A Mathematical Model for Regional Quality Assurance of Higher Educational Institution in the Philippines

Roel S. Lumagsao, Rhowel M. Dellosa

Abstract: *The study aimed to develop a regional educational quality assurance model for Higher Educational Institutions (HEIs) in the Philippines. Cordillera Administrative Region (CAR) was the subject of the study. Selected HEIs of CAR were assessed based on the Institutional Sustainability Assessment (ISA) Standards. The respondents of the study are administrators, selected faculty, students, researchers, and community extension and linkages officers of selected universities and colleges of CAR. Descriptive and developmental research designs were used to determine the existing status of the educational institution of selected HEIs of CAR using the ISA standards. It is found out that governance and management, quality of teaching and learning, quality of professional exposure, research and creative work, support for students and relations with the community were important variables in the formulation of mathematical model of regional educational quality assurance. The mathematical model for regional educational quality assurance was formulated with the use of statistical tools and significant predictors of regional educational quality assurance of HEIs in the Philippines were also determined based on the inputs of selected HEIs in CAR.*

Index Terms: *Higher Educational Institution, Quality Assurance, Regression Analysis*

I. INTRODUCTION

The report from [1] stated that the Philippine Higher Education plays an important role in the country's economy and is vital in achieving global competitiveness. This could be traceable to the academic and professional standards for the quality of teaching, learning facilities and educational experience of the students. Poor quality Higher Educational Institutions (HEIs) led to poor quality graduates. Thus, every HEI's should have a rigorous system of internal quality assurance, assessed by Quality Assurance Agencies such as Commission on Higher Education (CHED) and reputable Accrediting Institutions to ensure high quality and relevant higher education, thereby equipped students with the knowledge, skills and core transferable competences they need to succeed after graduation, within a high quality learning environment which recognizes and supports good teaching.

As mentioned by [2], the Quality Assurance (QA) uniquely initiated to anticipate and respond to the challenges in order to safeguard the reputation of higher educational institution, to support economic opportunity and provide assurance to those who invest in and undertake learning, particularly the HEI's in the Cordillera Administrative Region (CAR).

It is the organized measurement, appraisal with a standard, observing of processes and an associated feedback mechanisms that confer error avoidance. This can be compared with quality control, which is focused on process output.

Quality is seen as something tangible and material, something that can be established and investigated; something objective, independent of our values. Knowledge on quality is obtained by quantitative measurements, evaluation scales, correlation studies, experiments and quasi-experiments; empirical research provides data and bases for the theories and postulates of quality which are introduced in the practice.

Considering this highly ambitious yet commendable process, most of the HEIs have encountered difficulty to start in compliance with the minimum standards of the Commission on Higher Education (CHED) as indicated in the Institutional Sustainability Assessment (ISA) instrument However, QA can be an important avenue to serve as the guide of the school management to start with accreditation process [3].

It was noted by [4] that measuring one's ability to promote quality is a repetitive process to meet standards of assessment wherein set of criteria to determine the level of quality is determined to provide substantial information for Higher Education Institution (HEI) as the recipient. Moreover, any QA mechanism that is being used by the HEIs must reflect on the value of their alumni which is one signs of the performance of an institution. Accreditation programs are one of the top priorities of HEIs of most developed countries to support strong partnership between the industry and academe in their respective regions and to encourage more students as they already embraced international standards and frameworks for their output. Due to several changes like the K-12, ASEAN integration and internationalizations, the quality cycle and initiatives becomes integral part to the HEI operations and functions. To promote harmonization between HEI and the quality, the HEIs must established internal quality assurance systems to translate policies into quality programs and quality results. To help the institution monitor the level and status of their quality, the Institutional Sustainability Assessment (ISA) framework was introduced by CHED. This will also addressed the demands and challenges of an international community, the Philippine Government has been implementing educational reforms for the past few years. The ISA Framework has five key result areas to measure the performance of institutions. These are governance and management, quality of teaching and learning, quality of professional exposure, research, and creative support for students and relations with the community. Each key result area has numerous indicators.

