ATMAE Validity & Reliability Report 2020-2022

Armin Moghadam[1, 2] and Fatemeh Davoudi Kakhki[1, 3]

[1]Assistant Professor, Department of Technology, San Jose State University, San Jose, CA 95192, USA

[2]ATMAE Validity & Reliability Officer, Appointed for 2022-2024

[3]ATMAE Board of Accreditation Member, Appointed for 2022-2024

ABSTRACT

This report presents a comprehensive evaluation of ATMAE accreditation reports for the 2020 to 2022 period. Recommendations on the extent to which programs comply with ATMAE accreditation standards and recommended accreditation levels and conditions made by ATMAE accreditation visiting teams are examined with the purpose of identifying improvement opportunities. The results will help ATMAE to identify specific standards which need to be adjusted in order to enhance accredited programs compliance and determine the consistency of accreditation visiting teams and board of accreditation's actions to enhance accreditation consistency.

The purpose of this report is to provide some insights on the area(s) to focus on, which are the most contributors of the partial and non-compliances across all programs accredited or reaccredited over the 3-year period between 2020 to 2022. Based on such results of analysing 136 reports for initial and reaccreditation visit reports, actions for improvement are recommended. Those actions include revising selected standard(s), provide templates/samples/detailed guidelines for specific guidelines related to outcome measures of programs, providing targeted training such as training sessions for institutes in self-study report writing and preparation for ATMAE accreditation visits, as well as improved and targeted training for the accreditation visiting team members focusing on evaluation and assessment of specific standards.

@2022 ATMAE

Table of Contents

Introduction 3
Self-Examination of ATMAE Accreditation Performance (2020-2022) 4
Study Population 4
Compliance Status Per Year Per Standard 6
Initial Accreditation Data and Analysis 7
Compliances by Standard 7
Partial Compliances by Standard & Outcome Assessment Accreditation Model 8
Reaccreditation Data and Analysis 10
Partial & Non-Compliances by Standard & Outcome Assessment Accreditation Model 11
Discussion and Recommendations for Improvement 14
Acknowledgement 15

Introduction

The objective of ATMAE accreditation is to ensure that programs in Technology, Management, and Applied Engineering that are accredited meet established standards and that outcome measures are used to continuously improve programs. This paradigm is consistent with that what is expected by the Council for Higher Education Accreditation (CHEA). The ATMAE Outcomes Assessment Accreditation Model requires that consideration be given to both the qualitative and quantitative criteria set forth in these standards. The overall schematic of the ATMAE Outcomes Assessment Accreditation Model is shown in *Figure 1*.

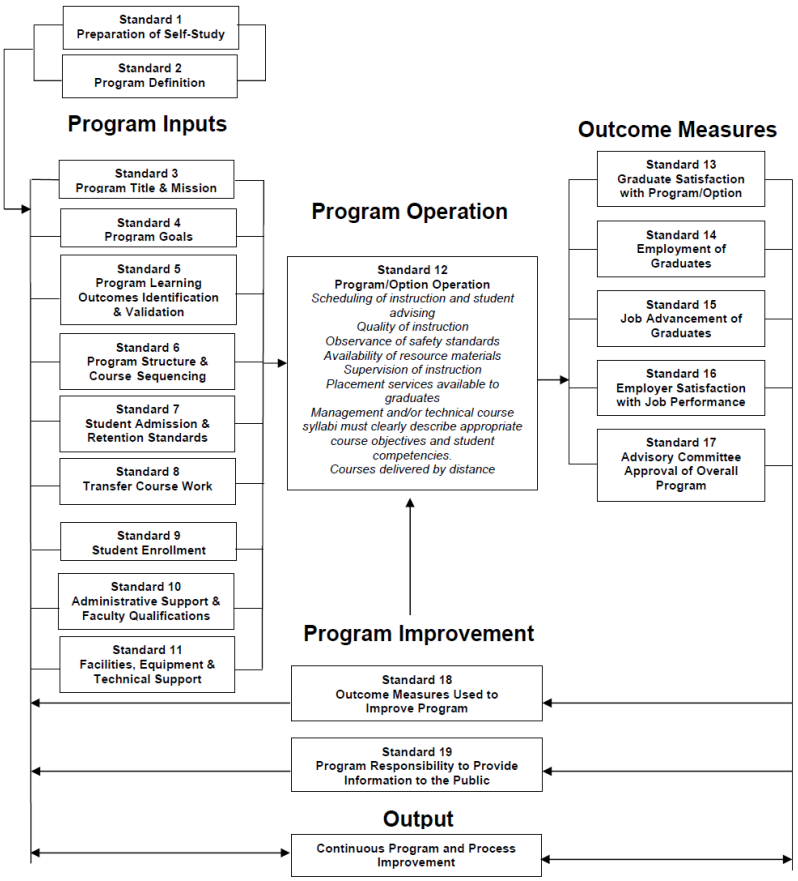

Figure 1: Accreditation Model (Source: 2021 ATMAE Accreditation Handbook)

Recommendations on the extent to which programs comply with ATMAE accreditation standards and recommended accreditation levels and conditions made by ATMAE accreditation visiting teams should be examined as part of the continuous improvement of ATMAE accreditation visiting teams' performance. Furthermore, examination of these reports allows for identifying improvement opportunities. The results

are expected to help ATMAE to identify specific standards which need to be adjusted in order to enhance accredited programs compliance and determine the consistency of accreditation visiting teams and board of accreditation's actions to enhance accreditation consistency.

