



**University of Tabuk**

**Faculty of Engineering**

**Mechanical Engineering Department**

**Key Performance Indicators (KPIs) Analysis Report**

**AY 2022-2023 (1444H)**

**Bachelor of Science in Mechanical Engineering**

**(2022-23)**

**Developed By: Quality Committee**

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## Table of Contents

Key Performance Indicators (KPIs) .....	6
Key Performance Indicators (KPIs) and Academic Standard .....	6
Measurement of KPIs.....	8
KPIs Assessment Plan.....	10
Benchmarks for KPIs Analysis.....	10
Actual Benchmark.....	10
Internal Benchmark.....	10
External Benchmark.....	10
Target .....	11
Analysis of KPI Measurement Results .....	11
Assessment results of ME KPIs .....	14
Assessment results of Operational Plan KPIs .....	17
Analysis of KPIs.....	18
KPI-P-01 Percentage of achieved indicators of the program operational plan objectives .....	18
Summary of Operational Plan KPIs (20) .....	18
KPI Analysis .....	<b>Error! Bookmark not defined.</b>
KPI Trend Analysis .....	21
Recommendations for Improvement.....	21
KPI-P-02 Students' Evaluation of quality of learning experience in the program.....	22
KPI Results.....	22
KPI Analysis .....	23
KPI Trend Analysis .....	23
Recommendations for Improvement.....	24
KPI-P-03 Students' evaluation of the quality of the courses .....	24
KPI Results.....	24
KPI Analysis .....	24
KPI Trend Analysis .....	25
Recommendations for Improvement.....	26
KPI-P-04 Apparent Completion rate .....	26
KPI Results.....	26
KPI Analysis .....	26
KPI Trend Analysis .....	27

Recommendations for Improvement.....	28
KPI-P-05 First-year students retention rate.....	28
KPI Results.....	28
KPI Analysis.....	28
KPI Trend Analysis.....	29
Recommendations for Improvement.....	29
KPI-P-06 Students' performance in the professional and/or national examinations.....	30
KPI Results.....	30
KPI Analysis.....	31
KPI Trend Analysis.....	31
Recommendations for Improvement.....	31
KPI-P-07 Graduates' employability and enrolment in Postgraduate Programs.....	32
KPI Results.....	32
KPI Analysis.....	33
KPI Trend Analysis.....	34
Recommendations for Improvement.....	34
KPI-P-08 Average number of students in the class.....	34
KPI Results.....	34
KPI Analysis.....	35
KPI Trend Analysis.....	36
Recommendations for Improvement.....	36
KPI-P-09 Employers' evaluation of the program graduates' proficiency.....	36
KPI Results.....	36
KPI Analysis.....	37
KPI Trend Analysis.....	37
Recommendations for Improvement.....	37
KPI-P-10 Students' satisfaction with the offered services.....	37
KPI Results.....	37
KPI Analysis.....	38
KPI Trend Analysis.....	39
Recommendations for Improvement.....	39
KPI-P-11 Ratio of students to Teaching Staff.....	39
KPI Results.....	39

KPI Analysis .....	40
KPI Trend Analysis .....	41
Recommendations for Improvement.....	41
KPI-P-12 Percentage of teaching staff distribution.....	41
KPI Results.....	41
KPI Analysis .....	42
KPI Trend Analysis .....	43
Recommendations for Improvement.....	43
KPI-P-13 Proportion of teaching staff leaving the Program.....	43
KPI Results.....	43
KPI Analysis .....	44
KPI Trend Analysis .....	45
Recommendations for Improvement.....	45
KPI-P-14 Percentage of publications of faculty members .....	45
KPI Results.....	45
KPI Analysis .....	46
KPI Trend Analysis .....	47
Recommendations for Improvement.....	47
KPI-P-15: Rate of published research per faculty member .....	47
KPI Results.....	47
KPI Analysis .....	48
KPI Trend Analysis .....	49
Recommendations for Improvement.....	49
KPI-P-16 Citations rate in refereed journals per faculty member .....	49
KPI Results.....	49
KPI Analysis .....	50
KPI Trend Analysis .....	51
Recommendations for Improvement.....	51
KPI-P-17 Satisfaction of beneficiaries with the learning resources .....	51
KPI Results.....	51
KPI Analysis .....	52
KPI Trend Analysis .....	53
Recommendations for Improvement.....	53

Analysis of Operational Plan KPIs .....	53
PG1.1 Evaluation of the Program Curriculum and Learning outcomes by the stakeholders .....	53
Survey.....	53
KPI Results.....	53
KPI Analysis .....	54
KPI Trend Analysis .....	54
Recommendations for Improvement.....	55
PG2.4 No. of patent proposal and applications submitted by the program in a calendar year.....	55
KPI Results.....	55
KPI Analysis .....	55
KPI Trend Analysis .....	56
Recommendations for Improvement.....	56
PG2.5 No. of research projects and grants applied by the program in a calendar year.....	56
KPI Results.....	56
KPI Analysis .....	57
KPI Trend Analysis .....	57
Recommendations for Improvement.....	58
PG3.1 No. of Awareness programs arranged for sustainable practices in an academic year.....	58
KPI Results.....	58
KPI Analysis .....	58
KPI Trend Analysis .....	59
Recommendations for Improvement.....	59
PG3.2 No. of community service programs organized by the program.....	60
KPI Results.....	60
KPI Analysis .....	60
KPI Trend Analysis .....	60
Recommendations for Improvement.....	61
Summary of KPI Analysis.....	61
Program’s Strengths.....	61
Program’s Weaknesses.....	<b>Error! Bookmark not defined.</b>
Priorities for Improvement .....	62
Action Plan for Improvement.....	63
Follow-up Plan.....	65

## Key Performance Indicators (KPIs)

The Bachelor of Science in Mechanical Engineering Program (BSc MEP) measures the Key Performance Indicators mandated by the National Center for Academic Accreditation and Evaluation (NCAAA) to measure the progress towards its goals and the extent of achievement of its mission. The NCAAA has defined six academic standards and seventeen KPIs for a baccalaureate program. The program KPIs defined by the NCAAA are given in the following table.

## Key Performance Indicators (KPIs) and Academic Standard

The KPIs mandated by NCAAA are given in the following table.

NCAAA Standard	Code	Key Performance Indicators (KPI)	Description
Standard 1 Mission and Goals	KPI-P-01	Percentage of achieved indicators of the program operational plan objectives	Percentage of performance indicators of the operational plan objectives of the program that achieved the targeted annual level to the total number of indicators targeted for these objectives in the same year
Standard 3 Teaching and Learning	KPI-P-02	Students' Evaluation of quality of learning experience in the program	Average of overall rating of final year students for the quality of learning experience in the program on a five- point scale in an annual survey
	KPI-P-03	Students' evaluation of the quality of the courses	Average students overall rating for the quality of courses on a five-point scale in an annual survey
	KPI-P-04	Completion rate	Proportion of undergraduate students who completed the program in minimum time in each cohort
	KPI-P-05	First-year students retention rate	Percentage of first-year undergraduate students who continue at the program the next year to the total number of first-year students in the same year
	KPI-P-06	Students' performance in the professional and/or national examinations	Percentage of students or graduates who were successful in the professional and / or national examinations, or their score average and median (if any)

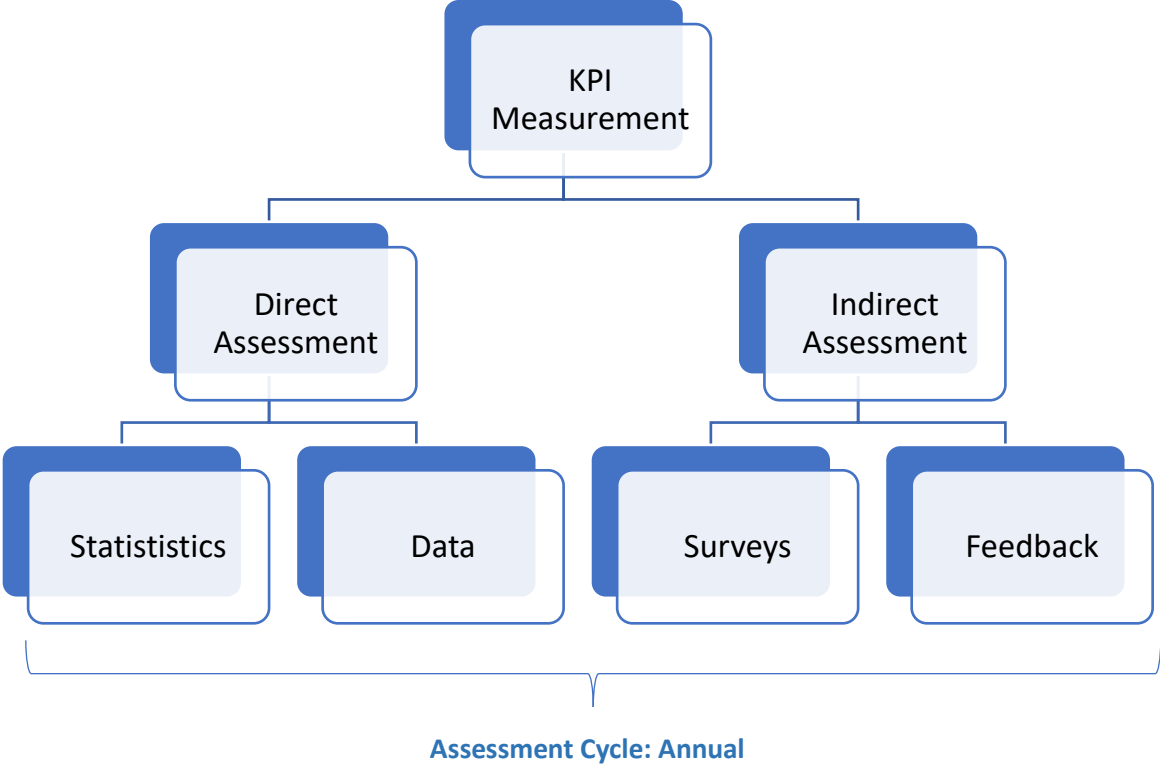
	KPI-P-07	Graduates' employability and enrolment in postgraduate programs	Percentage of graduates from the program who within a year of graduation were: a) employed, b) enrolled in postgraduate programs during the first year of their graduation to the total number of graduates in the same year
	KPI-P-08	Average number of students in the class	Average number of students per class (in each teaching session/activity: lecture, small group, tutorial, laboratory, or clinical session)
	KPI-P-09	Employers' evaluation of the program graduate's proficiency	Average of overall rating of employers for the proficiency of the program graduates on a five-point scale in an annual survey
Standard 4 Students	KPI-P-10	Students' satisfaction with the offered services	Average of students' satisfaction rate with the various services offered by the program (restaurants, transportation, sports facilities, academic advising, ...) on a five-point scale in an annual survey
Standard 5 Teaching Staff	KPI-P-11	Ratio of students to teaching staff	Ratio of the total number of students to the total number of full-time and full-time equivalent teaching staff in the program
	KPI-P-12	Percentage of teaching staff distribution	Percentage of teaching staff distribution based on: a) Gender, b) Branches, c) Academic Ranking
	KPI-P-13	Proportion of teaching staff leaving the program	Proportion of teaching staff leaving the program annually for reasons other than age retirement to the total number of teaching staff.
	KPI-P-14	Percentage of publications of faculty members	Percentage of full-time faculty members who published at least one research during the year to total faculty members in the program
	KPI-P-15	Rate of published research per faculty member	The average number of refereed and/or published research per each faculty member during the year (total number of refereed and/or published research to the total number of full-time or equivalent faculty members during the year)
	KPI-P-16	Citations rate in refereed journals per faculty member	The average number of citations in refereed journals from published research per faculty member in the program (total

			number of citations in refereed journals from published research for full-time or equivalent faculty members to the total research published)
Standard 6 Learning Resources, Facilities, and Equipment	KPI-P-17	Satisfaction of beneficiaries with the learning resources	Average of beneficiaries' satisfaction rate with the adequacy and diversity of learning resources (references, journals, databases... etc.) on a five- point scale in an annual survey.
Operational Plan KPIs to achieve the Program Goals	PG1.1	Evaluation of the Program Curriculum and Learning outcomes by the stakeholders Survey	Indirect Assessment through Employer and Alumni Surveys
	PG2.4	No. of patent proposal and applications submitted by the program in a calendar year	--
	PG2.5	No. of research projects and grants applied by the program in a calendar year	--
	PG3.1	No. of Awareness programs arranged for sustainable practices in a academic year	--
	PG3.2	No. of community service programs organized by the program	--

## Measurement of KPIs

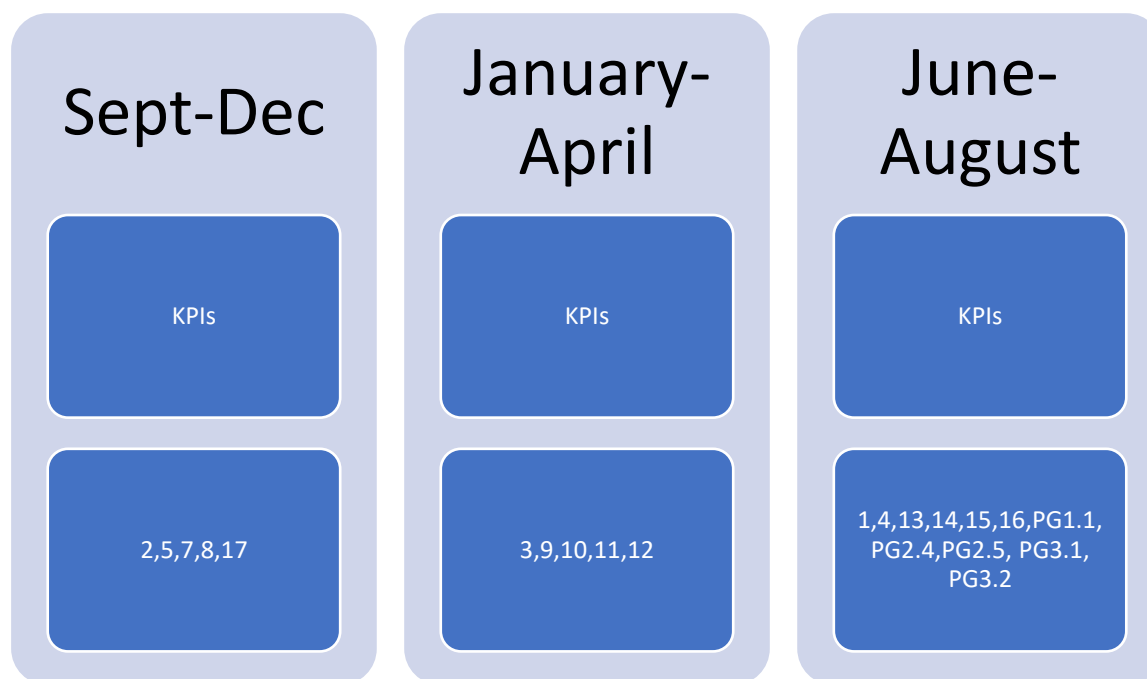
The BSc MEP measures its program KPIs once in an academic year. The program KPIs are measured by both direct and indirect assessments. The following figure gives the outline of the measurement process.





## KPIs Assessment Plan

The assessment of KPIs are done across the academic year as under:



## Benchmarks for KPIs Analysis

### Actual Benchmark

The average achievement of the indicator after the analysis of the survey is referred to as the actual benchmark. The actual benchmark is calculated from the average of the result in numbers, as a percentage from the direct assessment results, or on a scale of 5 from the indirect methods (surveys).

### Internal Benchmark

The average achievement of the indicator by a program of similar nature within the University of Tabuk is referred to as the internal benchmark. The program collects its internal benchmarks from several programs and decides on a particular benchmark to compare with. Preferably, the program selects the highest benchmark available to them for the KPI if more than one internal benchmark is available to them.

### External Benchmark

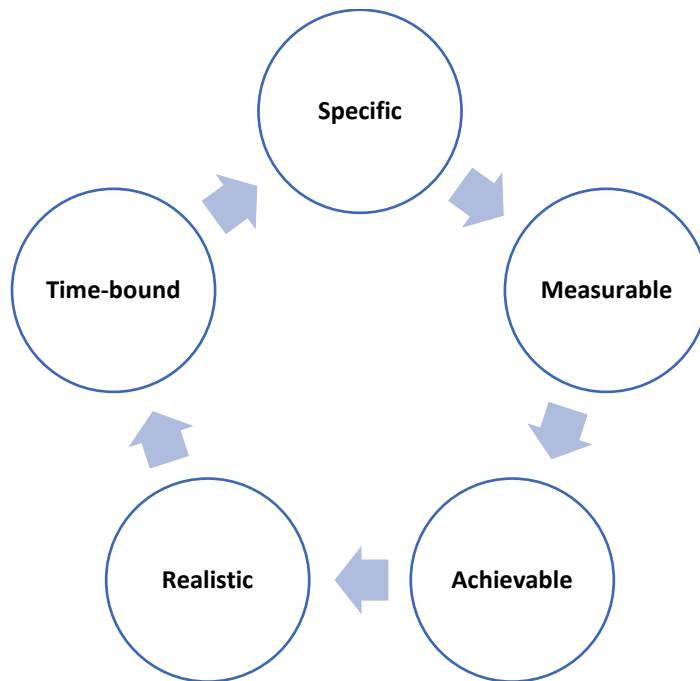
The average achievement of the indicator by a program of similar nature in other universities is referred to as an external benchmark. The external benchmark is obtained for the mandatory program KPIs specified by NCAAA by the following mechanism.

1. The program (or university) desirably, should have an agreement for the exchange of the benchmarks from an accredited program. Presently, the University of Tabuk has an agreement with King Khalid University, Abha, Saudi Arabia for the exchange of the benchmarks.

2. If the program fails to get a favorable response from the external program, it may contact a similar program directly within the Kingdom of Saudi Arabia or in other countries to get the external benchmarks.
3. In case the benchmarks are not obtained for any KPI, the program may analyze the results in comparison with the average, the actual benchmark, and the target benchmark.

## Target

The target of the survey is fixed based on the SMART philosophy.



### **SMART philosophy used to fix the target benchmark.**

- Considering the SMART philosophy, the initial target of the average result of the survey responses is taken between 70% to 80%.
- If the target is achieved, the program may maintain the same target in the subsequent year.
- An increment of 5% may be made in the target of the achieved indicator as found appropriate by the quality committee.
- If the quality committee finds the target to be maintained the same as the previous survey, the same target can be maintained in the subsequent year.

