moderated mediation model. Studies in Higher Education. 47. 10.1080/03075079.2020.1754782

[13]. Hoseini, S. A., Fallahpour, A., Wong, K. Y., & Antuchevičienė, J. (2021). Developing an integrated model for evaluating government R&D organizations' performance: a combination of DEA-ANP. *Technological and Economic Development of Economy*, *27*(4), 970-991

[14]. Jonkers, K. & Zacharewicz, T., Research Performance Based Funding Systems: a Comparative Assessment, Publications Office of the European Union, Luxembourg, EUR 27837 EN, ISBN 978-92-79-68715-0

[15]. Baggett, Kenneth S. "A Systems-Based Framework for the Assessment of Performance Measurement System Implementations in Government R&D Organizations" (2014). Doctor of Philosophy (PhD), Dissertation, Engineering Management & Systems Engineering, Old Dominion University