As part of ATMAE's process of continuous improvement, the Chair of the Board of Accreditation shall appoint validity and reliability officer on Validity and Reliability. This subcommittee is responsible to "assess the validity and reliability of accreditation criteria, procedures, and standards", and has the responsibility of producing and representing such analyses and results in form of a report to the Board of Accreditation.

In this validity and reliability report, we aim at identifying the standards with higher share of partial or non-compliances are based on a review and analysis of three years data from accreditation reports. We further examine those areas in relation to the *Figure 1* model based on the four categories of Program Inputs, Program Operation, Outcomes Measure, and Program Improvement. The purpose is to provide some insights on the area(s) to focus on that are most contributors of the partial and non-compliances. Based on such results, actions for improvement such as providing specific training can be taken including training sessions for institutes in self-study report writing and preparation for ATMAE accreditation visits, and also for the accreditation visiting team members to receive improved and targeted training on those areas.

Self-Examination of ATMAE Accreditation Performance (2020-2022)

Study Population

This study is based on the record of accreditation reports received by ATMAE for the 3-year period between 2020 to 2022. The population for this study is a total of 136 institutions that were visited and investigated for either initial or reaccreditation purposes. Specifically, 23 institutes were reviewed for initial accreditation, and 113 institutes were reviewed for reaccreditation.

The number of initial programs visited in 2022 has reached 12 from 6 and 5 in 2021 and 2020. Considering the percentage of total programs visited for initial accreditation (Figure 1), the share has increased from 7.35% of total visits in 2020 to 25% in 2022. The lowest number of program accreditation visits, either initial or reaccreditation, was in 2021, which is expected due to the effect of COVID-19 on accreditation requests from various institutes. The highest number of reaccreditation visits was in 2020 with 63 programs reaccredited across 16 institutes, followed by 36 reaccreditations in 9 institute in 2022. In 2021, only 14

programs across 7 institute went through reaccreditation visits, and 6 programs from 2 institutes went for initial accreditation. The breakdown of data (frequencies) is given in *Table 1* , and the percentage is shown in *Figure 2*.

Table 1: Data on Total Accreditation Visits

Year	Type of Visit	Number of Institution	Total Number of Programs	Total Visits Per Year
2022	Initial	4	12	48
	Reaccreditation	9	36	
2021	Initial	2	6	20
	Reaccreditation	7	14	
2020	Initial	2	5	68
	Reaccreditation	16	63	
Total Initial Visits	23			
Total Reaccreditation Visits	113			
Total Visits	**136**			