## Analysis of KPI Measurement Results

### Indirect Assessment (Surveys) and Feedback

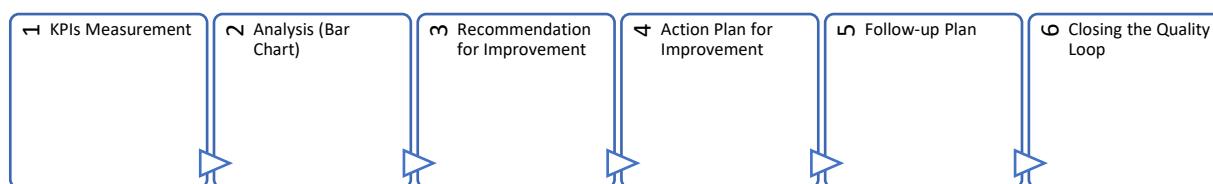
The program used the benchmarks in the KPI analysis. For the analysis of KPIs by indirect assessment, the program uses opinion surveys from the stakeholders.

In the analysis report of the surveys, the program plots the responses on a bar chart about the level of satisfaction of the respondents and evaluating the average of the response against a predetermined target.

The program identifies the strengths and weaknesses based on the survey analysis. From the weaknesses and the comments received from the respondents, the program quality committee identifies the priorities for improvement and actions to be taken. The actions are included in the annual program report and follow-up of the implementation of the actions is done in the subsequent year.

#### Direct Assessment (Data and Statistics)

In the KPI analysis report, the program transfers the average result obtained from the surveys in the KPI table and compares it with the predetermined target, the internal benchmark, and the external benchmark on a bar chart. Based on the comparison, the program writes the analysis, and recommendations for improvement (if applicable) and prepares an action plan for improvement, which is added to the Annual Program Report. The redundancy among the recommendations and actions is removed.



**Process for the analysis KPI results.**

#### KPI Analysis

The KPIs achievement (actual benchmark) are compared with the target, internal and external benchmarks and a crisp analysis is written. If the KPI meets the target and one of the internal or external benchmarks, the KPI is taken as achieved. The KPI that meets the target and both internal and external benchmarks, is recognized as the program’s strength.

#### KPI Trend Analysis

The KPIs trend analysis is done during each self-study cycle. The primary objective of the KPI trend analysis is to compare the trend of the actual benchmark over the last three years and observe how the program progresses. It is to be noted that each year there are some changes in the program, the students are changing and so is the timetable and sometimes the course instructors, hence the previous year’s performance makes no surety of its achievement in the next year. Therefore, it becomes necessary to measure the KPIs each year and analyze its level of achievement by trend analysis.

#### Recommendations for Improvement

If the target is not achieved with a considerable margin (more than 10%) and/or the actual benchmark is short of the internal/external benchmark by a bigger margin, the program writes short and crisp recommendation for improvement, normally one for each KPI. If the program KPI meets the target/benchmarks, no recommendation is needed.

#### Action plan for Improvement

The recommendations for all the KPIs are transformed into the actions to be taken for improvement and a short and crisp action plan for improvement is made in a table which includes the time period and the responsible entity to take the action. A few actions are not directly in the control of the program for e.g. the policy matters, financial needs, recruitment of the new staff, development of the infrastructure, purchase of equipment and materials, etc. For such actions the program raises a request to the Faculty of Engineering/University of Tabuk and follows up as necessary.

#### **Follow-up Plan**

A follow-up plan is also prepared in close correlation of the action plan for improvement. The program monitors the effectiveness and completion of the actions based in different committees and ensures that the actions are taken for improvement as planned.

#### **Closing the Quality Loop**

The action plan for improvement may differ each year and the actions are taken for improvement, monitored and the measurement of KPIs are done at the end of next year to determine the level of improvement. Hence, the quality loop is closed to achieve continuous improvement.

## Assessment Results of ME KPIs

The assessment results of BSc MEP KPIs for the academic year 2022-23 (1444H) is given in the following table.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
1	Percentage of achieved indicators of the program operational plan objectives	50%	65%	NA	50%	The actual benchmark achieved the target and exceeded the external benchmark, by the time of the analysis of this KPI, the internal KPI was not available. The KPI is taken as achieved and considered as the program's strength.	65%
2	Students' Evaluation of quality of learning experience in the program	4	4.14	3.92	4.6	The actual benchmark achieved the target and exceeded the internal benchmark but is short of the external benchmark. The KPI is taken as achieved.	4.25
3	Students' evaluation of the quality of the courses	4	4.25	3.94	3.9	The actual benchmark meets the target and the internal and external benchmarks. The KPI is taken as achieved.	4.3
4	Apparent completion rate	60 %	44.82 %	30 %	55%	The actual benchmark is short of the target, exceeds the internal benchmark but short of the external benchmark. The reason for this is poor results in some courses. More emphasis on math and mechanical design courses needs to be made.	60 %
5	First-year students retention rate	100 %	100%	100 %	95%	The actual benchmark is 100% and the target has been achieved. The actual benchmark is equal to the internal benchmarks and more than the external benchmark. The KPI is taken as achieved.	100 %
6	Students' performance in the professional and/or national	70%	100%	55% Avg. Score	Not available	Till the previous this KPI couldn't be measured due to the unavailability of data and most students not appearing in the FE	100% of students

	examinations  *FE exam conducted by the University in collaboration of professional test		Avg. Score 29.78	34.57		exam. The qualifying score is 62% for the FE exam. The target for this KPI in 2022-23 is that 100% of the students should appear in the FE exam and 70% of them should qualify it. The actual benchmark met the target and exceeded the external and internal benchmarks, hence the KPI is taken as achieved for 2022-23. However, the average score of the students (29.78) is far less than the qualifying score (62%).	appear and 50% of students qualify the FE exam.
7	Graduate's employability and enrollment in postgraduate programs (a) Employed (b) Enrollment in PG Programs	50 %	22.2% (a) 18.5 (a) 3.7	80 %	Not available	The employability ratio is short of the target and the internal benchmarks. The data of some graduates could not be collected due to the poor response of the graduates to the communication requests from the program. The KPI is not achieved, and the actual benchmark is short of the target and the benchmarks, hence it is identified as the weakness of the program.	50 %
8	Average number of students in the class	40	33	25	20	The number of students in the class achieved the target but was still higher than the internal and external benchmarks.	25
9	Employers' evaluation of the program graduates' proficiency	4	4.09	3.56	4.3	The employer evaluation of the graduates meets the target and the internal benchmark, but it is slightly short of the external benchmark. This KPI is taken as achieved.	4.25

10	Students' satisfaction with the offered services	3.5	3.77	3.24	4.4	The students' satisfaction with the offered services meets the target and the internal benchmark but is slightly short of the external benchmark. The KPI is taken as achieved.	3.75
11	Ratio of students to teaching staff	20:1	21:1	20:1	9:1	The ratio of the students to teaching staff is slightly higher than the target and the internal and external benchmarks. The KPI is not achieved.	20:1
12	Percentage of teaching staff distribution (Doctoral Qualification)	80%	100%	90 %	76%	The actual benchmark meets the target and the external benchmark. So, the KPI is taken as achieved and KPI 12 is considered as the program's strength.	80%
13	Proportion of teaching staff leaving the program (Other than Retirement)	0%	0%	0 %	0%	No faculty left the ME department for reasons other than retirement. The KPI is taken as achieved and it is the strength of the program.	0%
14	Percentage of publications of faculty members (Percentage of Faculty who Published at least one paper)	30 %	45.45 %	44 %	89%	The publications of faculty achieved the target and the internal benchmark but is short of the external benchmark. The KPI is taken as achieved, however, further improvement is desirable next year.	50 %
15	Rate of published research per faculty member	2	0.9	1.88	3.26	The actual benchmark is well short of the target and the internal and external benchmarks. The KPI is not achieved and needs improvement.	2
16	Citations rate in refereed journals per faculty member	1	0.56	41	108	The citation rate per faculty member is low, short of the target and much less than the benchmarks.	1
17	Satisfaction of beneficiaries with the learning resources	3.5	3.45	4.27	3.35	The actual benchmark meets the target and the external benchmark but is less than the internal benchmark. The KPI is taken as achieved.	3.5



## Assessment results of Operational Plan KPIs

The assessment results of BSc MEP KPIs for the academic year 2022-23 (1444H) is given in the following table Operational Plan KPIs (Additional)

KPI#	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Analysis	KPI New Target Benchmark
PG1.1	Evaluation of the Program Curriculum and Learning outcomes by the stakeholders Survey	4	4.05	The KPI PG1.1 meets the target and is regarded as achieved.	4.1
PG2.4	No. of patent proposal and applications submitted by the program in a calendar year	1	1	The KPI PG2.4 meets the target and is regarded as achieved.	1
PG2.5	No. of research projects and grants applied by the program in a calendar year	2	5	The KPI PG2.5 meets the target and is regarded as achieved	5
PG3.1	No. of Awareness programs arranged for sustainable practices in an academic year.	2	2	The KPI PG3.1 meets the target and is regarded as achieved.	2
PG3.2	No. of community service programs organized by the program.	4	3	The KPI PG3.2 does not meet the target and is not achieved.	3

## Analysis of KPIs

### KPI-P-01 Percentage of achieved indicators of the program operational plan objectives

#### Summary of Operational Plan KPIs (20)

The following table gives the summary of the achievement of BSc MEP's operational plan (OP) KPIs in academic year 2022-23 (1444H).

S#	OP KPI#	KPI	Aligned NCAAA KPI	Achieved	Not Achieved
1.	PG1.1	Evaluation of the Program Curriculum and Learning outcomes by the stakeholders Survey	Additional KPI	✓	
2.	PG1.2	Percentage of students or graduates who were successful in the professional and / or national examinations, or their score average and median (if any) (KPI-P-06)	(KPI-P-06)	✓	
3.	PG1.3	Percentage of graduates from the program who within a year of graduation were: a. employed b. enrolled in postgraduate programs during the first year of their graduation to the total number of graduates in the same year (KPI-P-07)	(KPI-P-07)		✓
4.	PG1.4	Employers' evaluation of the program graduate's proficiency (KPI-P-09)	(KPI-P-09)	✓	
5.	PG2.1	Percentage of full-time faculty members who published at least one research during the year to total faculty members in the program. (KPI-P-14)	(KPI-P-14)	✓	
6.	PG2.2	Rate of published research per faculty member (KPI-P-15)	(KPI-P-15)		✓
7.	PG2.3	Citations rate in refereed journals per faculty member (KPI-P-16)	(KPI-P-16)		✓
8.	PG2.4	No. of patent proposal and applications submitted by the program in a calendar year	Additional KPI	✓	
9.	PG2.5	No. of research projects and grants applied by the program in a calendar year	Additional KPI	✓	
10.	PG3.1	No. of Awareness programs arranged for sustainable practices in a academic year	Additional KPI	✓	

11.	PG3.2	No. of community service programs organized by the program	Additional KPI		✓
12.	PG4.1	Average of overall rating of final year students for the quality of learning experience in the program on a five-point scale in an annual survey (KPI-P-02)	(KPI-P-02)	✓	
13.	PG4.2	Average students overall rating for the quality of courses on a five-point scale in an annual survey. (KPI-P-03)	(KPI-P-03)	✓	
14.	PG4.3	Average number of students per class (in each teaching session/activity: lecture, small group, tutorial, laboratory or clinical session) (KPI-P-08)	(KPI-P-08)		✓
15.	PG4.4	Average of students' satisfaction rate with the various services offered by the program (restaurants, transportation, sports facilities, academic advising, ...) on a five-point scale in an annual survey. (KPI-P-10)	(KPI-P-10)	✓	
16.	PG5.1	Proportion of undergraduate students who completed the program in minimum time in each cohort. (KPI-P-04)	(KPI-P-04)		✓
17.	PG5.2	Percentage of first-year undergraduate students who continue at the program the next year to the total number of first-year students in the same year. (KPI-P-05)	(KPI-P-05)	✓	
18.	PG5.3	Ratio of the total number of students to the total number of full-time and full-time equivalent teaching staff in the program. (KPI-P-11)	(KPI-P-11)		✓
19.	PG5.4	Percentage of teaching staff with doctoral qualification. (KPI-P-12)	(KPI-P-12)	✓	
20.	PG5.5	Proportion of teaching staff leaving the program annually for reasons other than age retirement to the total number of teaching staff. (KPI-P-13)	(KPI-P-13)	✓	

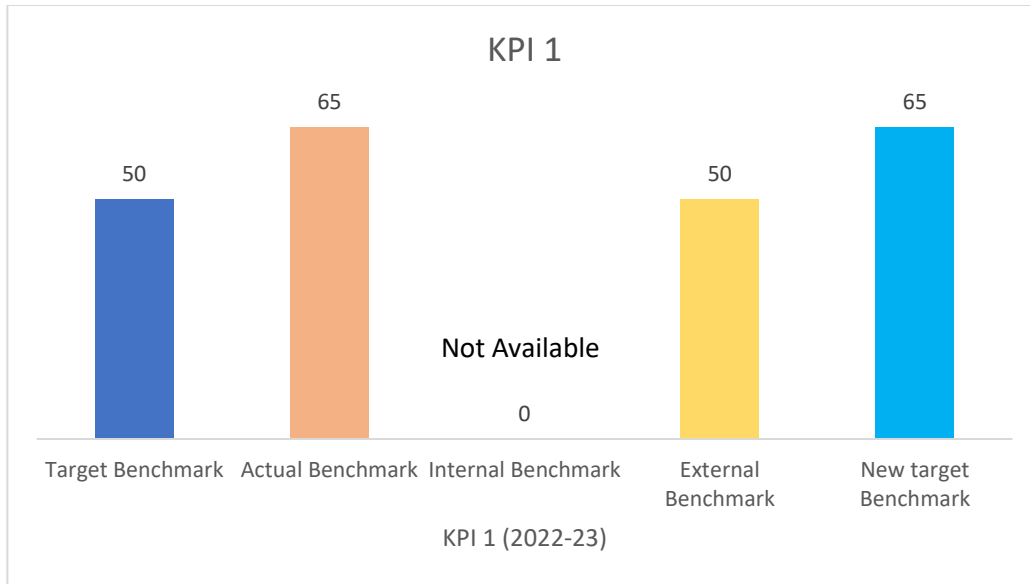
## KPI Results

The BSc MEP has 20 operational plan KPI, among them 15 are aligned with the NCAAA KPIs and 5 KPIs are in addition to those. Among the 20 KPIs, the program achieved 13 KPIs and couldn't achieve 7 KPIs. Hence the percentage of the achieved KPIs is 65%.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
1	Percentage of achieved indicators of the program operational plan objectives	50%	65%	NA	50%	The actual benchmark achieved the target and exceeded the external benchmark, by the time of the analysis of this KPI, the internal KPI was not available. The KPI is taken as achieved and considered as the program's strength.	65%

#### KPI Analysis

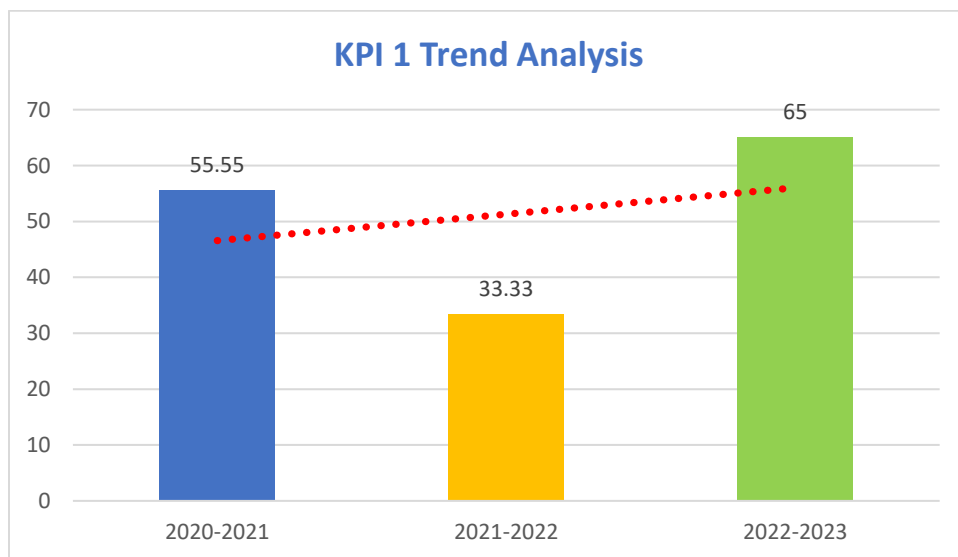
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The actual benchmark achieved the target and exceeded the external benchmark, by the time of the analysis of this KPI, the internal KPI was not available. The KPI is taken as achieved and considered as the program's strength.

#### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The KPI trend analysis shows an improvement compared with the previous three years. There was a dip in the KPI in 2021-22 but in the year 2022-23, the improvement is achieved.

#### Recommendations for Improvement

- The new target of the KPI should be increased.