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These are defined as the core indicators that apply to all institutions. There are also other indicators that apply to institutions to the extent that is appropriate in relation to the stage of development of the institution. There were eight core indicators and six other indicators that comprises to ISA framework metrics.

This paper analyzed the quality assurance status of HEIs in CAR in terms of governance and management, quality of teaching and learning, quality of professional exposure, quality of research and creative work and support to students and relations with the community. The above mentioned variables were based on ISA Framework of CHED which focuses on the five areas. The result of the analysis will become a basis for an educational quality assurance model for higher education institutions of Cordillera Administrative Region. And finally, the development of regional educational quality assurance model for HEIs in the Philippines was initiated.

BACKGROUND OF THE STUDY

A. Theoretical Framework

The study anchored on ISA Framework which focuses on the five (5) key results areas; namely: (1) governance and management, (2) quality of teaching and learning, (3) quality of professional exposure, (4) research and creative work and, (5) support to students and relations with the community. In HEI, quality assurance refers to explicit commitment and practices of higher education institutions to the development of an institutional culture which recognizes the importance of quality and the continuous enhancement of quality of services. It was mentioned by [5] and [6] that quality assurance covered all policies, processes, and actions through which the quality of higher education is maintained. Moreover, the current demands of quality education through the translation of knowledge, skills, and attitudes that conform to accepted standards. The concept was similar with what [2] used in their study wherein, it emphasized the need to recognize and validate different models used in the academic institution, learn about the features that make them effective and finding new ways to define quality that is adaptable to different circumstances. The study of [7] defined the quality as excellence or limited supply. The Council of Quality Assurance have developed a quality assurance framework for Ontario Universities and operationalized in several ways including fitness for purpose, exceptional, and value-added. For example, the criteria for the evaluation of new undergraduate and graduate programs, which include consistency of the program with the institution's mission and academic plans and clarity and appropriateness of the program's requirement associated learning outcomes in addressing the institution's own undergraduate and graduate degree level Expectation, assess fitness for purpose. These measures, intended to provide evidence of quality of the faculty and evidence of a program structure and faculty research that will ensure the intellectual quality of the student experience, include qualifications, research, innovation and scholarly record, and appropriateness of collective faculty expertise to contribute substantively to the proposed program. Finally, the degree level expectations included in the framework, which represent the threshold level skills and knowledge Ontario students must demonstrate in order to successfully complete their programs [8].

B. Conceptual Framework

In line with the theoretical framework, the conceptual framework of the study was developed as shown in figure 1. Developmental model is utilized as conceptual framework wherein inputs refer to the assessment of quality assurance of HEI's in Cordillera Administrative Region (CAR) in terms of governance and management, quality of teaching and learning, quality of professional exposure, research and creative work and, support to students and relations with the community and the output was the regional educational quality assurance model for HEI's of CAR.

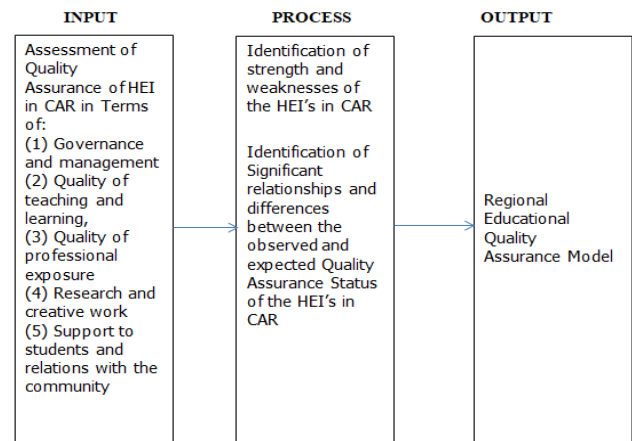### C. Paradigm of the Study

Fig. 1: Paradigm of the Study

Figure 1 showed the assessment of quality assurance of HEIs as the inputs of the study, the processes concerns on the determination of the strength and weaknesses and the significance difference between the observed and expected quality assurance status of selected HEIs in CAR and the regional educational quality assurance model for HEI's as the output of the study.