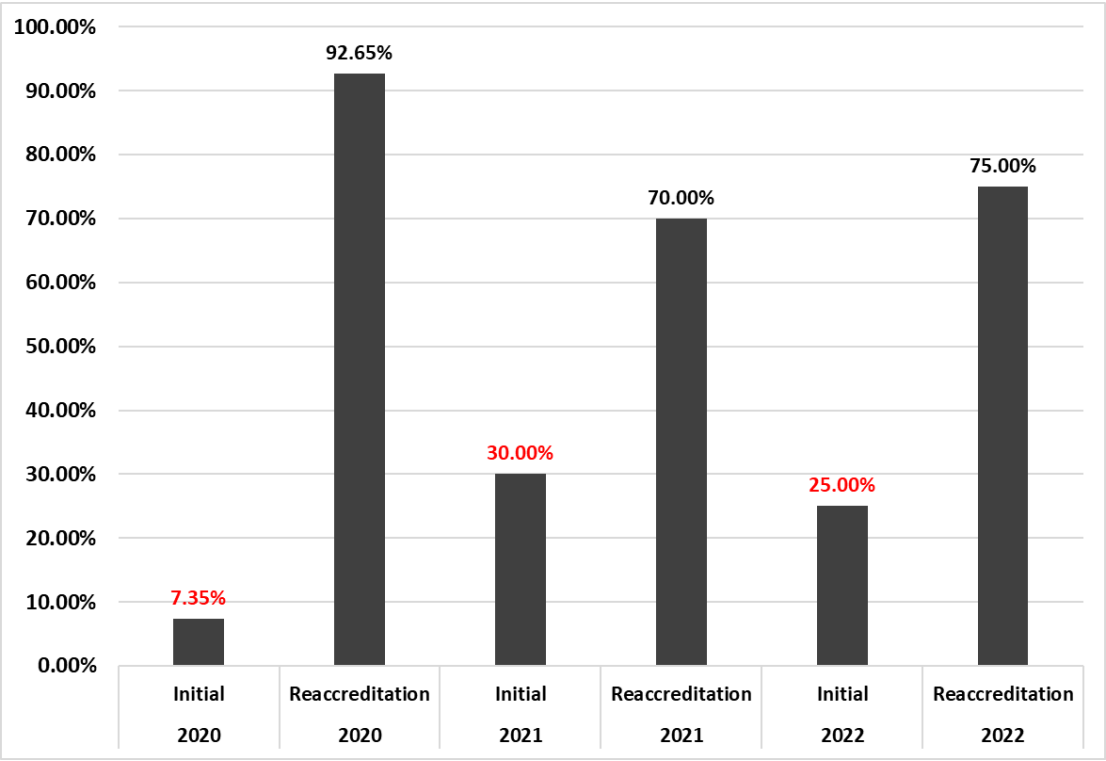

Figure 2: Breakdown of number of visits per year

Compliance Status Per Year Per Standard

The overall statistics based on annual analysis per standard is presented in *Table 2*. The cells in red represent those standards that the percentage of compliance is not satisfactory, and the green cells show the ones with highly compliant results, based on the data from the population of study. Standards 1—3 are almost in complete compliances across the three years in all program reports. The lowest percentage of compliance vary numerically, but are mostly visible among standards 12—19. There were two big non-compliances for 2021 in standards 15 and 16 (15% for each) which decreased to 8% for standard 15 and 0% for standard 16 in 2022 reports.

Table 2: Overall statistics of ATMAE Initial and Reaccreditation Performance Per Standard

Std	Standard Definition	2020			2021			2022		
		C	P	N	C	P	N	C	P	N
1	Preparation of self-study	85%	15%	0%	100%	0%	0%	85%	15%	0%
2	Program definition	100%	0%	0%	95%	5%	0%	100%	0%	0%
3	Program title & mission	90%	10%	0%	100%	0%	0%	100%	0%	0%
4	Program goals	69%	21%	10%	85%	15%	0%	81%	19%	0%
5	Program learning outcome identification & validation	71%	29%	0%	70%	30%	0%	60%	40%	0%
6	Program structure & course sequencing	90%	10%	0%	75%	25%	0%	90%	10%	0%
7	Students admission & retention standards	93%	7%	0%	100%	0%	0%	100%	0%	0%
8	Transfer coursework	93%	7%	0%	100%	0%	0%	100%	0%	0%
9	Student enrollment	75%	25%	0%	85%	15%	0%	79%	21%	0%
10	Administrative support & faculty qualifications	84%	16%	0%	70%	30%	0%	69%	31%	0%
11	Facilities, equipment & technical support	87%	13%	0%	55%	35%	0%	73%	23%	4%
12	Program/option operation	66%	34%	0%	90%	10%	0%	63%	38%	0%
13	Graduate satisfaction with program/option	68%	32%	0%	70%	30%	0%	44%	56%	0%
14	Employment of graduates	81%	19%	0%	65%	25%	0%	71%	29%	0%
15	Job advancement of graduates	72%	28%	0%	35%	50%	15%	46%	46%	8%
16	Employer satisfaction with job performance	50%	47%	0%	45%	40%	15%	58%	42%	0%
17	Advisory committee approval of overall program	68%	31%	1%	80%	20%	0%	52%	48%	0%
18	Outcome measures used to improve program	72%	28%	0%	60%	40%	0%	46%	54%	0%
19	Program responsibility to provide information to the public	91%	9%	0%	55%	45%	0%	56%	44%	0%

Initial Accreditation Data and Analysis

As presented in *Table 1*, a total of 23 institutes were visited for initial accreditation during 2020 to 2022. The data shows that all standards were in either compliance or partial compliance and there were *zero non-compliance* for all standards. This is a significant improvement over previous initial accreditation report records presented in the most recent validity and reliability report completed in 2015.

Compliances by Standard

Figure 3 represents the data on the compliance of each standard. All reports have 100% compliance related to preparation of self-study and program definition (standards 1, 2), as well as standards 4, 7, and 8 related to program goals, student admission and retention standards, and transfer coursework. In other words, out of the 19 standards across all initial accreditation reports, only 5 are in full compliance, which constitutes for 26.31% of all standards. The details of the data for the percentage of compliance per standard is given in Figure 2.