#### KPI-P-02 Students' Evaluation of quality of learning experience in the program

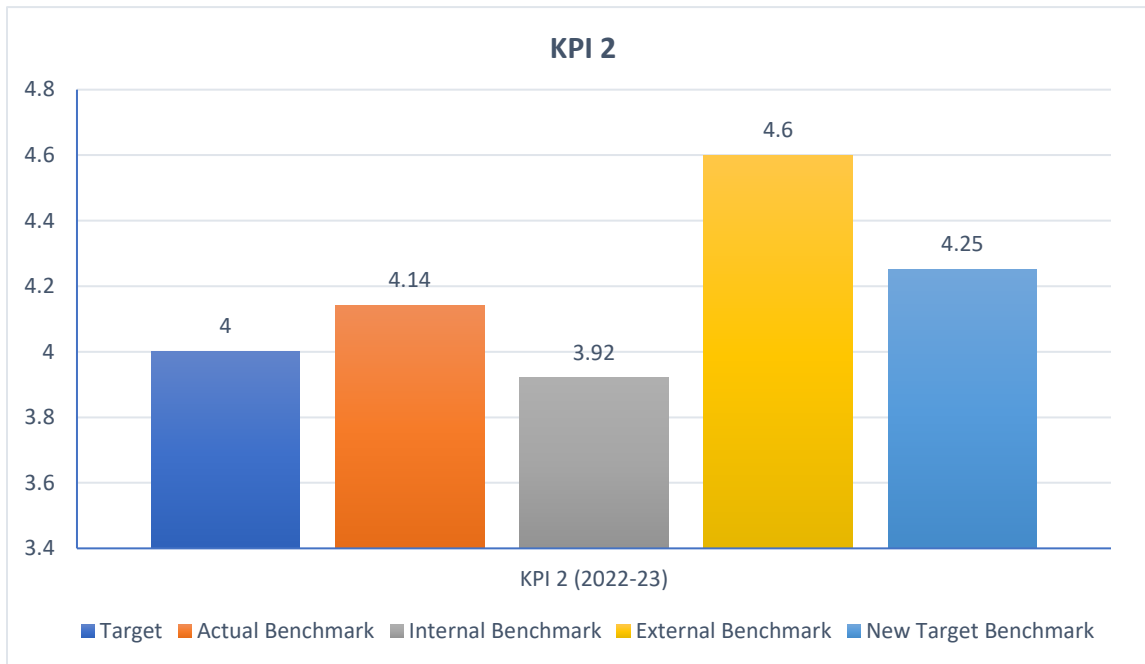
#### KPI Results

The results of KPI 2 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
2	Students' Evaluation of quality of learning experience in the program	4	4.14	3.92	4.6	The actual benchmark achieved the target and exceeded the internal benchmark but is short of the external benchmark. The KPI is taken as achieved.	4.25

### KPI Analysis

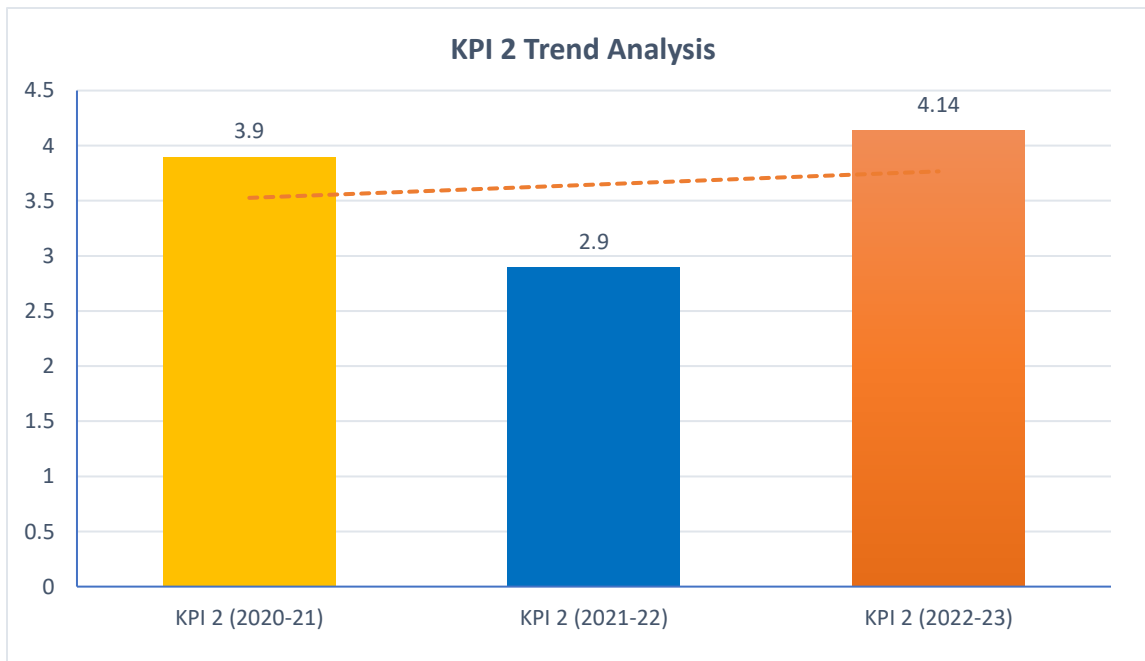
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The actual benchmark achieved the target and exceeded the internal benchmark but is short of the external benchmark. The KPI is taken as achieved.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The KPI trend analysis shows an improvement compared with the previous three years. There was a dip in the KPI in 2021-22 but in the year 2022-23, the improvement is achieved.

#### Recommendations for Improvement

- The new target of the KPI should be increased.

#### KPI-P-03 Students' evaluation of the quality of the courses

##### KPI Results

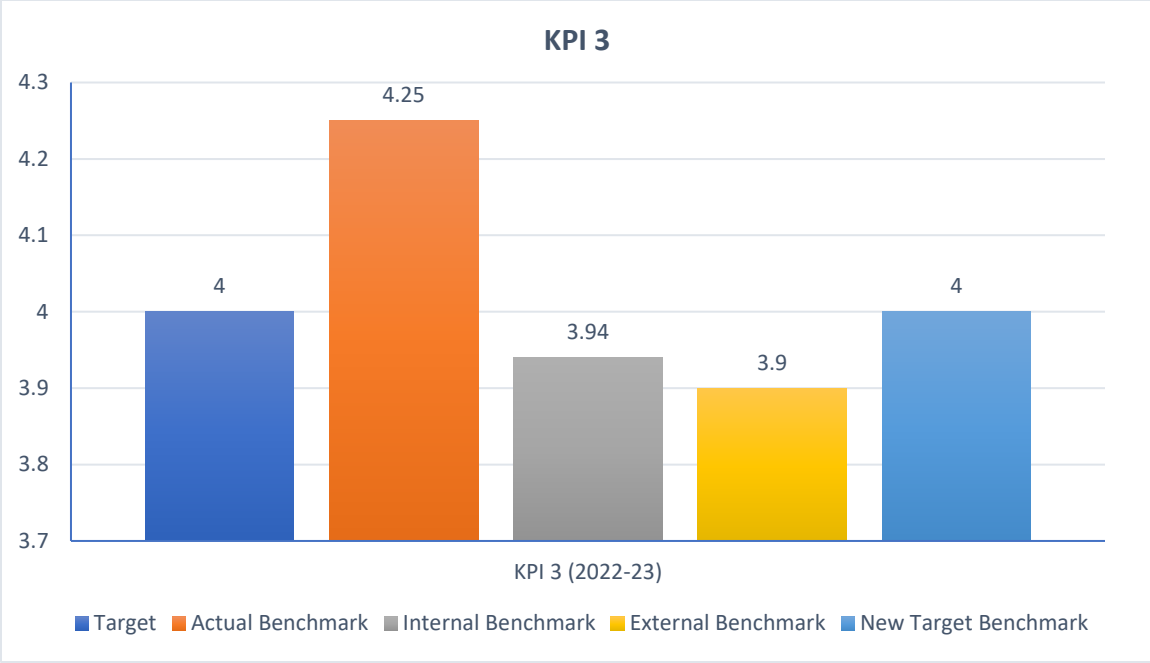
The results of KPI 3 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
3	Students' evaluation of the quality of the courses	4	4.25	3.94	3.9	The actual benchmark meets the target and the internal and external benchmarks. The KPI is taken as achieved.	4

##### KPI Analysis

The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.

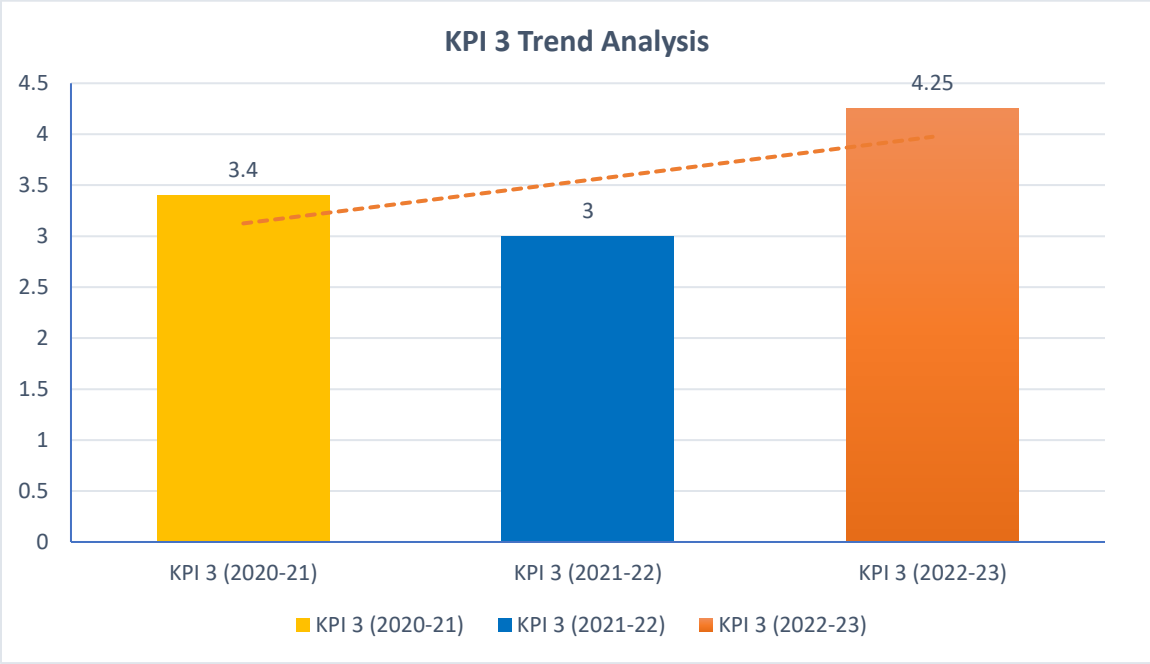




The actual benchmark meets the target and the internal and external benchmarks. The KPI is taken as achieved.

**KPI Trend Analysis**

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The KPI trend analysis shows an improvement compared with the previous three years. There was a dip in the KPI in 2021-22 but in the year 2022-23, the improvement is achieved.

### Recommendations for Improvement

- The new target of the KPI should be increased.

### KPI-P-04 Apparent Completion rate

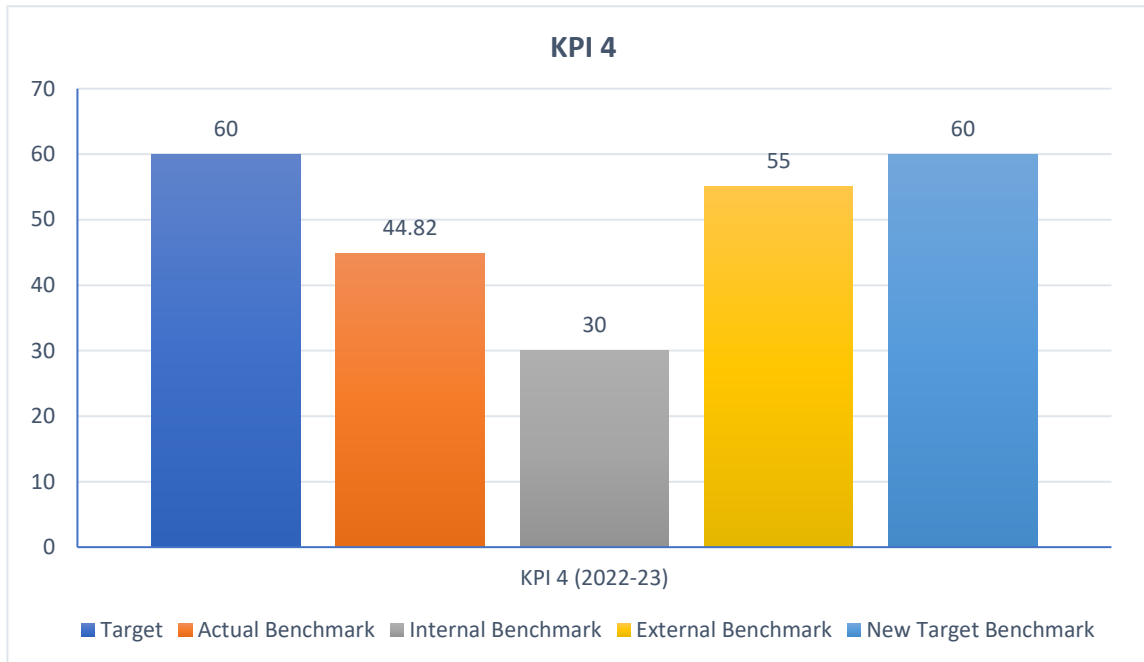
#### KPI Results

The results of KPI 4 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
4	Apparent completion rate	60 %	44.82%	30 %	55%	The actual benchmark is short of the target, exceeds the internal benchmark but short of the external benchmark. The reason for this is poor results in some courses. More emphasis on math and mechanical design courses needs to be made.	60 %

#### KPI Analysis

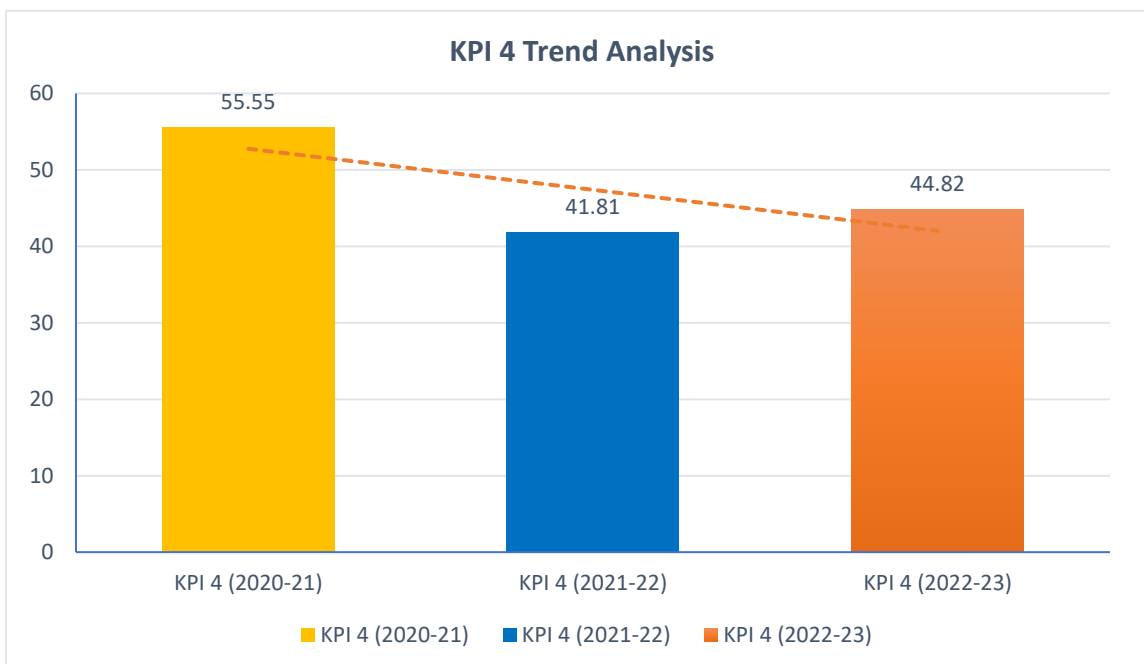
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The actual benchmark is short of the target, exceeds the internal benchmark but short of the external benchmark.

#### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The KPI trend analysis shows an improvement compared with the previous year but still less than 2020-21. The KPI needs to be improved by identifying the courses in which the failure rates are higher.

### Recommendations for Improvement

- The program should emphasize the teaching of math and mechanical design-based courses so that these courses are taught in easy-to-understand ways and include more problem solving during the course delivery. The contact hours for such courses may also be increased.

### KPI-P-05 First-year students retention rate

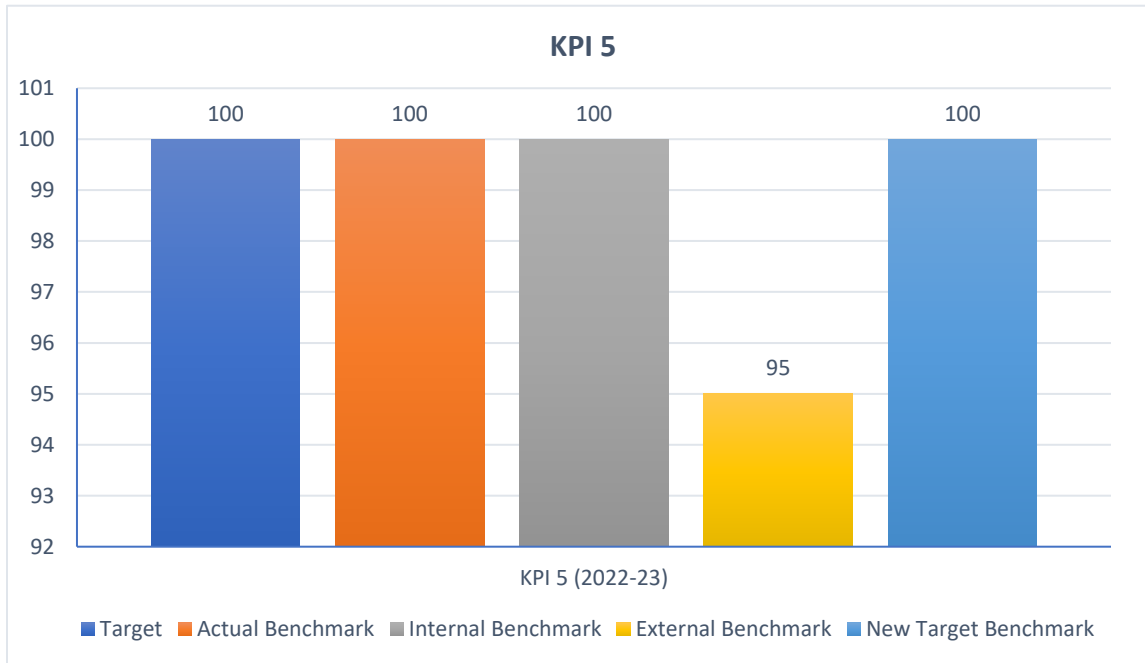
#### KPI Results

The results of KPI 5 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
5	First-year students retention rate	100 %	100%	100 %	95%	The actual benchmark is 100% and the target has been achieved. The actual benchmark is equal to the internal benchmarks and more than the external benchmark. The KPI is taken as achieved.	100 %

#### KPI Analysis

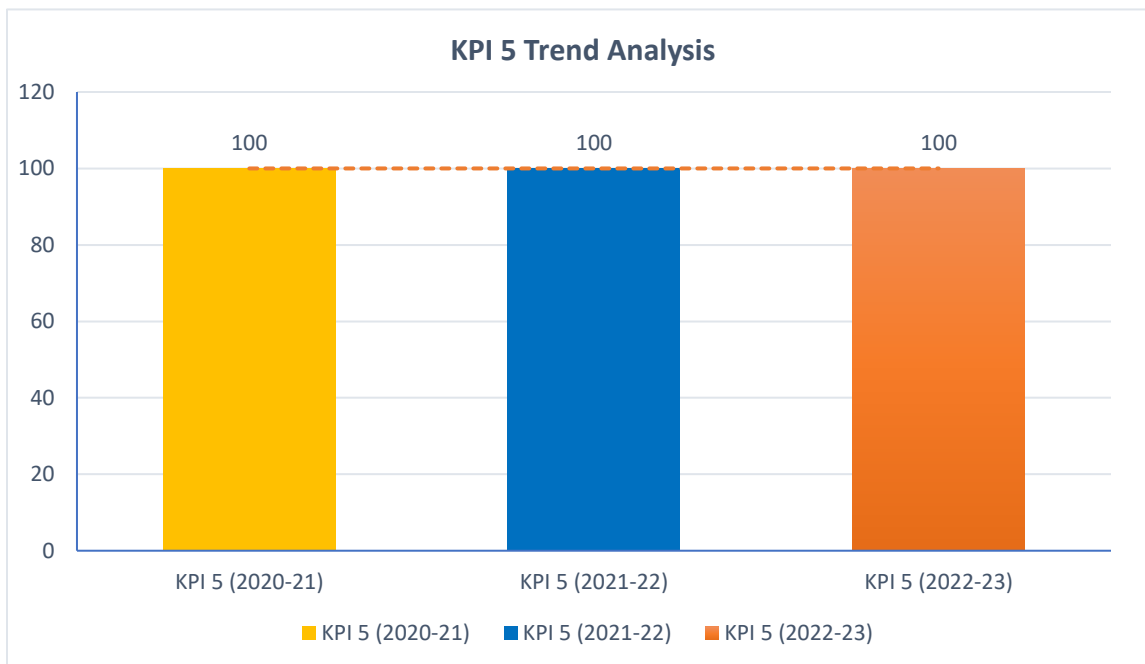
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The actual benchmark is 100% and the target has been achieved. The actual benchmark is equal to the internal benchmarks and more than the external benchmark. The KPI is taken as achieved.

#### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The KPI is consistently achieved, and it reflects as the program strength.

#### Recommendations for Improvement

None

## KPI-P-06 Students' performance in the professional and/or national examinations

### KPI Results

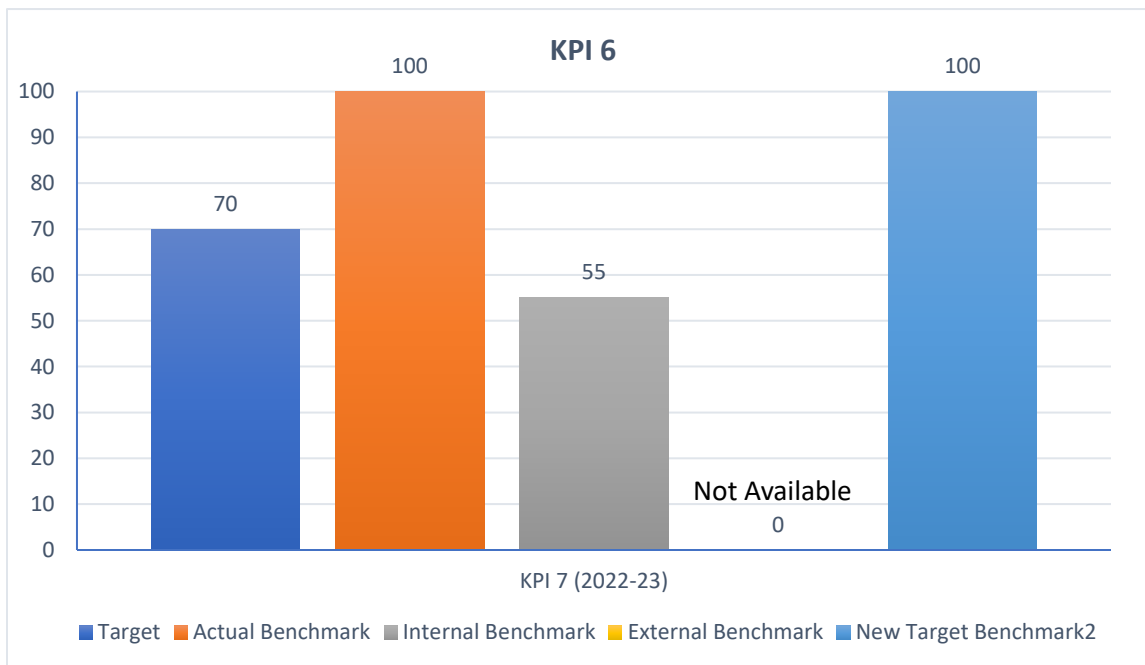
The results of KPI 6 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
6	Students' performance in the professional and/or national examinations	70%	100%  Avg. Score 29.78	55%  Avg. Score 34.57	Not available	Till the previous this KPI couldn't be measured due to the unavailability of data and most students not appearing in the FE exam. The qualifying score is 62% for the FE exam. The target for this KPI in 2022-23 is that 100% of the students should appear in the FE exam and 70% of them should qualify it. The actual benchmark met the target and exceeded the external and internal benchmarks, hence the KPI is taken as achieved for 2022-23. However, the average score of the students (29.78) is far less than the	100% students appear and 50% of students qualify the FE exam.

						qualifying score (70).	
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### KPI Analysis

The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



Till the previous this KPI couldn't be measured due to the unavailability of data and most students not appearing in the FE exam. The qualifying score is 70% for the FE exam. The target for this KPI in 2022-23 is that, 70% of the students should appear in the FE exam. The actual benchmark met the target and exceeded the external and internal benchmarks, hence the KPI is taken as achieved for 2022-23. However, the average score of the students (29.78) is far less than the qualifying score (62%).

### KPI Trend Analysis

The KPI 6 has not been measured in previous years hence the trend analysis cannot be done.

### Recommendations for Improvement

- The program should develop a process to encourage students for preparation of the FE exam and help them academically and by motivation to pass the FE exam. The target for this KPI should be revised and based on the percentage of students appearing and well as qualifying the FE exam.

## KPI-P-07 Graduates' employability and enrolment in Postgraduate Programs

### KPI Results

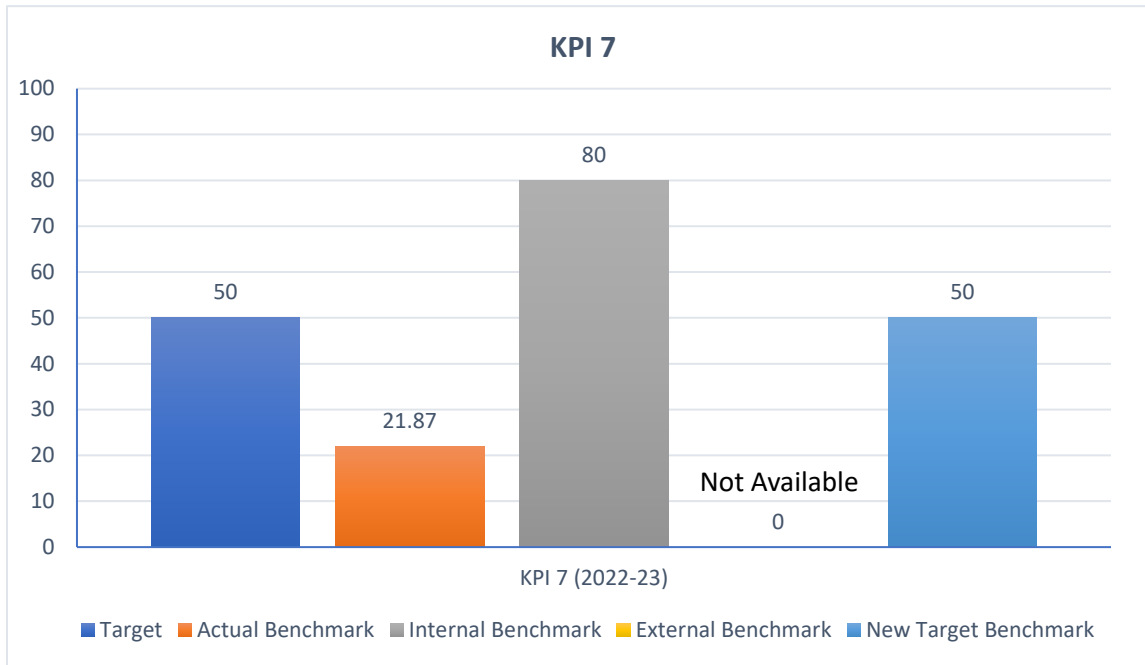
The results of KPI 7 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
7	Graduate's employability and enrollment in postgraduate programs (b) Employed (c) Enrollment in PG Programs	50 %	21.87% 14/64 (a) 17.18 (b) 4.68	80 %	Not available	The employability ratio is short of the target and the internal benchmarks. The data of some graduates could not be collected due to the poor response of the graduates to the communication requests from the program.	50 %



### KPI Analysis

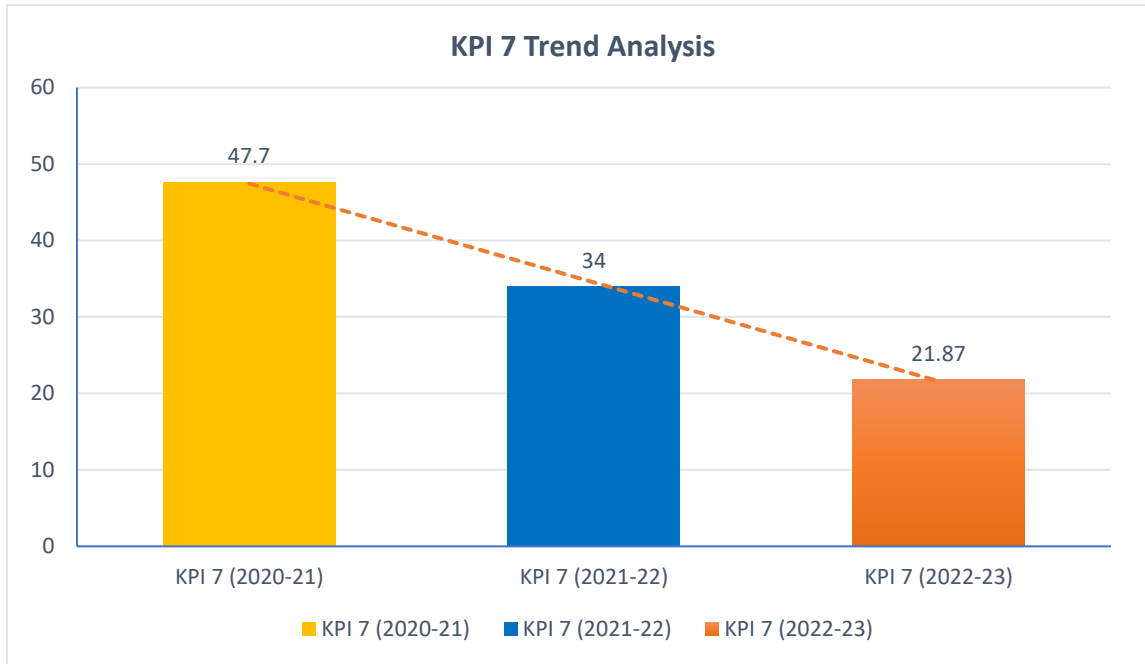
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The employability ratio is short of the target and the internal benchmarks. The data of some graduates could not be collected due to the poor response of the graduates to the communication requests from the program.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows a decline in the graduates' employment over the past three years. This KPI is identified as the program's weakness.

### Recommendations for Improvement

- The graduates' employability needs improvement.

### KPI-P-08 Average number of students in the class

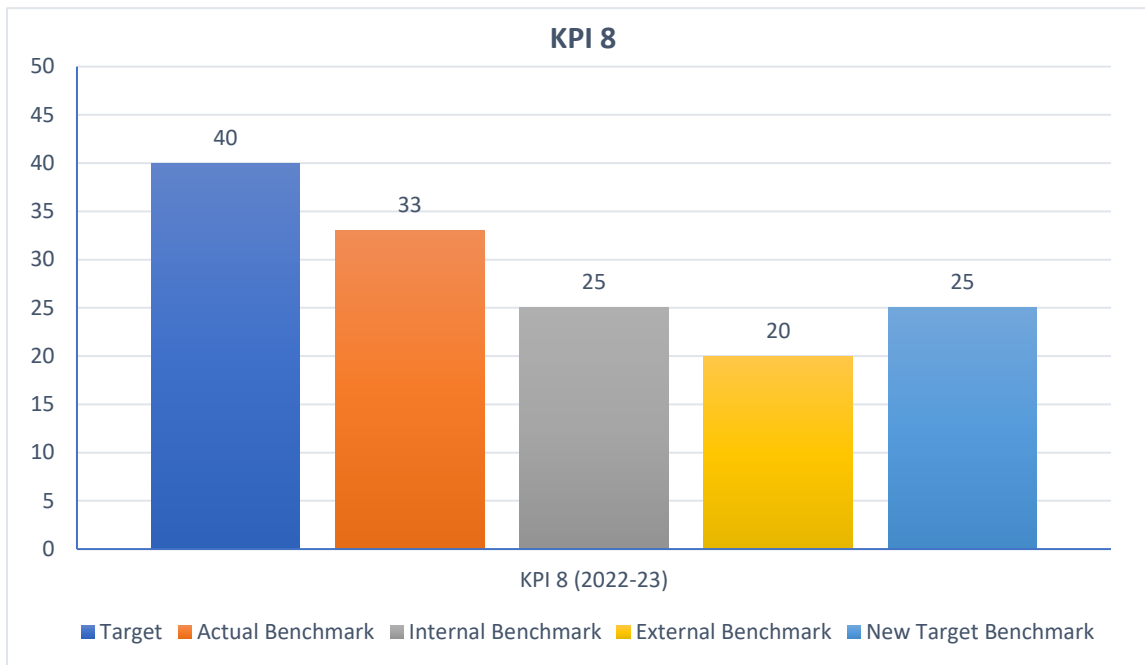
#### KPI Results

The results of KPI 8 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
8	Average number of students in the class	40	33	25	20	The number of students in the class achieved the target but was still higher than the internal and external benchmarks.	25

### KPI Analysis

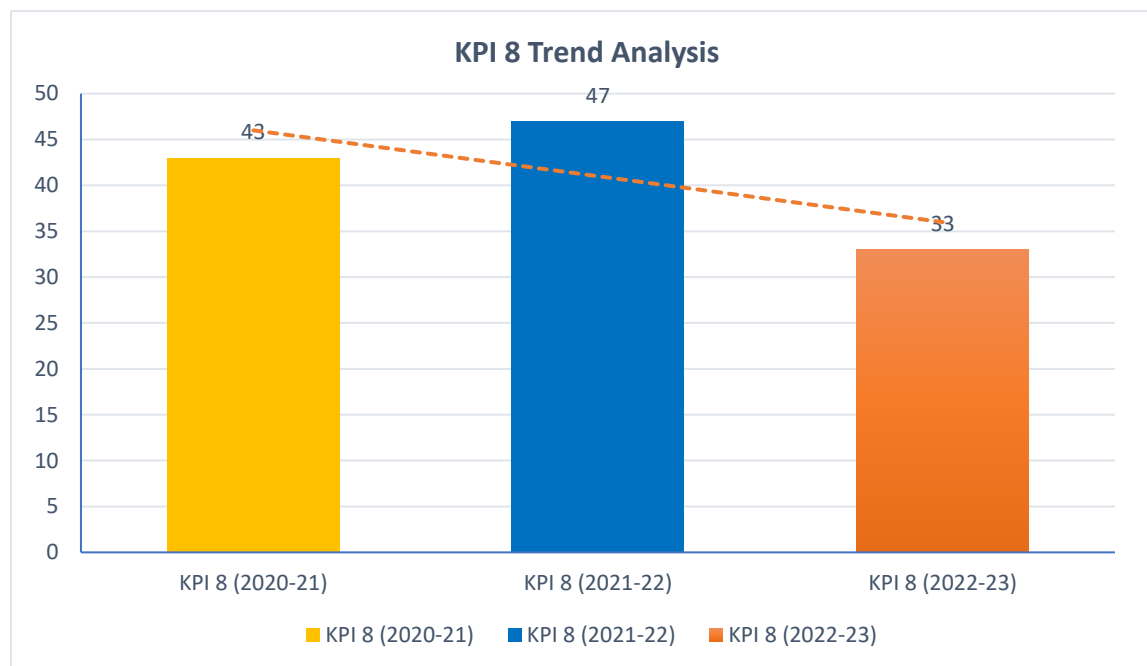
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The number of students in the class achieved the target but was still higher than the internal and external benchmarks.

## KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis over three years shows an improvement caused by the reduction of the average number of students in the class. The higher number of the students in the class in 2020-21 and 2021-22 is mainly due to the COVID 19 pandemic period in which the classes were transferred to online mode and the section strength was considerably higher in online teaching mode.