D. Statement of the Problem

The main purpose of the study is to come up with a model for regional educational quality assurance. Specifically, the study sought to answer the following questions:

1. What is the Quality Assurance Status of selected HEIs in regional setting in terms of governance and management, quality of teaching and learning, quality of professional exposure, research and creative work, support for students and relations with the community?

2. What are the significant differences between the "As Observed" and the "As Expected" quality assurance status of selected HEIs in regional setting?

3. Based on the findings of the study, what regional educational quality assurance model can be proposed?

II. RESULTS AND ANALYSIS

This part presented the findings and analysis based on the collated data from the respondents. The proponents have adapted the Institutional Sustainability Assessment Self Evaluation Document and conducted the survey to five (5) selected schools of Cordillera Administrative Region (CAR).

The respondents are composed of the administrators, faculty and students with a total of two hundred ten (210) respondents. The instrument was composed of three (3) parts, the respondents profile, institution profiles and the perception on the statement. The respondent's profile will determine the name, gender and profession of the respondents. The institution's profile will determine the basic information about the institution, list of recognized and phased out programs, levels of accreditation and quality assurance mechanisms. The perception statement determined their assessment on the ISA criteria, which are composed of government and management, quality of teaching and learning, quality of professional exposure, research and creative work, support to students and relations with the community. Five (5) selected institutions are all private institutions. Four (4) of the institution are private non-sectarian and non-profit and one (1) of the institution was private sectarian. All of the institutions are offering college degree programs like engineering, allied medicine, culinary, tourism and hotel and restaurant management, information technology education, elementary and secondary education, Business Management and criminology programs. One (1) of the institution was an ISO certified and one of the institutions was granted levels 1 and 2 of the local accreditation body. Moreover, there are also programs on some of the institutions that were phased out voluntarily and by CHED because of decrease in enrollment. To further present the findings, the proponent would like to present the result to elaborate the answers of the statement of the problems.

A. Quality Assurance Status of selected Higher Education Institutions

Table I: Summary of Quality Assurance Status According to School Administrators

AREA	As Expected		As Observed	
	Weighted Mean	Interpretation	Weighted Mean	Interpretation
1. Government and Management	4.31	*Very High*	3.72	High
2. Quality of Teaching	4.62	*Very High*	3.62	High
3. Quality of Professional Exposure, Research, and Creative Work	4.74	*Very High*	3.69	High
4. Support for Students	4.80	*Very High*	3.94	High
5. Relations with the Community	4.03	High	3.60	High
Over-all Composite Mean	4.50	*Very High*	3.71	High

Scale: Very High- 4.20-5.00, High - 3.40-4.19, Average - 2.60-3.39, Low- 1.80-2.59, Very Low - 1.00-1.79

Table I shows the summary of quality assurance status according to five (5) areas. The "As Expected" responses obtained a composite mean of 4.50 and reflect to "Very High" remarks while the "As Observed" responses obtained a composite mean of 3.71 and reflect to "High" remarks.

From the results, the "As Expected" ratings show that 80% or 4 out of 5 areas of quality assurance reflects to "Very High" remarks while the rest of the areas reflect to "High" remarks. This means that the respondents have the assumption that the institution provided the quality assurance as enumerated in ISA standards. On the other hand, the "As Observed" ratings show that all of the areas of quality assurance reflect "High" remarks. This means that there is an existing quality assurance with some areas for improvement as described by the slight difference in weighted means of two observations that are necessary to come up with regional educational quality assurance model.

Table II: Summary of Quality Assurance Status According to Faculty Members

AREA	As Expected		As Observed	
	Weighted Mean	Interpretation	Weighted Mean	Interpretation
1. Government and Management	4.31	*Very High*	3.72	High
2. Quality of Teaching	4.62	*Very High*	3.62	High
3. Quality of Professional Exposure, Research, and Creative Work	4.74	*Very High*	3.69	High
4. Support for Students	4.80	*Very High*	3.94	High
5. Relations with the Community	4.03	High	3.60	High
Over-all Composite Mean	4.50	*Very High*	3.71	High

Scale: Very High- 4.20-5.00, High - 3.40-4.19, Average - 2.60-3.39, Low- 1.80-2.59, Very Low - 1.00-1.79

Table II shows the summary of quality assurance status according to five (5) areas. The "As Expected" responses obtained a composite mean of 4.50 and reflect to "Very High" remarks while the "As Observed" responses obtained a composite mean of 3.71 and reflect to "High" remarks.