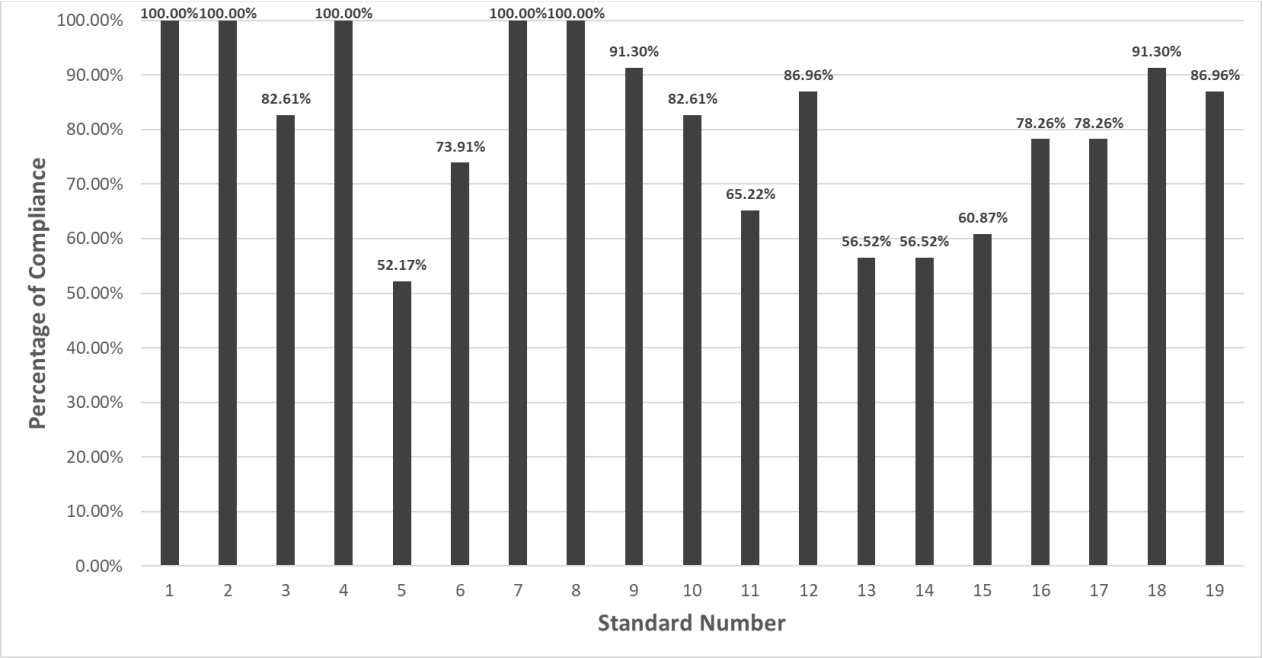

Figure 3: Percentage of Compliance to standards for initial accreditations (2020-2022 reports)

Partial Compliances by Standard & Outcome Assessment Accreditation Model

The data for partial compliance per standard is given in Table 2 for all the 23 institutes with initial accreditation. Each standard is also compared with its place in the Outcome Assessment and Accreditation Model presented previously as Figure 1 in this report. Considering the partial compliance data, the highest area for partial compliance is standard 5, program learning outcome identification and validation, followed by standards 13, 14, and 15 with a frequency of between 40% to 44% partial compliance.

Comparing the data to the Outcome Assessment and Accreditation Model, as presented in *Figure 1*, the main area for partial compliance is related to the "Outcome Measures". All standards 13 to 17, in the "Outcome Measures" section, are in partial compliance. This seems to be a great area of focus for improving the compliance.

The same observation holds for the standards in the "Program Inputs" section of the Outcome Assessment and Accreditation Model. Standards 3, 5, 6, 9, 10 and 11 (6 out of 9 standards) are in partial compliance in all reports. Standard 5, focusing on program learning outcomes identification and validation, seems the most challenging for receiving complete compliance. Standards 6, and 11, on program structure and course sequencing and facilities, equipment and technical support are the next for partial compliance with 26.09% across the 23 initial accreditation reports.

Table 3: Partial Compliance by standards/ outcome assessment accreditation model for initial accreditations

Standard	Partial Compliance	Outcome Assessment Accreditation Model
5	47.83%	Program inputs
13	43.48%	Outcome measures
14	43.48%	Outcome measures
15	39.13%	Outcome measures
6	26.09%	Program inputs
11	26.09%	Program inputs
16	21.74%	Outcome measures
17	21.74%	Outcome measures
3	17.39%	Program inputs
10	17.39%	Program inputs
12	13.04%	Program operation
19	13.04%	Program improvement
9	8.70%	Program inputs
18	8.70%	Program improvement

With less frequency, 17.39%, 17.39% and 8.70% for standards 3, 10, and 8, there is partial compliance for program title and mission, administrative support and faculty qualification, and transfer coursework standards in the "Program Inputs" section.

Considering standard 12 on program/option operation, there is 83% of compliance, and only 13.04% of all reports were scored with partial compliance in the category of "Program Operation" in the Outcome Assessment and Accreditation Model. Considering the "Program Improvement" section in the Outcome Assessment and Accreditation Model, both standards 18 and 19 are in partial compliance in 13.04% and 8.70% of all initial accreditation report.