### Recommendations for Improvement

- The program needs to expand its infrastructure capacity and faculty strength

## KPI-P-09 Employers' evaluation of the program graduates' proficiency

### KPI Results

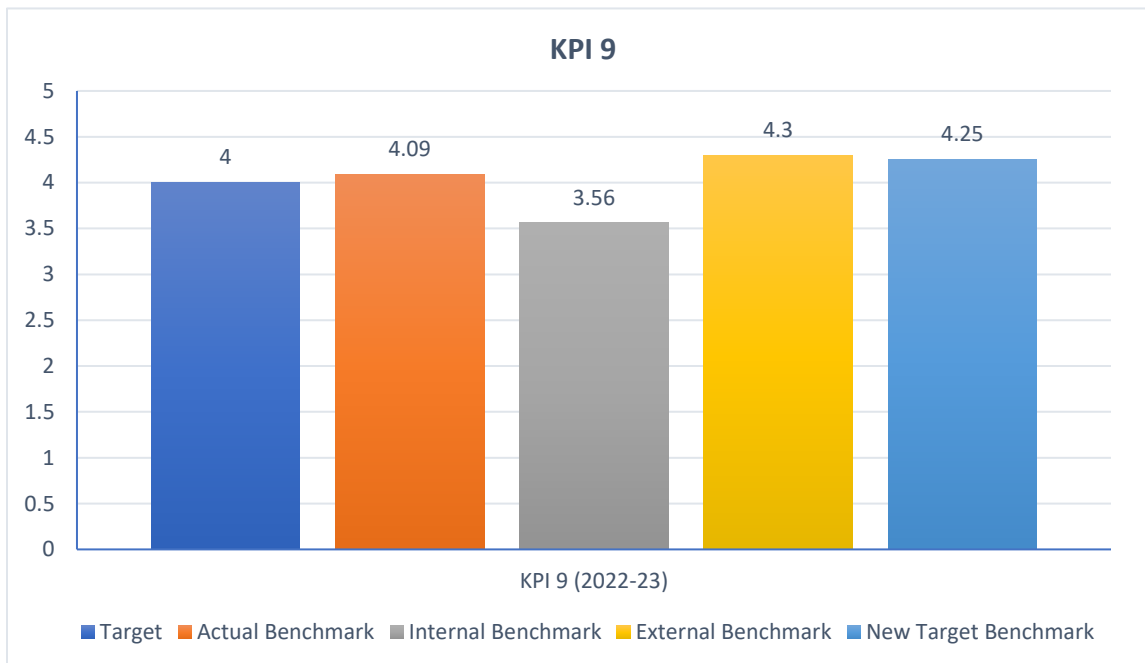
The results of KPI 9 are shown in the table below.

KPI #	KPI	KPI Target Bench mark	KPI Actual Bench mark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
9	Employers' evaluation of the program graduates' proficiency	4	4.09	3.56	4.3	The employer evaluation of the graduates meets the target and the internal benchmark, but	4.25

						it is slightly short of the external benchmark. This KPI is taken as achieved.	
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### KPI Analysis

The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The employer evaluation of the graduates meets the target and the internal benchmark, but it is slightly short of the external benchmark. This KPI is taken as achieved.

### KPI Trend Analysis

The KPI 9 has not been measured in previous years hence the trend analysis cannot be done.

### Recommendations for Improvement

- The recommendation given in KPI 7 will help to improve the result of this KPI as well. The new target benchmark of this KPI should be increased.

### KPI-P-10 Students' satisfaction with the offered services

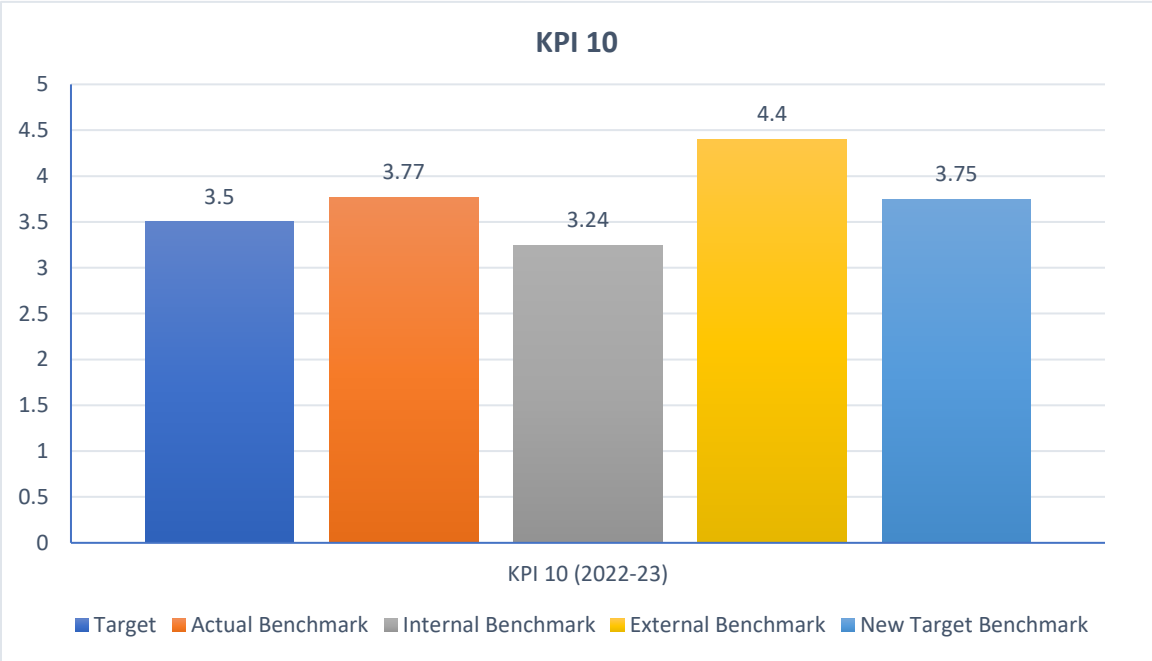
#### KPI Results

The results of KPI 10 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
10	Students' satisfaction with the offered services	3.5	3.77	3.24	4.4	The students' satisfaction with the offered services meets the target and the internal benchmark but is slightly short of the external benchmark. The KPI is taken as achieved.	3.75

KPI Analysis

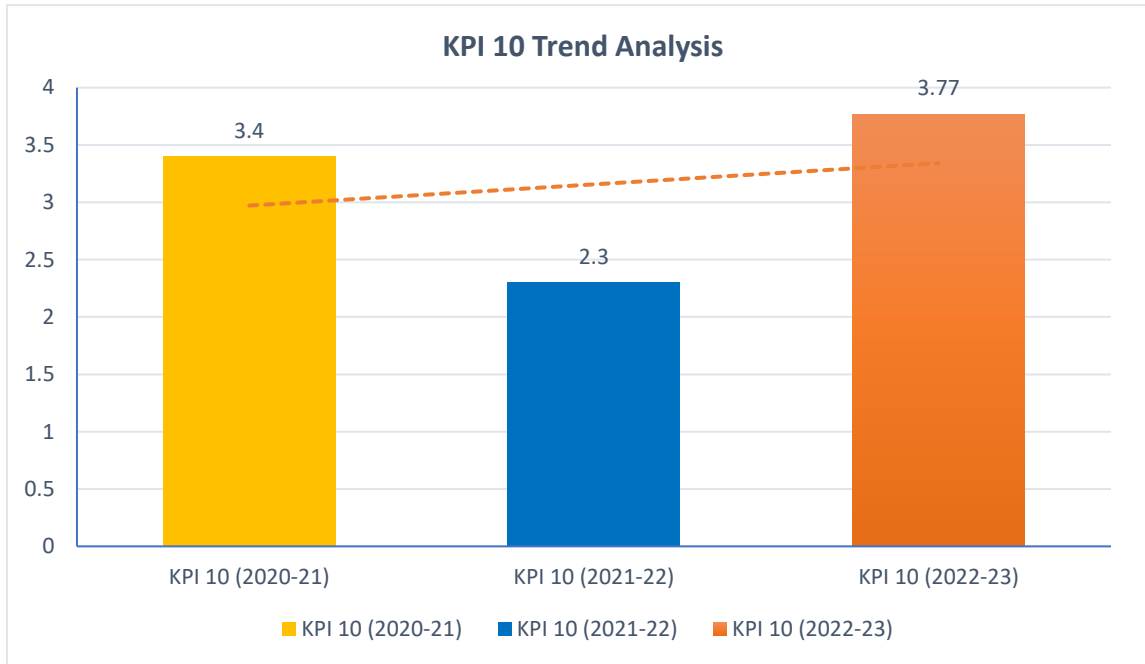
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The students' satisfaction with the offered services meets the target and the internal benchmark but is slightly short of the external benchmark. The KPI is taken as achieved.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows an improved trend and the highest achieved satisfaction level with the services provided by the students.

### Recommendations for Improvement

- The new target for the KPI should be increased to achieve continuous improvement.

### KPI-P-11 Ratio of students to Teaching Staff

#### KPI Results

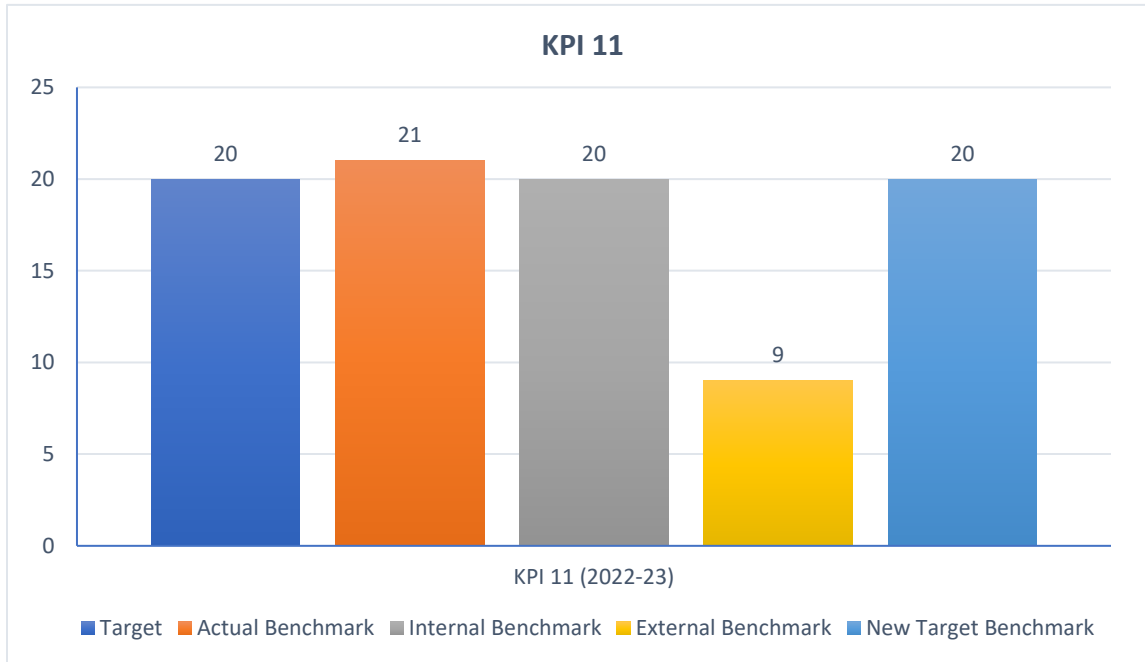
The results of KPI 11 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
11	Ratio of students to teaching staff	20:1	21:1	20:1	9:1	The ratio of the students to teaching staff is slightly higher than the target and the internal and external	20:1

						benchmarks. The KPI is not achieved.	
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### KPI Analysis

The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.

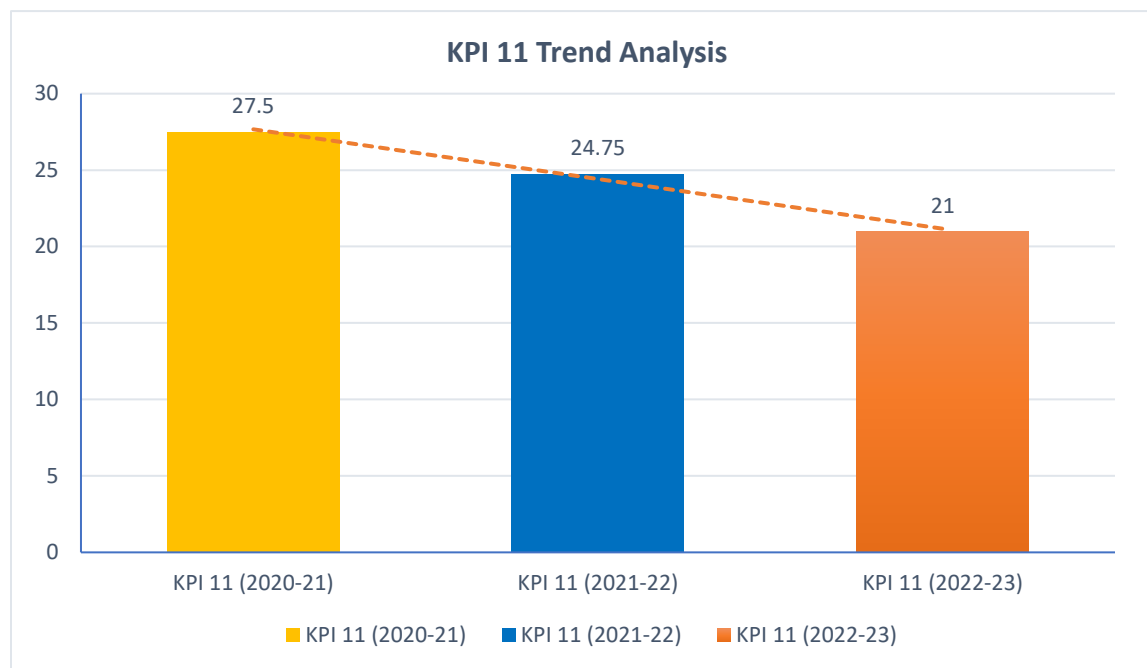


The ratio of the students to teaching staff is slightly higher than the target and the internal and external benchmarks. The KPI is not achieved.



### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows steady improvement in the student to teacher ratio.

### Recommendations for Improvement

- The program should take the necessary steps to improve the teaching student to staff ratio further by recruiting more faculty.

### KPI-P-12 Percentage of teaching staff distribution

#### KPI Results

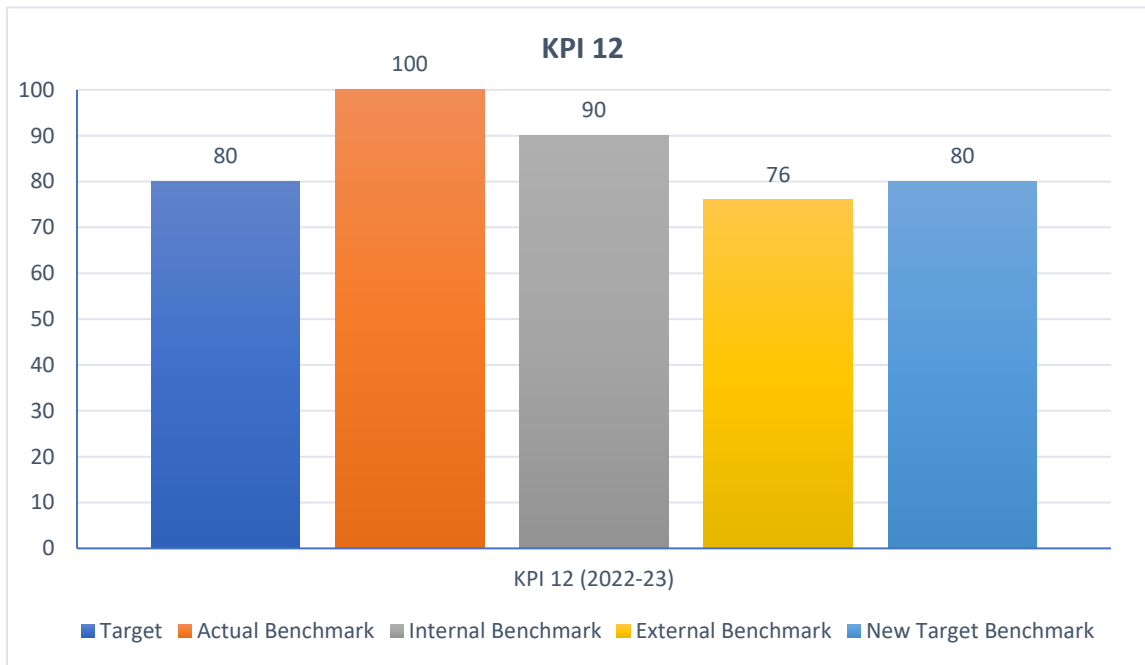
The results of KPI 12 are shown in the table below.

KPI #	KPI	KPI Target Bench mark	KPI Actual Bench mark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
12	Percentage of teaching staff distribution (Doctoral Qualification)	80%	100%	90 %	76%	The actual benchmark meets the target and the external benchmark. So, the KPI is taken as achieved and KPI 12 is considered as	80%

						the program's strength.	
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### KPI Analysis

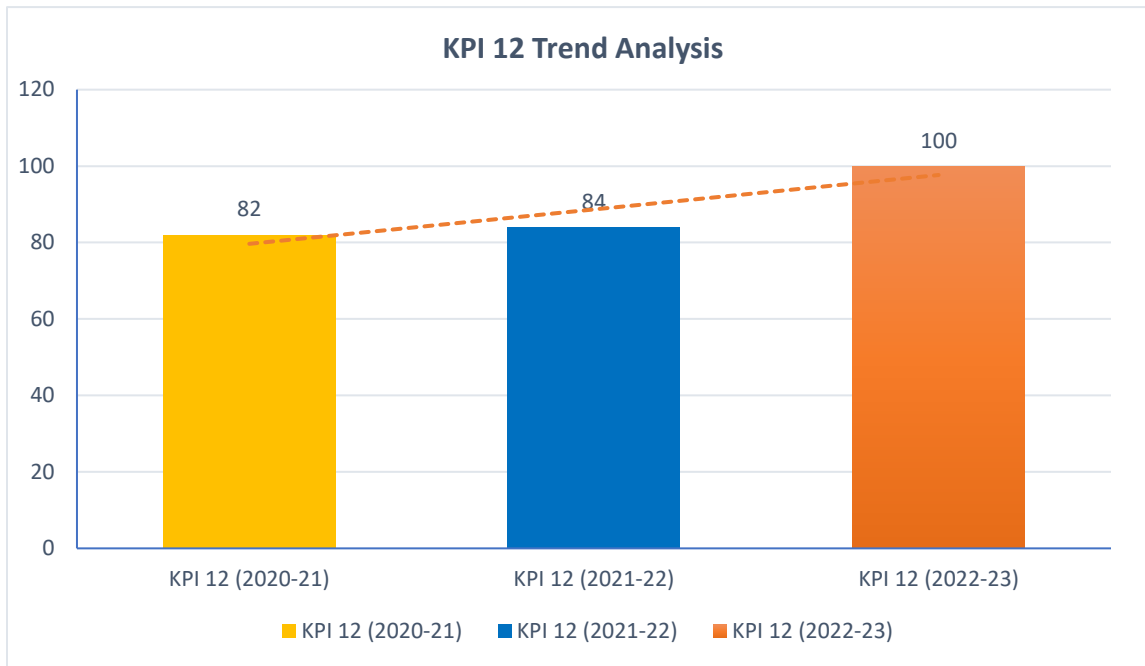
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The actual benchmark meets the target and the external benchmark. So, the KPI is taken as achieved and KPI 12 is considered as the program's strength.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows steady improvement in the faculty qualification.