From the results, the "As Expected" ratings show that 80% or 4 out of 5 areas of quality assurance reflects to "Very High" remarks while the rest of the areas reflects to "High" remarks. This means that the respondents expected the institution to provide the quality assurance as enumerated in ISA standards. On the other hand, the "As Observed" ratings show that all of the areas of quality assurance reflect "High" remarks. This means that there is an existing quality assurance with some areas for improvement as described by the slight difference in weighted means of two observations that are necessary to come up with regional educational quality assurance model.

Table III: Summary of Quality Assurance Status According to Students

AREA	As Expected		As Observed	
	Weighted Mean	Interpretation	Weighted Mean	Interpretation
1. Government and Governance	4.24	*Very High*	3.76	High
2. Quality of Teaching and Learning	4.54	*Very High*	3.49	High
3. Quality of Professional Exposure, Research and Creative Work	4.69	*Very High*	3.74	High
4. Support for Students	4.81	*Very High*	3.73	High
5. Relations with the Community	4.16	**High**	3.49	High
Over-all Composite Mean	4.49	*Very High*	3.64	High

Scale: Very High- 4.20-5.00, High - 3.40-4.19, Average - 2.60-3.39, Low- 1.80-2.59, Very Low - 1.00-1.79

Table III shows the summary of quality assurance status according to five (5) areas. It shows that the "As Expected" responses obtained a composite mean of 4.49 and reflects to "Very High" remarks while the "As Observed" responses obtained a composite mean of 3.64 and reflects to "High" remarks.

From the result, the "As Expected" ratings shows that 80% or 4 out of 5 areas of quality assurance reflects to "Very High" remarks while the rest of area reflects to "High" remarks. This means that the respondents have expected the institutions to provide the quality assurance as enumerated in ISA standards. On the other hand, the "As Observed" ratings show that all of the areas of quality assurance reflect "High" remarks. This means that there is an existing quality assurance with some areas for improvement as described by the slight difference in weighted means of two observations that are necessary to come up with regional educational quality assurance model.

B. The Significant Differences between the "As Observed" and the "As Expected" Quality Assurance Status of Selected HEIs in CAR

The following data summarized the result of paired t-test to determine the significant difference between the "As Observed" and "As Expected" quality assurance status of selected HEIs in CAR.

Table IV: Summary of Result of Assessment of the Three Groups of Respondents

Areas	Alpha (α)	p - value	Interpretation
1. Governance and Management	0.05	0.000	Highly Significant
2. Quality of Teaching and Learning	0.05	0.000	Highly Significant
3. Quality of Professional Exposure, Research and Creative Work	0.05	0.023	Significant
4. Support for Students	0.05	0.169	Not Significant
5. Relations with the Community	0.05	0.143	Not Significant

Table IV shows the summary of the result. It is revealed that three out of five (3/5) or 60% of the "As Observed" and "As Expected" result are significantly different and two out of five (2/5) or 40% are not significantly different..

From the finding of the result, it shows that government and management, quality of teaching and learning and quality of professional exposure, research and creative work "As Expected" and "As Observed" ratings are significantly different while support for students and relations with the community "As Expected" and "As Observed" ratings are not significantly different. This is an indication that the educational institution in CAR has two areas for improvement. This expressly suggests that there is a need to focus the HEI in CAR on the support for students and relations with the community.

C. The Derived Regional Educational Quality Assurance Model

The derived educational quality assurance model is in the form of equations. The proponent used regression analysis to determine the educational quality assurance model.