The area for improvement can be identified using the Pareto chart as well, as depicted in Figure 3. Looking at both data from Table 2 and Figure 3, one focus area that would significantly improve the partial compliance to compliance is the category of "Outcome Measures" (standards 13 to 17) as well as "Program Inputs" (standard 5, 6, 11).

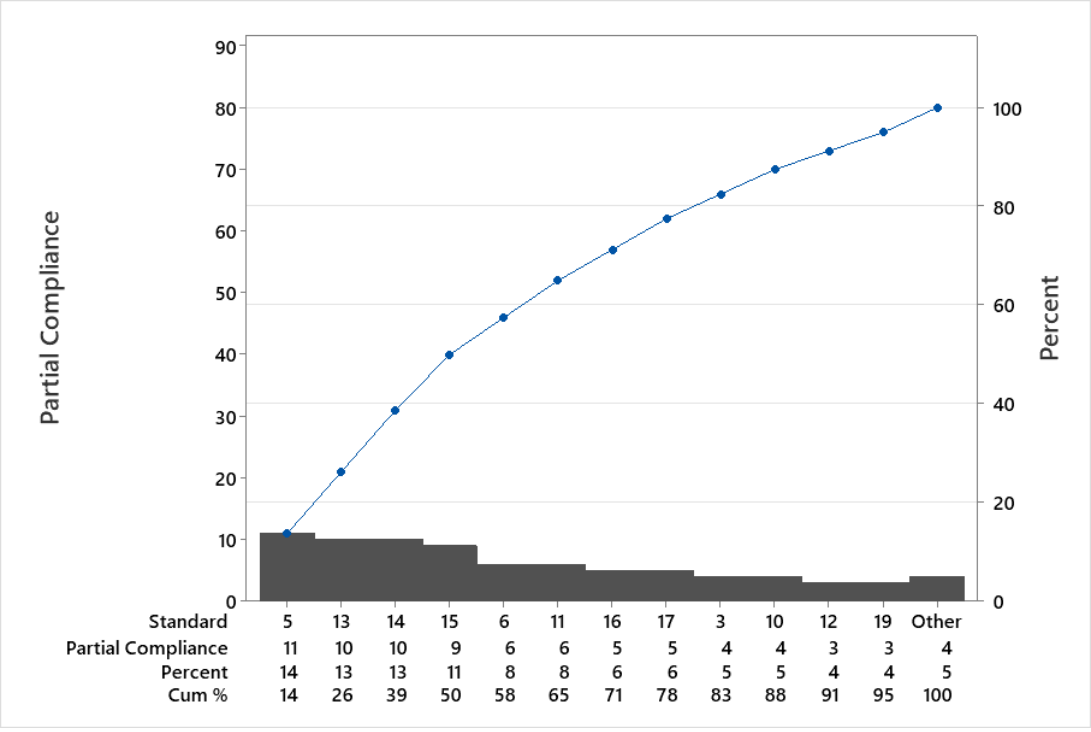

Figure 4: Percentage of Partial Compliance to standards for initial accreditations (2020-2022 reports)

Reaccreditation Data and Analysis

A total of 113 programs were visited for accreditation during 2020 to 2022. The details of the compliance status per standard is represented in *Table 4*. The overall data on full compliance is presented in *Figure 5*. Standards 2, 3, 6, 7, and 8 have the highest percentage of compliance between 90% to 99% among standards in all reports. While almost all standards are either in compliance or partial compliances, a few non-compliances are observed. The highest percentage of non-compliances are in standards 4 and 15 with a share of 6.19% of total reports, followed by 2.65% in standard 16, and less than 1% non-compliance on standard 17. With the expectation of standard 14, all standards 12-18 are compliance in less than 60% of the reports.

Table 4: Partial Compliance by standards for reaccreditations

Standard	Compliance	Compliance %	Partial compliance	Partial compliance %	Non-Compliance	Non-Compliance %
1	96	84.96%	17	15.04%	0	0.00%
2	112	99.12%	1	0.88%	0	0.00%
3	110	97.35%	3	2.65%	0	0.00%
4	80	70.80%	26	23.01%	7	6.19%
5	79	69.91%	34	30.09%	0	0.00%
6	102	90.27%	11	9.73%	0	0.00%
7	108	95.58%	5	4.42%	0	0.00%
8	108	95.58%	5	4.42%	0	0.00%
9	85	75.22%	28	24.78%	0	0.00%
10	85	75.22%	28	24.78%	0	0.00%
11	90	79.65%	21	18.58%	0	0.00%
12	73	64.60%	40	35.40%	0	0.00%
13	68	60.18%	45	39.82%	0	0.00%
14	89	78.76%	22	19.47%	0	0.00%
15	64	56.64%	42	37.17%	7	6.19%
16	53	46.90%	55	48.67%	3	2.65%
17	69	61.06%	43	38.05%	1	0.88%
18	62	54.87%	51	45.13%	0	0.00%
19	80	70.80%	33	29.20%	0	0.00%