### Recommendations for Improvement

None

### KPI-P-13 Proportion of teaching staff leaving the Program

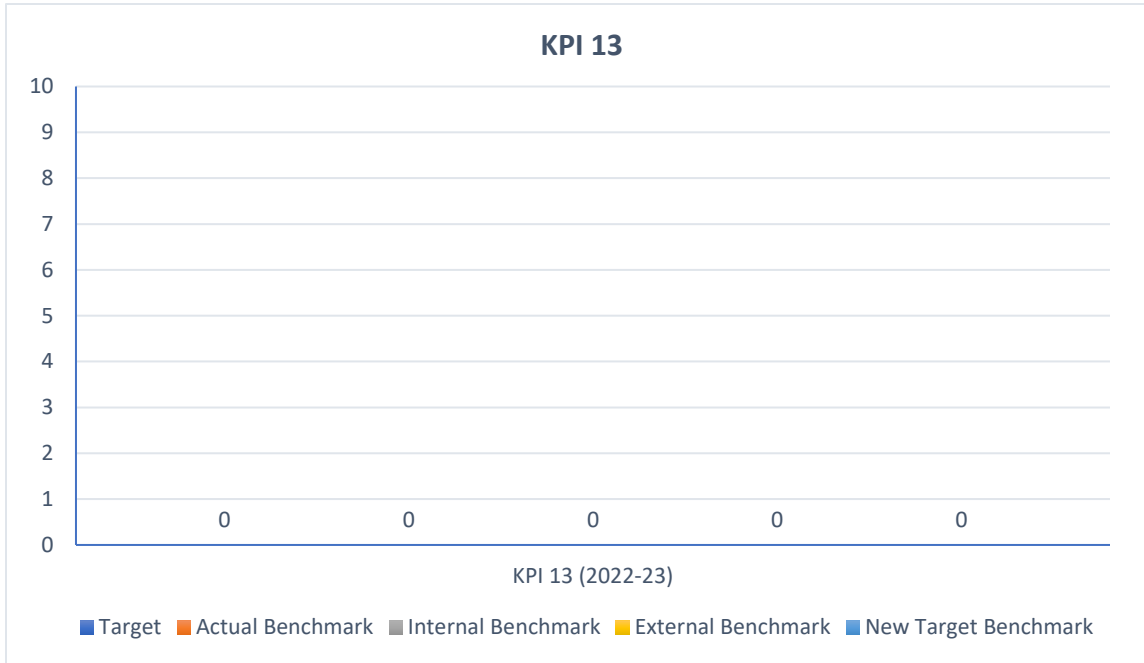
#### KPI Results

The results of KPI 13 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
13	Proportion of teaching staff leaving the program (Other than Retirement)	0%	0%	0%	0%	No faculty left the ME department for reasons other than retirement. The KPI is taken as achieved and it is the strength of the program.	0%

### KPI Analysis

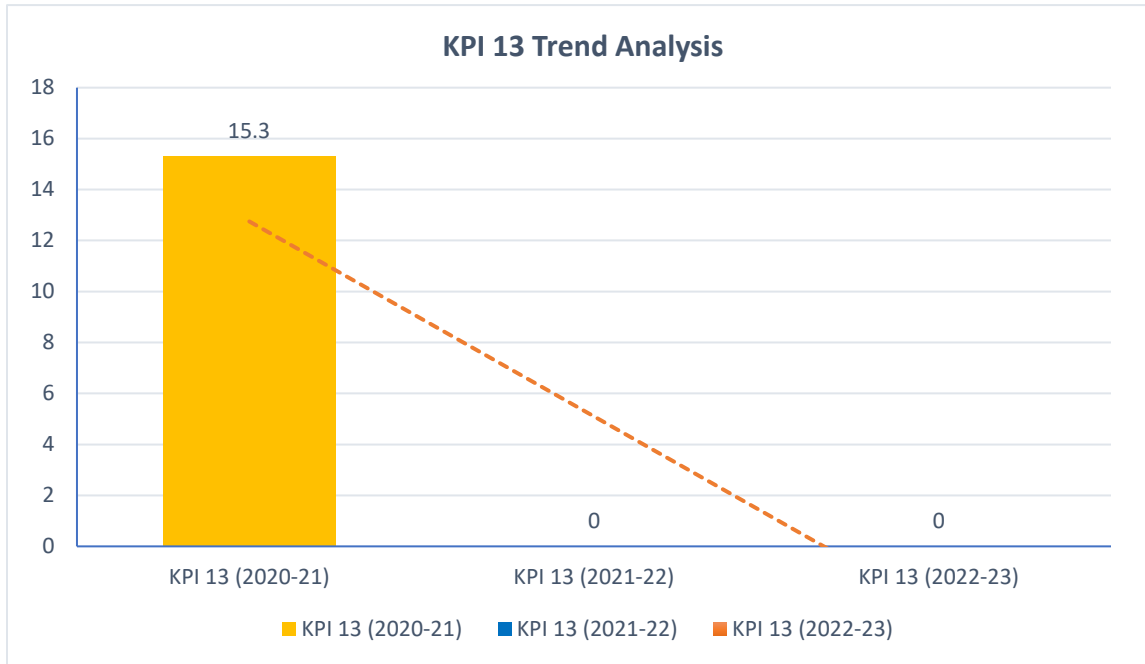
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



No faculty left the ME department for reasons other than retirement. The KPI is taken as achieved and it is the strength of the program.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows an improved trend and the KPI is achieved.

### Recommendations for Improvement

None

### KPI-P-14 Percentage of publications of faculty members

#### KPI Results

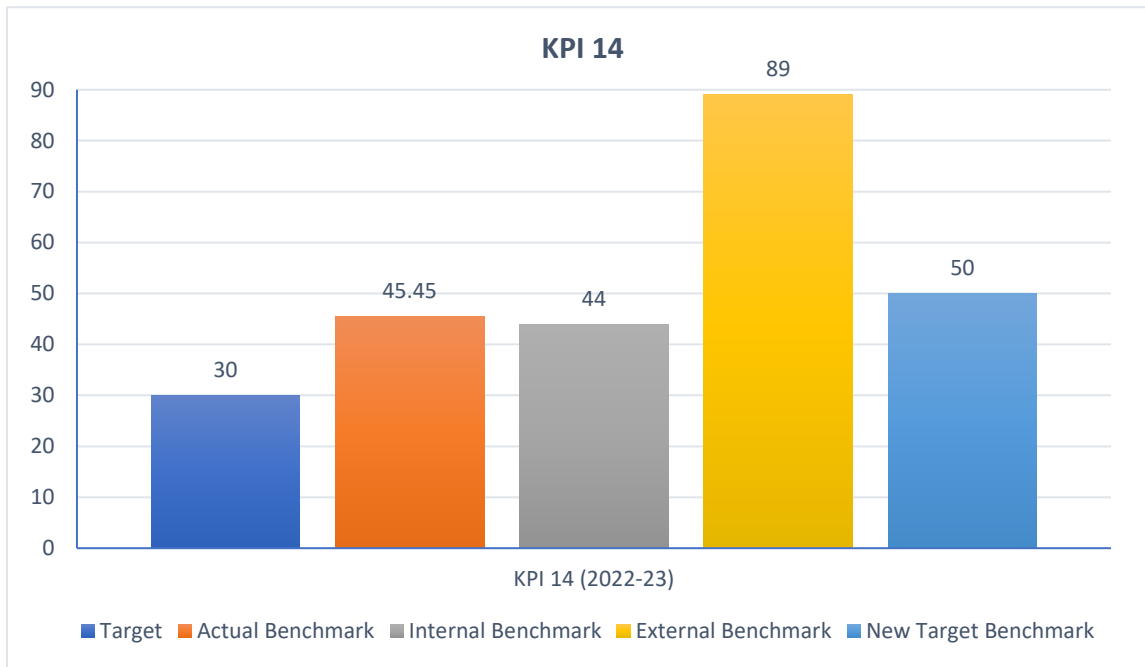
The results of KPI 14 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
14	Percentage of publications of faculty members (Percentage of Faculty who Published at least one paper)	30 %	45.45%	44 %	89%	The publications of faculty achieved the target and the internal benchmark but is short of the external benchmark. The KPI is taken as	50 %

						achieved, however, further improvement is desirable next year.	
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### KPI Analysis

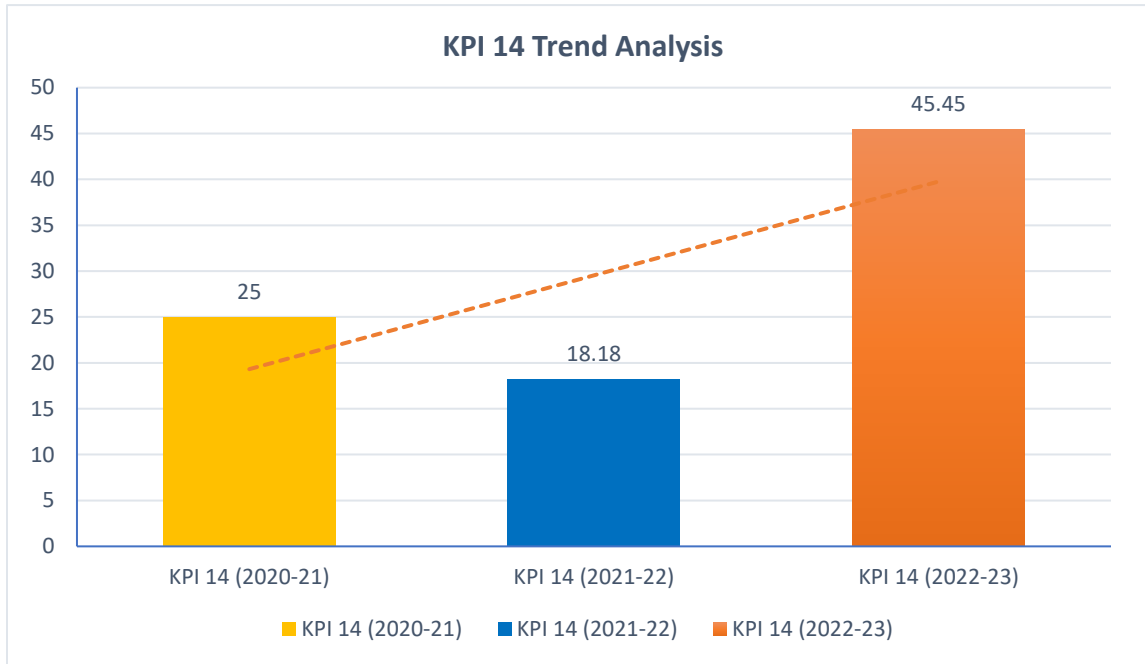
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The publications of faculty achieved the target and the internal benchmark but is short of the external benchmark. The KPI is taken as achieved, however, further improvement is desirable next year.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows an improved trend and the highest achieved satisfaction level with the services provided by the students.

### Recommendations for Improvement

- The publication per faculty needs improvement.

### KPI-P-15: Rate of published research per faculty member

#### KPI Results

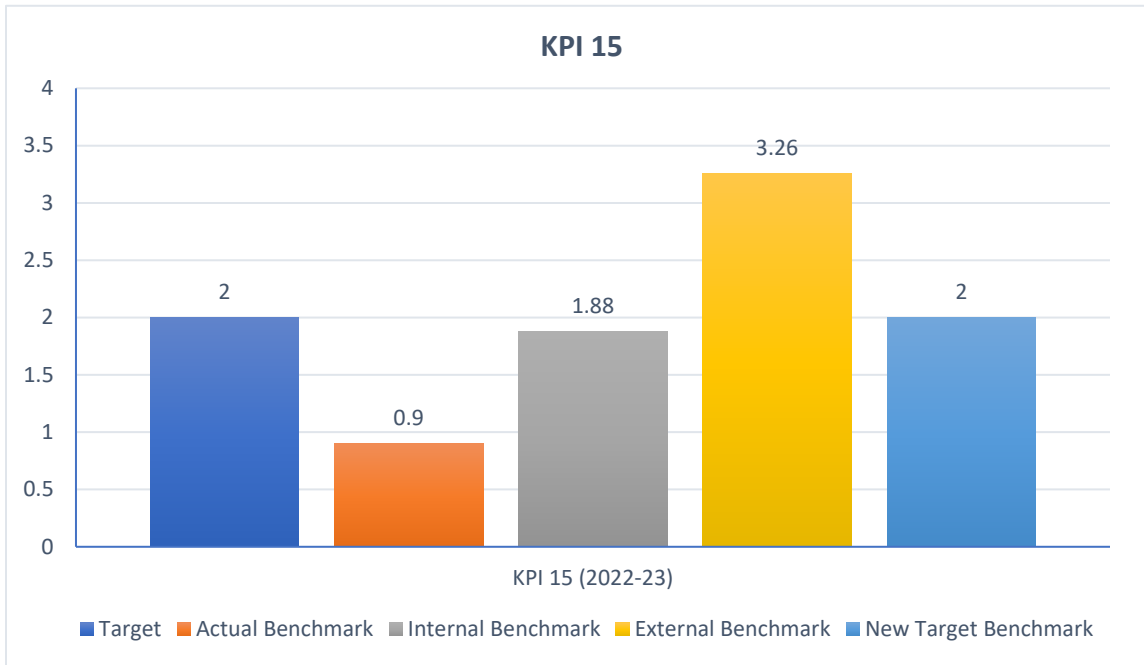
The results of KPI 15 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
15	Rate of published research per faculty member	2	0.9	1.88	3.26	The actual benchmark is well short of the target and the internal and external benchmarks. The KPI is not achieved and	2

						needs improvement.	
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### KPI Analysis

The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.

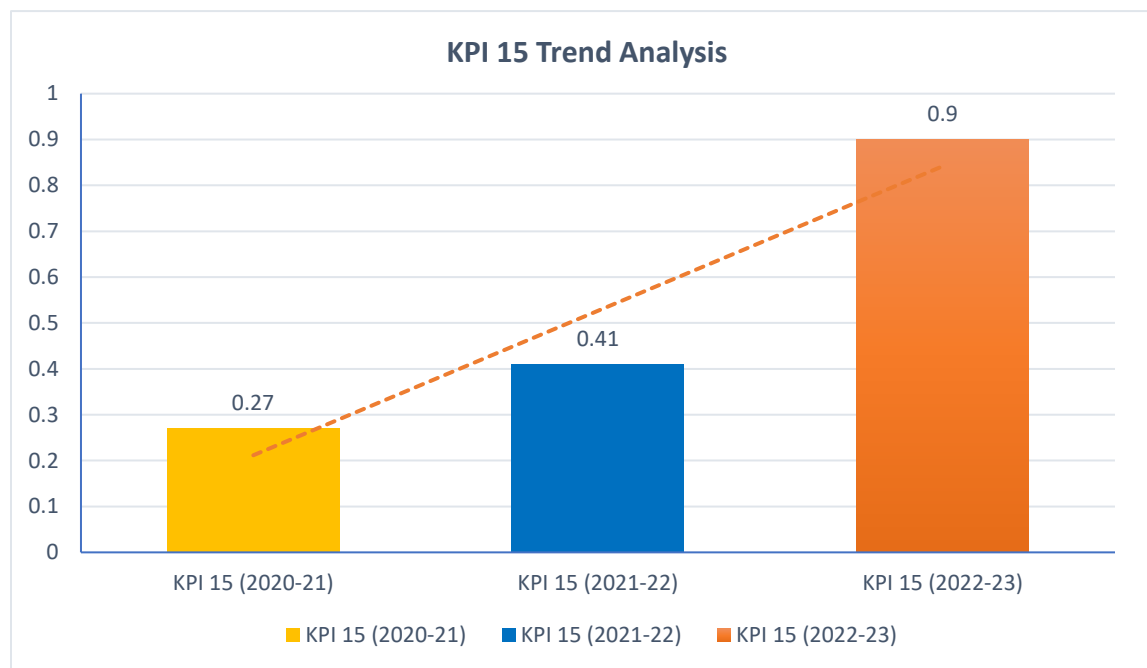


The actual benchmark is well short of the target and the internal and external benchmarks. The KPI is not achieved and needs improvement.



### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows an improved trend, marginally, but still the KPI is not achieved.

### Recommendations for Improvement

- The publication per faculty needs improvement.

### KPI-P-16 Citations rate in refereed journals per faculty member

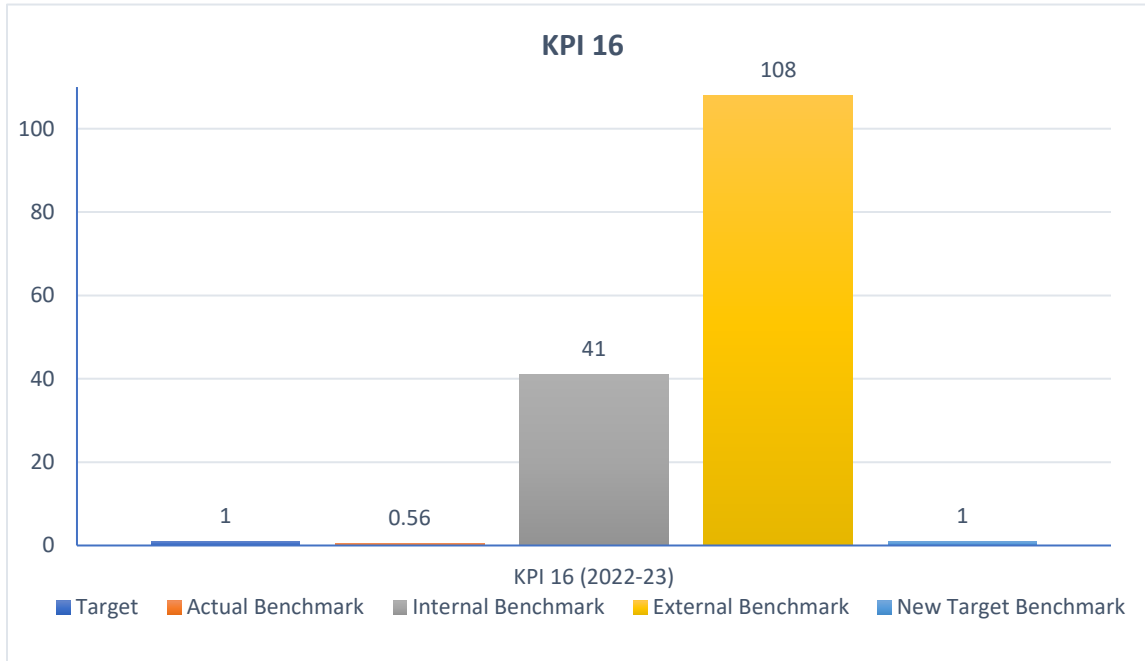
#### KPI Results

The results of KPI 16 are shown in the table below.