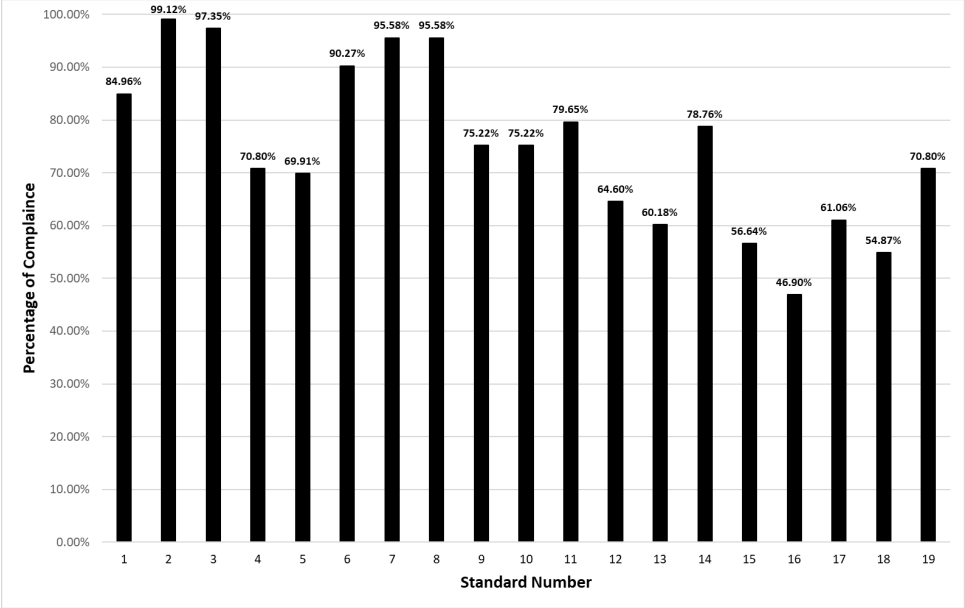

Figure 5: Percentage of Compliance to standards for Reaccreditations (2020-2022 reports)

Partial & Non-Compliances by Standard & Outcome Assessment Accreditation Model

The data for partial and non-compliance per standard is given in Table 2 for all the 113 institutes with reaccreditation report status. Each standard is also compared with its place in the Outcome Assessment and Accreditation Model presented previously as *Figure 1* in this report.

Figure 6 shows the relationship between the partial and non-compliance standards (%) and the categories of the Outcome Assessment and Accreditation Model. The highest percentage of partial and non-compliances are observed for the standards related to the "Outcome Measures", with the lowest percentage of 19.74% for standard 14 (employment of graduates) and the highest share of 48.67% for standard 16 on employer satisfaction with job performance. The most frequent instances of non-compliances belong to this category with standards 15 and 16 showing 6.19% and 2.65% of non-compliances on job advancement of graduates, and employer satisfaction with job performance standards.

The next group of partial compliances belong to the "Program Improvement" category, with 45.13% of partial compliance in standard 18 on outcome measures used to improve program, followed by 29.20% partial compliance on standard 19 on program responsibility to provide information to the public. There were no instances of non-compliance in this category.

With lower percentage of partial compliances, the next group of standards are categorized under the "Program Inputs" which consist of standards 3 to 11. As shown in *Figure 6*, standard 5 on program learning outcomes identification and validation has the highest percentage of partial compliance with 31%. Standards 4, 9, and 10, focusing on program goals, student enrolment, and administrative support and faculty qualifications, are next with around 24% partial compliance in this category. Standard 11 on facilities, equipment, and faculty qualifications has almost 19% partial compliances. Finally, standards 3, 6 7, and 8 have lower partial compliance between 4% to 10%.

On the area of "Program Operation", consisting of standard 12, the rate of partial compliance is as high as 35.40%, which is considerably significant.

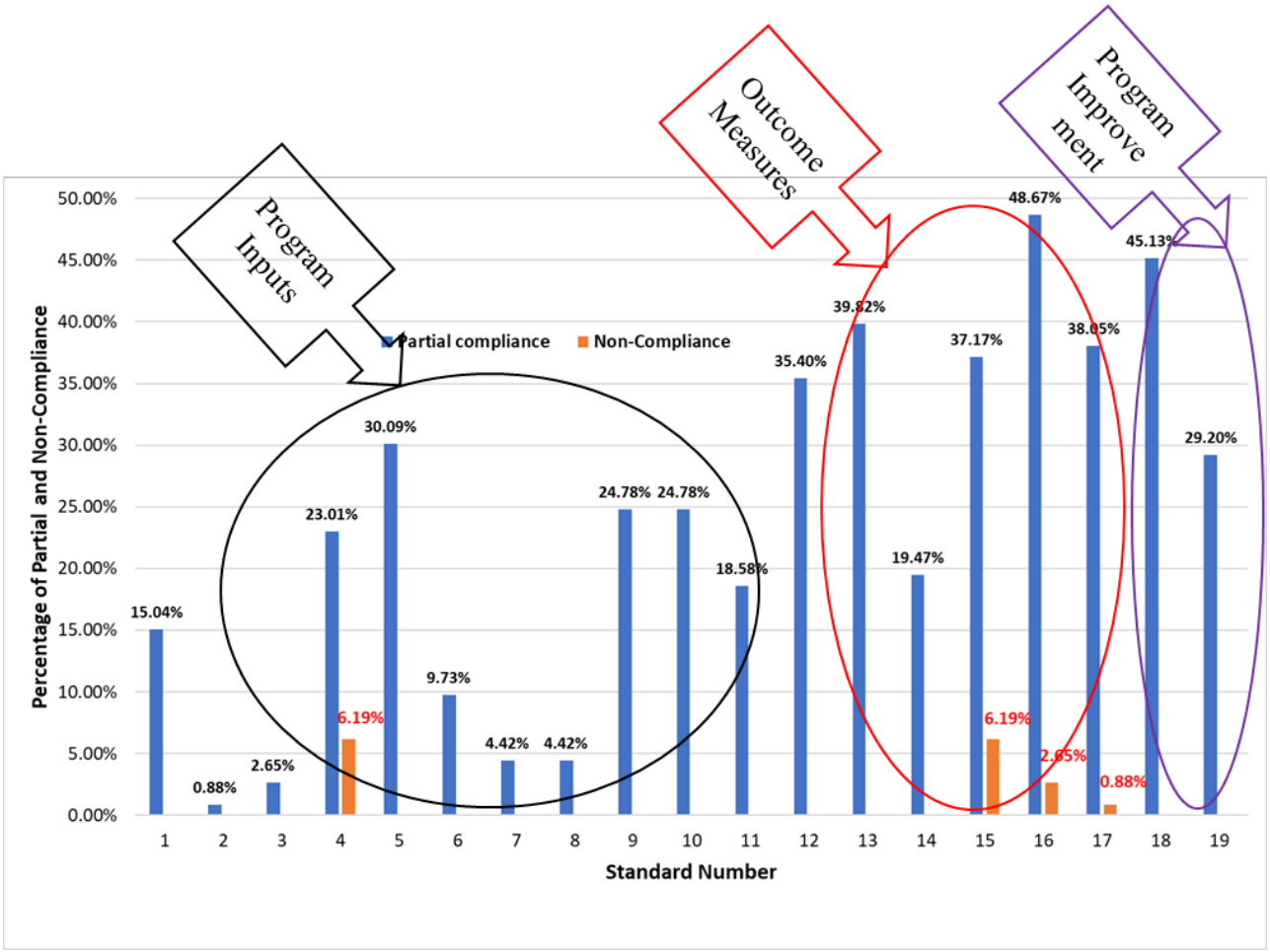

Figure 6: Percentage of Partial and Non-Compliance to standards for Reaccreditations (2020-2022 reports)

As for partial compliances, the majority occurred in standards 16, 18, 13, 17, 15, 12; these six standards account for more than 50% of partial compliances in the report. By resolving the issues in self-study reports related to these standards, a 54% improvement in compliance rate can be expected. The details and cumulative percentage are shown in Pareto chart in *Figure 7*.

The majority of non-compliances are in standards 4, 15, 16, and 17. Addressing these standards across all reports would improve the non-compliance, according to the Pareto chart in *Figure 8*.

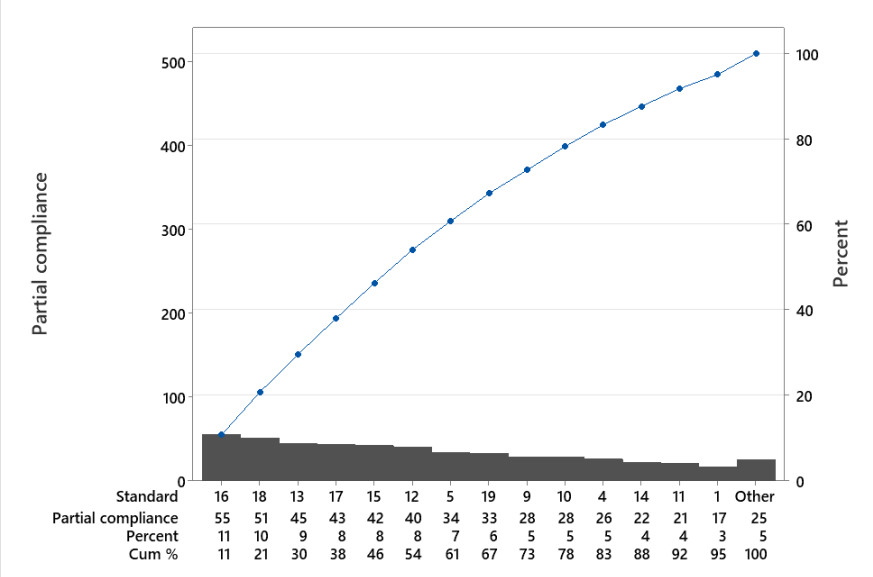

Figure 7: Percentage of Partial Compliance to standards for Reaccreditation (2020-2022 reports)