KPI #	KPI	KPI Target Bench mark	KPI Actual Bench mark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
16	Citations rate in refereed journals per faculty member	1	0.56	41	108	The citation rate per faculty member is low, short of the target and much less than the benchmarks. The KPI 16 is a weakness of the program.	1

### KPI Analysis

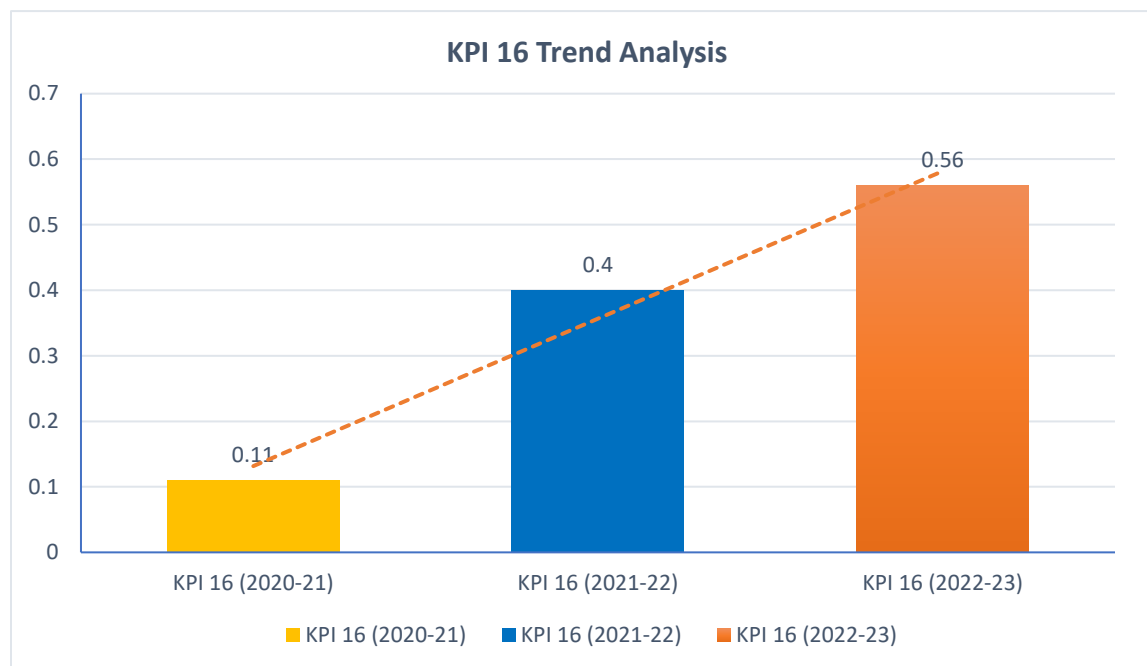
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The citation rate per faculty member is low, short of the target and much less than the benchmarks.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows an improved trend, marginally, but still the KPI is not achieved.

### Recommendations for Improvement

- The program needs significant improvement in the research contribution of the faculty members.

### KPI-P-17 Satisfaction of beneficiaries with the learning resources

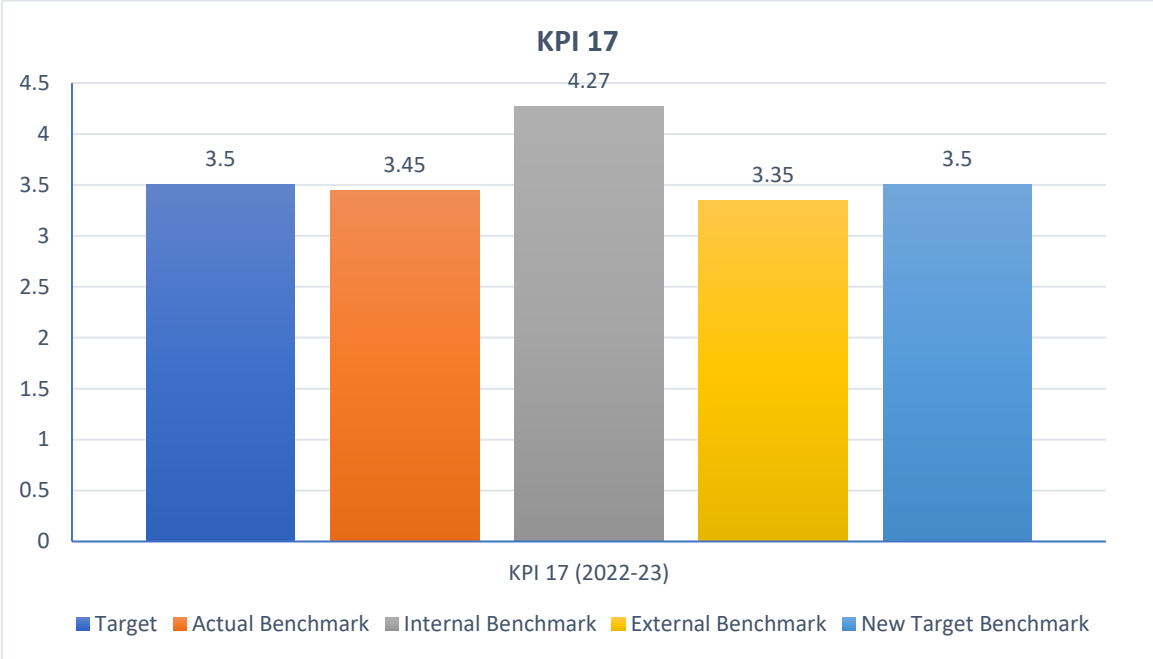
#### KPI Results

The results of KPI 17 are shown in the table below.

KPI #	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Internal Benchmarks	KPI External Benchmarks	KPI Analysis	KPI New Target Benchmark
17	Satisfaction of beneficiaries with the learning resources	3.5	3.45	4.27	3.35	The actual benchmark is less than the target and the external benchmarks but slightly more than the internal benchmark. The KPI is taken as achieved.	3.5

KPI Analysis

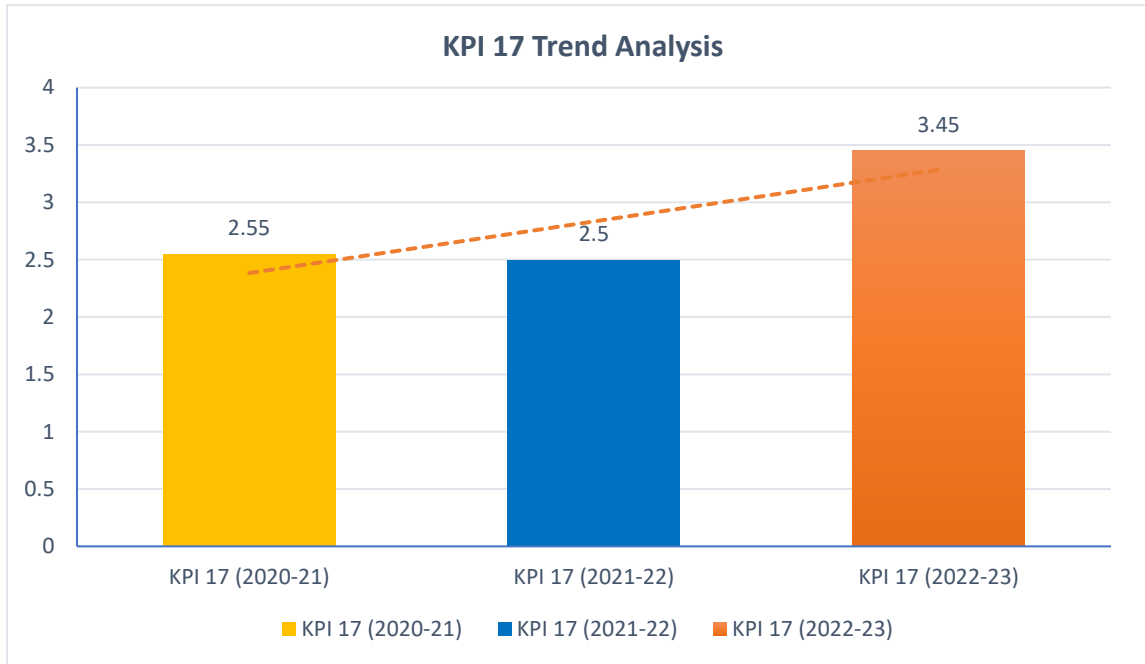
The following bar chart gives a graphical comparison of the achieved result with the target and benchmarks.



The actual benchmark meets the target and the external benchmark but is less than the internal benchmark. The KPI is taken as achieved.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved for the three successive academic years.



The trend analysis for three years shows an improved trend of satisfaction of the students with the learning resources and the highest achieved satisfaction level in the current year.

### Recommendations for Improvement

- None.

## Analysis of Operational Plan KPIs

### PG1.1 Evaluation of the Program Curriculum and Learning outcomes by the stakeholders Survey

#### KPI Results

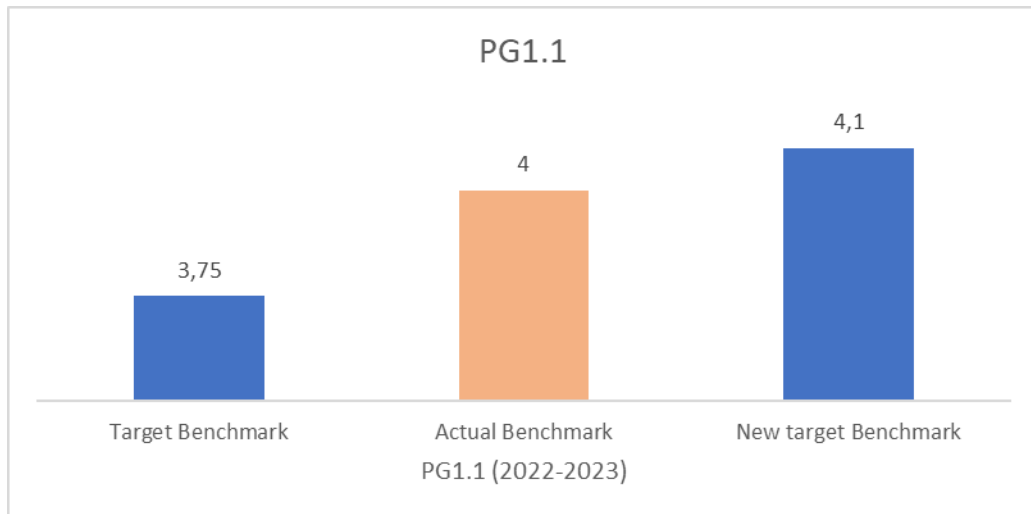
The results of PG1.1 are shown in the table below.

KPI#	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Analysis	KPI New Target Benchmark
PG1.1	Evaluation of the Program Curriculum and Learning	3.75	4.05	The KPI PG1.1 meets the target and is regarded as achieved.	4.1

outcomes by the stakeholders Survey				
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### KPI Analysis

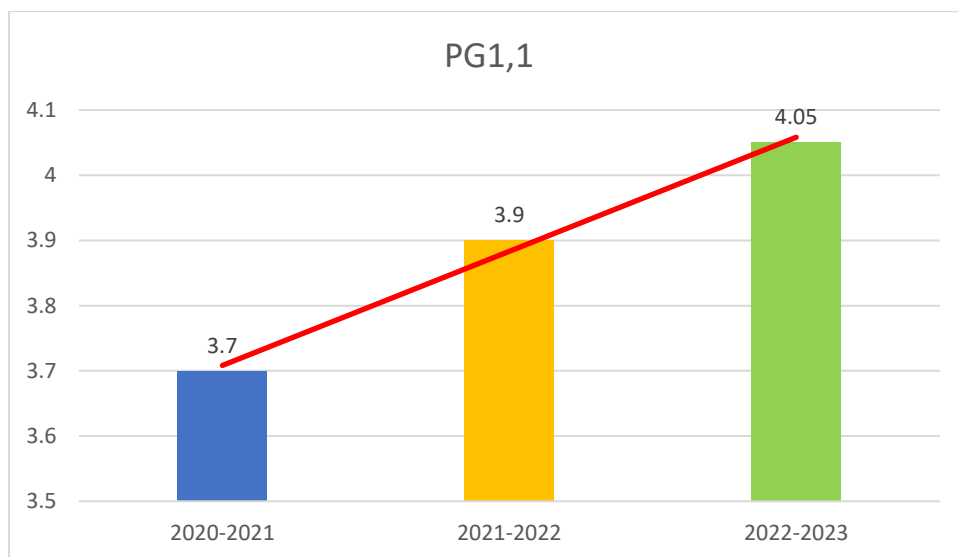
The following bar chart gives a graphical comparison of the achieved result with the target.



The KPI PG1.1 meets the target and is regarded as achieved.

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved PG1.1 for the three successive academic year.



The trend analysis for three years shows an improved trend of satisfaction of the Program Curriculum and Learning outcomes by the stakeholders.

Recommendations for Improvement  
None.

**PG2.4 No. of patent proposal and applications submitted by the program in a calendar year**

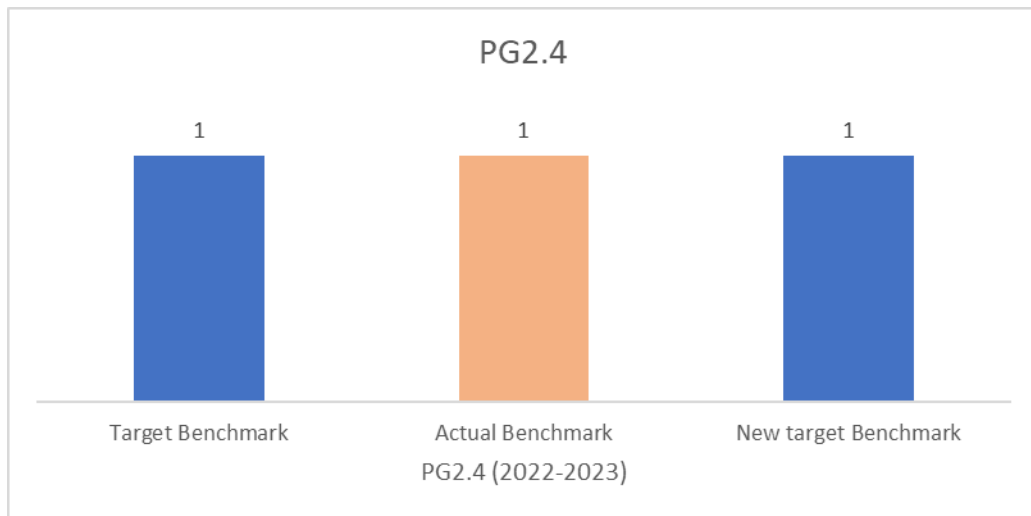
KPI Results

The results of KPI PG2.4 are shown in the table below.

KPI#	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Analysis	KPI New Target Benchmark
PG2.4	No. of patent proposal and applications submitted by the program in a calendar year	1	1	The KPI PG2.4 meet the target and regarded as achieved.	1

KPI Analysis

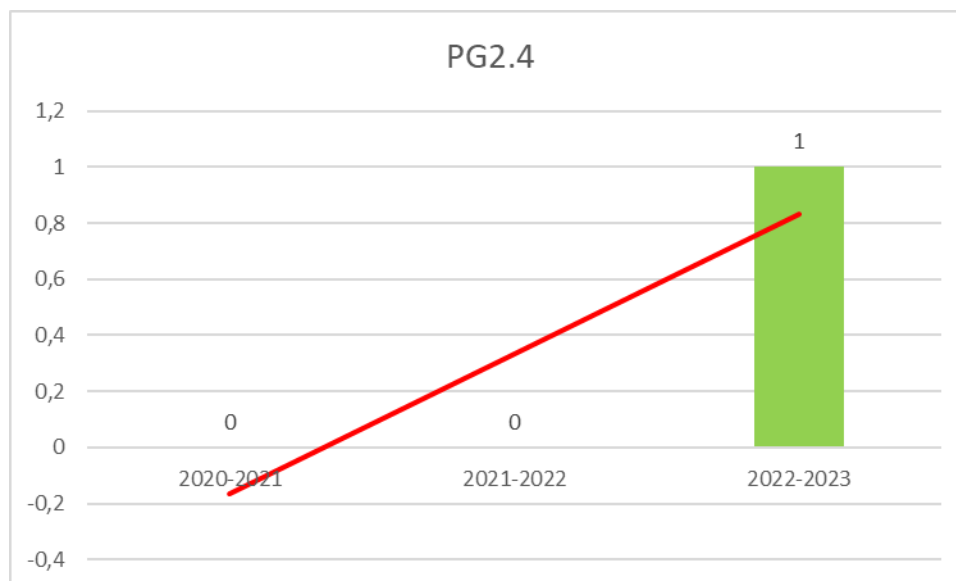
The following bar chart gives a graphical comparison of the achieved result with the target.



The KPI PG2.4 meets the target and regarded as achieved..

### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved PG2.4 for the three successive academic year.



The trend analysis for three years shows an improvement of the No. of patent proposal and applications submitted by the program.

### Recommendations for Improvement

To increase the No. of patent proposal by the faculty member, the following actions should be taken by the program :

- The faculty should be encouraged to identify innovative ideas and prepare and file patent applications.

### PG2.5 No. of research projects and grants applied by the program in a calendar year.

#### KPI Results

The results of KPI PG2.5 are shown in the table below.