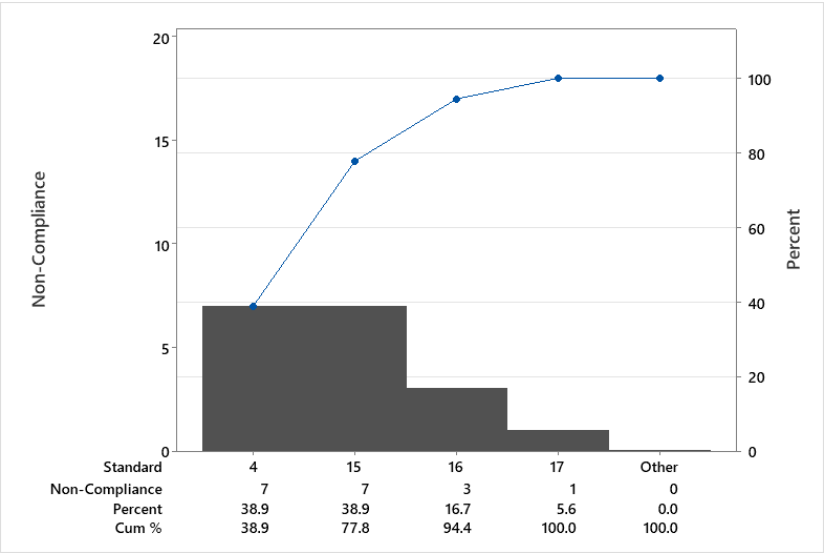

Figure 8: Percentage of Non-Compliance to standards for Reaccreditation (2020-2022 reports)

Discussion and Recommendations for Improvement

In this validity and reliability report, we aimed at identifying the standards with higher share of partial or non-compliances based on a review and analysis of three years data from accreditation reports. We further examined those areas in relation to the Figure 1 model based on the four categories of Program Inputs, Program Operation, Outcomes Measure, and Program Improvement. The summary of the findings of this report are:

- The number of accreditation visits, regardless of type of visits, decreased substantially from 2020 to 2021, and then peaked up again in 2022. This could be a result of COVID-19 emergence which put a halt on institutions' decision for extensions on reaccreditation visits or postponing initial accreditation.

- Regarding initial accreditation visits, there were zero instances of non-compliances. This is a significant improvement over previous validity and reliability report, and could be linked to ATMAE's accreditation policies and procedures efforts in modifying and changing standards, as well as more focused training workshops for accreditation visiting members.

- Regarding initial accreditation visits, 5 out of 19 standards are in full compliance across all reports. Standards related to preparation of self-study and program definition (standards 1, 2), as well as standards 4, 7, and 8 related to program goals, student admission and retention standards, and transfer coursework, are all in 100% compliance. This is a significant improvement over previous reports, and could be linked to the efforts of board of accreditation members in holding training workshops on self-study writing.

- For both initial and reaccreditation visit reports, standard 5, program learning outcomes identification and validation, is an area of concern with 30% to 48% partial compliance as a recurring pattern in all reports. Focusing on this specific standard and providing more guidance on how institutes can document it, and how visiting teams can assess and evaluate it, could be a big step in enhancing the compliance rate in accreditation performance.

- While most partial compliances are related to the reaccreditation visits, the rate is high for both initial and reaccreditation reports when it comes to “outcome Measures”, consisting of standards 13 to 17. It seems that most institutes struggle on how to survey, document, and present results related to these standards, specifically for those related to job advancement of graduate and employer satisfaction with job performance. It is recommended that ATMAE create some standard templates/samples of measurable survey questions for helping institutes in tracking their graduates and accurately document the necessary data for successfully meeting the requirement of full compliance for these standards.

- Regardless of the type of visit, standard related to “Program Improvement” (standards 18 and 19) are another area of improving from partial compliance to full compliance, with specific focus on standard 19 for program responsibility to provide information to the public. This could be improved through communications between ATMAE and the institute in need of accreditation (or reaccreditation) to properly prepare for meeting the requirement of this standard. Such details can also be added to update the current ATMAE Accreditation Handbook.

Acknowledgement

Special thank you is extended to Amy Good for compiling initial data for this study and providing the authors with some insights on purpose and requirement of this report.