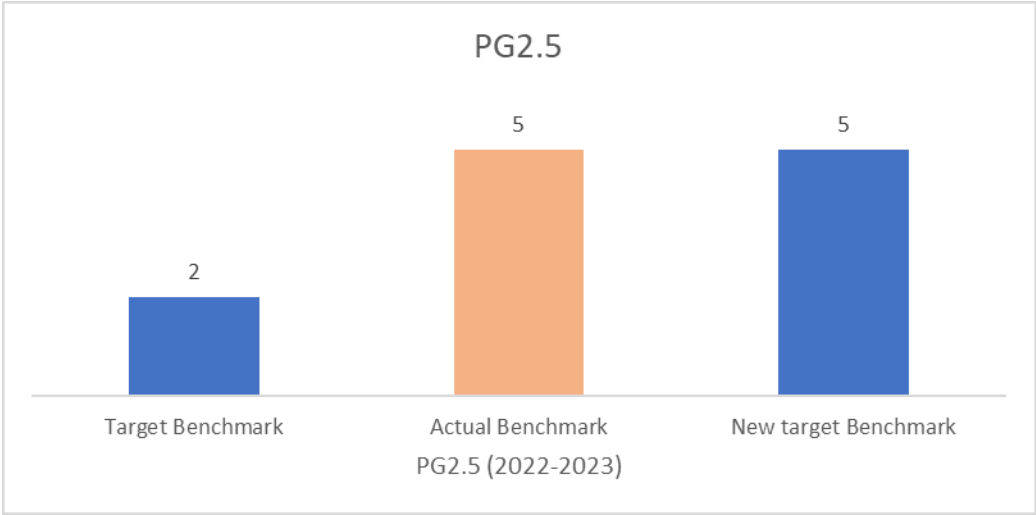
KPI#	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Analysis	KPI New Target Benchmark
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PG2.5	No. of research projects and grants applied by the program in a calendar year	2	5	The KPI PG2.5 meets the target and is regarded as achieved	5
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KPI Analysis

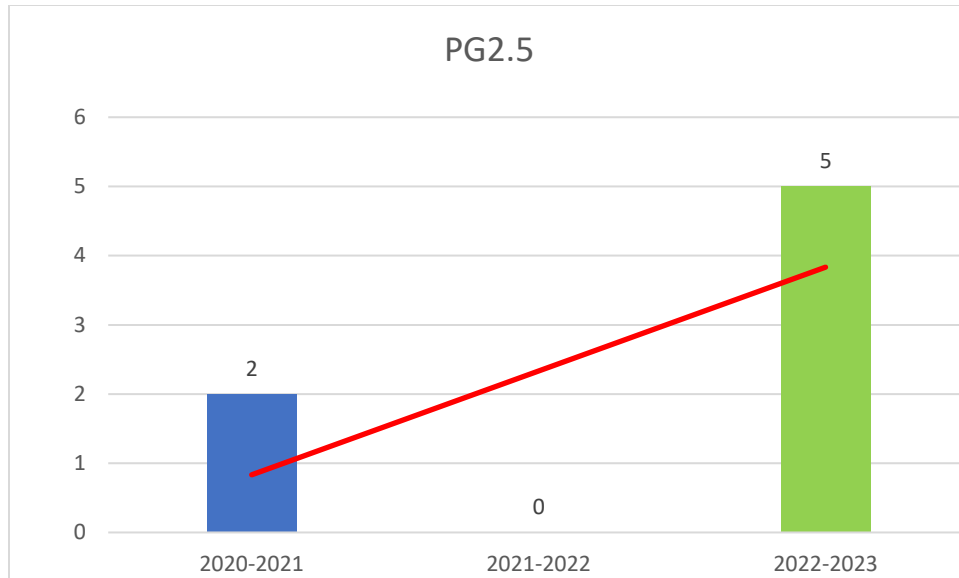
The following bar chart gives a graphical comparison of the achieved result with the target.



The KPI PG2.5 meets the target and is regarded as achieved.

KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved PG2.5 for the three successive academic year.



The trend analysis for three years shows an improved trend of the No. of research projects and grants applied by the program.

Recommendations for Improvement  
None.

### PG3.1 No. of Awareness programs arranged for sustainable practices in an academic year

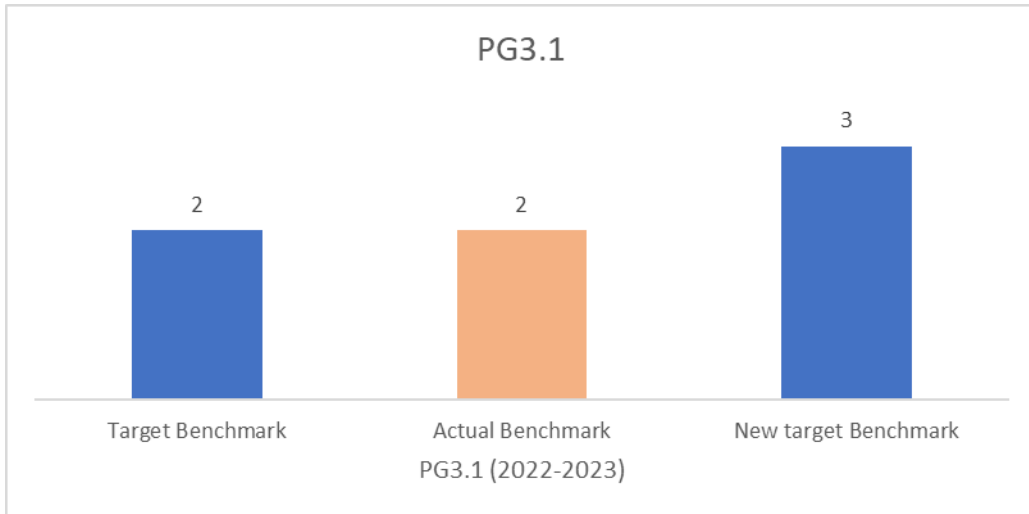
#### KPI Results

The results of KPI PG3.1 are shown in the table below.

KPI#	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Analysis	KPI New Target Benchmark
PG3.1	No. of Awareness programs arranged for sustainable practices in a academic year	2	2	The KPI PG3.1 meets the target and regarded as achieved.	3

#### KPI Analysis

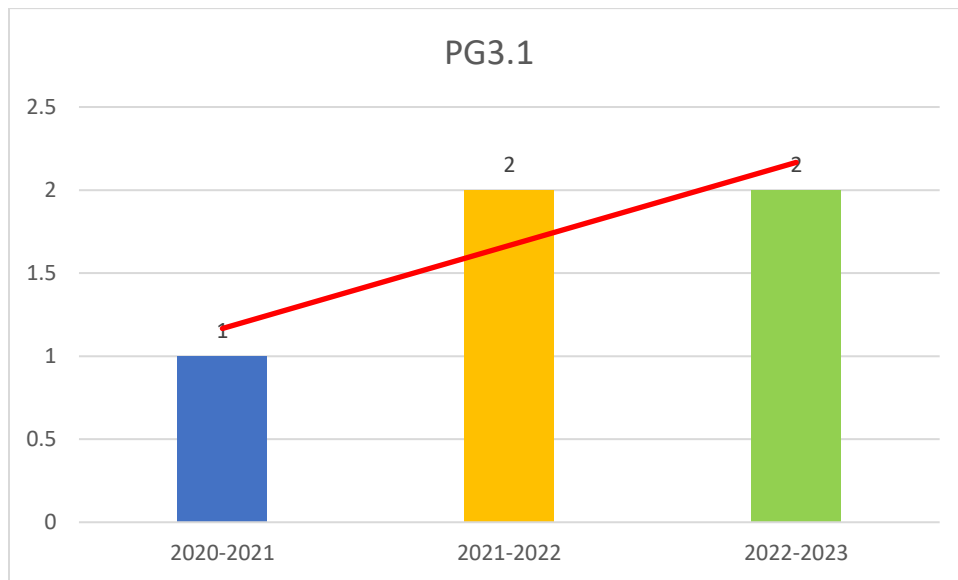
The following bar chart gives a graphical comparison of the achieved result with the target.



The KPI PG3.1 meets the target and is regarded as achieved.

#### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved PG3.1 for the three successive academic year.



The trend analysis for three years shows improvement of the No. of Awareness programs arranged for sustainable practices.

#### Recommendations for Improvement

None.

### PG3.2 No. of community service programs organized by the program.

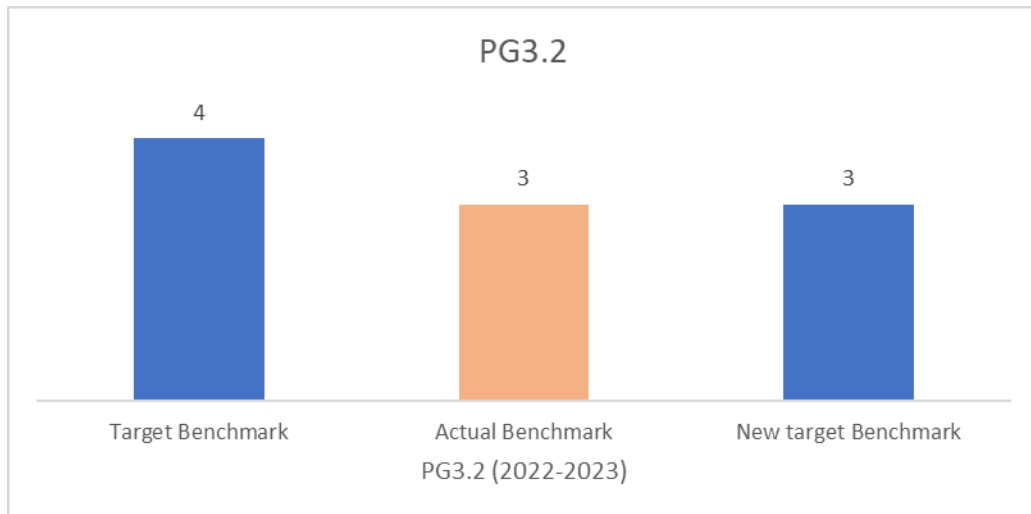
#### KPI Results

The results of KPI PG3.2 are shown in the table below.

KPI#	KPI	KPI Target Benchmark	KPI Actual Benchmark	KPI Analysis	KPI New Target Benchmark
PG3.2	No. of community service programs organized by the program.	4	3	The KPI PG3.2 does not meet the target and is regarded as not achieved.	3

#### KPI Analysis

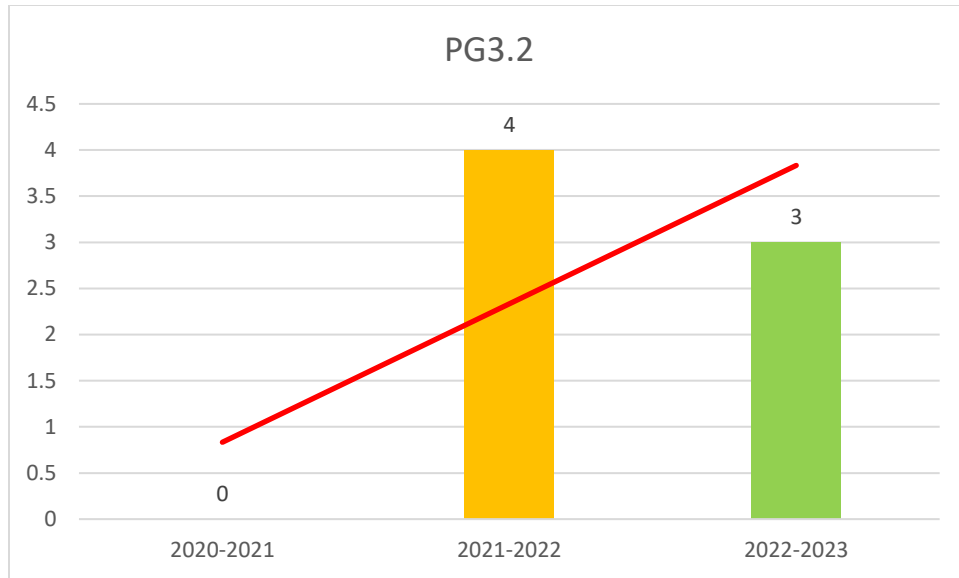
The following bar chart gives a graphical comparison of the achieved result with the target.



The KPI PG3.2 does not meet the target and is regarded as not achieved.

#### KPI Trend Analysis

The following bar chart gives a graphical comparison of the achieved PG3.2 for the three successive academic year.



The trend analysis for three years shows improvement of the number of community service programs by faculty and students.

#### Recommendations for Improvement

- None

#### Summary of KPI Analysis

The BSc MEP program measured 17 KPIs recommended by NCAAA. The program has an operational plan to achieve its goals. There are 20 operational plan KPIs out of which 15 KPIs are common with the NCAAA recommended KPIs and there are 5 additional operational plan KPIs. In total, the program measured 22 KPIs in the academic year 2022-23. Among the 17 NCAAA KPIs the program achieved 11 KPIs (64.7%) and among the 20 operational plan KPIs, the program achieved 13 KPIs (65%). Hence in total out of 22 KPIs, the program achieved 15 KPI (68.18%). The trend analysis of the KPIs show that in about 70% KPIs, the program is improving. An action plan has been developed to achieve the KPIs in the next assessment cycle, which couldn't be achieved in 2022-23.

#### Program's Strengths

1. Percentage of achieved indicators of the program operational plan.
2. Percentage of teaching staff with Doctoral Qualification.
3. Faculty retention.

## Priorities for Improvement

1. The program should emphasize the teaching of math and mechanical design-based courses so that these courses are taught in easy-to-understand ways and include more problem solving during the course delivery. The contact hours for such courses may also be increased.
2. The program should develop a process to encourage students for preparation of the FE exam and help them academically and by motivation to pass the FE exam. The target for this KPI should be revised and based on the percentage of students appearing and well as qualifying for the FE exam.
3. The graduates' employability needs improvement.
4. The program needs to expand its infrastructure capacity and faculty strength.
5. The program should take the necessary steps to improve the teaching student to staff ratio by recruiting more faculty.
6. The publication per faculty needs improvement.
7. The program needs significant improvement in the research contribution of the faculty members.
8. The faculty should be encouraged to identify innovative ideas and prepare and file patent applications.

### Action Plan for Improvement

The following table gives the actions to be taken for improvement of the KPIs which are short of the target.

KPI #	Action for Improvement	Responsibility	Start Date	Completion Date	Remarks
1	The new target of the KPI should be increased.	Academic Accreditation & D and Q committee	01.09.22	31.05.23	None
2	The new target of the KPI should be increased.	Academic Accreditation & D and Q committee	01.09.22	31.05.23	None
3	The new target of the KPI should be increased.	Academic Accreditation & D and Q committee	01.09.22	31.05.23	None
4	The program should emphasize the teaching of math and mechanical design-based courses so that these courses are taught in easy-to-understand ways and include more problem solving during the course delivery. The contact hours for such courses may also be increased.	Department Council	01.09.22	31.12.22	None
5	None	--	--	--	None
6	The program should develop a process to encourage students for preparation of the FE exam and help them academically and by motivation to pass the FE exam. The target for this KPI should be revised and based on the percentage of students appearing and well as qualifying the FE exam.	Department Council	01.09.22	31.12.22	None
7	The graduates' employability needs improvement	Alumni Affairs and Labor Market Needs Committee	01.09.22	31.05.23	None
8	The program needs to expand its infrastructure capacity and faculty strength.	Academic Accreditation & D and Q committee	01.09.22	31.05.23	None

9	The recommendation given in KPI 7 will help to improve the result of this KPI as well. The new target benchmark of this KPI should be increased.	Academic Accreditation & D and Q committee	01.09.22	31.05.23	None
10	The new target for the KPI should be increased to achieve continuous improvement.	Program Chair / Curricula and Courses Development Committee	01.09.22	31.12.22	None
11	The program should take the necessary steps to improve the teaching student to staff ratio by recruiting more faculty.	Department Council	01.09.22	31.12.22	None
12	None	--	--	--	None
13	None	--	--	--	None
14	The publication per faculty needs improvement,	Program Chair	01.09.22	31.12.22	None
15					
16	The program needs significant improvement in the research contribution of the faculty members.	Graduate Studies and Research Committee	01.09.22	31.12.22	None
17	The learning resources need review and improvement.	Program Chair / Curricula and Courses Development Committee	01.09.22	31.05.23	None
PG1.1	None	--	--	--	None
PG2.4	To increase the no. of patents proposed by the program, the faculty should be encouraged to identify innovative ideas and prepare and file patent applications.	Graduate Studies and Research Committee	01.09.22	31.05.23	None
PG2.5	None	--	--	--	None
PG3.1	None				
PG3.2	None				



## Follow-up Plan

The following table gives the actions to be taken for improvement of the KPIs which are short of the target.

KPI #	Action for Improvement	Responsibility to Follow-up	Timeframe	Remarks
4	The program should emphasize the teaching of math and mechanical design-based courses so that these courses are taught in easy-to-understand ways and include more problem solving during the course delivery. The contact hours for such courses may also be increased.	Department Council	01.09.22 - 31.05.23	None
6	The program should develop a process to encourage students for preparation of the FE exam and help them academically and by motivation to pass the FE exam. The target for this KPI should be revised and based on the percentage of students appearing and well as qualifying the FE exam.	Department Council	01.09.22 - 31.05.23	None
7	The graduates' employability needs improvement.	Department Council	01.09.22 - 31.05.23	None
8	The program needs to expand its infrastructure capacity and faculty strength. The target of the KPI should be reduced for the next evaluation cycle.	Department Council	01.09.22 - 31.05.23	None
9	The recommendation given in KPI 7 will help to improve the result of this KPI as well. The new target benchmark of this KPI should be increased.	Department Council	01.09.22 - 31.05.23	None
10	The new target for the KPI should be increased to achieve continuous improvement.	Department Council	01.09.22 - 31.05.23	None
11	The program should take the necessary steps to improve the teaching student to staff ratio by recruiting more faculty.	Department Council	01.09.22 - 31.05.23	None
14	The publication per faculty needs improvement,	Department Council	01.09.22 - 31.05.23	None
15				
16	The program needs significant improvement in the research contribution of the faculty members.	Department Council	01.09.22 - 31.05.23	None
17	The learning resources need review and improvement.	Department Council	01.09.22 - 31.05.23	None

PG2.4	To increase the No. of patent proposed by the program, the faculty should be encouraged to identify innovative ideas and prepare and file patent applications.	Department Council	01.09.22 - 31.05.23	None
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Prepared By: Academic Accreditation & Development and Quality committee

Date: 30.09.2023