Using linear regression model, the equation is as follows:

$$Y = a + bx1 + bx2 + bx3 + bx4 + bx5$$

where:

  a - constant
  Y - As Expected Ratings
  b - coefficients
  x1 - x5 (Five Areas of ISA Quality Assurance on "As Observed" Assessment)

The assessment was composed of "As Expected" and "As Observed" ratings of the respondents of the study. To come up with a model, the result of the "As Expected" ratings were considered as the dependent variables of the Educational Quality Assurance while the "As Observed" Ratings five areas of ISA Quality Assurance were considered as the independent variables that has something to do with Educational Quality Assurance. Information below shows the basis for the regression model.

Table V: Summary of Relationships of Five Areas of Quality Assurance with Educational Quality Assurance

STATEMENTS	Coefficients	P-Value	Relationship	Interpretation
Constant	2.870308749	0.024344275		
(A) Governance and Management	0.286943855	0.038614727	Positive	Significant
(B) Quality of Teaching and Learning	0.019334079	0.012318999	Positive	Significant
(C) Quality of Professional Exposure, Research and Creative Work	-0.208944677	0.001789005	Negative	Significant
(D) Support for Students	0.343964426	0.038069706	Positive	Significant
(E) Relations with the Community	-0.158729696	0.001715058	Negative	Significant

Table V shows the constant and coefficient of the regression model. It shows that the Educational Quality Assurance is related with items governance and management, quality of teaching and learning, quality of professional exposure, research and creative work, support to students and relations with the community. Moreover, government and management and quality of teaching and learning and support for students has positive relationship with the regionla educational qauality assurance while quality of professional exposure and relations with the community has an inverse relationship with quality assurance. The result shows that the regression analysis expressed by the equation:

$$Y = 2.870 + 0.286x_1 + 0.019x_2 - 0.208x_3 + 0.343x_4 - 0.158x_5$$

Government and management, quality of teaching and learning, quality of professional exposure, research and creative work, support to students and relations with the community are significant in the model.

D. Consolidated Summary Model

The following is the consolidated summary model based on the findings of the result.
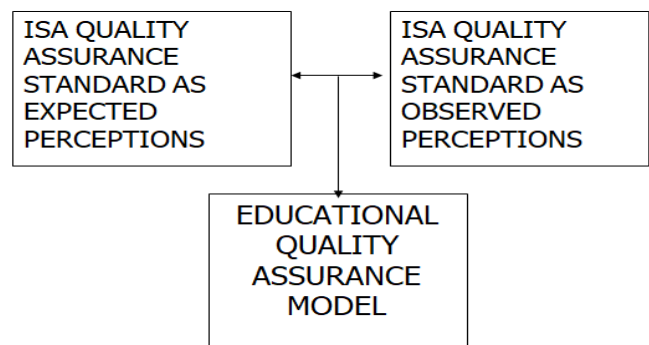

Fig. 2: Educational Quality Assurance Model

From the finding of the results, it is elaborated that the assessment of educational system based from ISA standards shows that there is a need to enhance the educational system in HEIs of CAR. On the other hand the paired t-test proved that significant difference between "As Expected" and "As Observed" ratings of the respondents exist. On the other note, items government and management, quality of teaching and learning, quality of professional exposure, research and creative work, support to students and relations with the community are all significant in the model with positive and inverse relationships. Moreover, it can be noticed that there is congruency between the "As Expected" and "As Observed" ratings based on the regression analysis that could be the basis for an effective regional educational quality assurance model.

III. CONCLUSION AND FUTURE WORKS

The proponent have adapted the Institutional Sustainability Assessment Self Evaluation Document and conducted the survey to five (5) selected schools of Cordillera Administrative Region (CAR). The respondents are composed of the administrators, deans, coordinators,

extension coordinators, faculty and students with a total of two hundred ten (210) respondents. The results of the study were based from the assessment of all the respondents. The presentation of the summary was according to the answers of the statement of the problems.

Based on the result of the study, the following conclusions were made:

1. Quality assurance status of selected HEIs in CAR in terms of (a) governance and management, (b) quality of teaching and learning, (c) quality of professional exposure, research and creative work, and (d) support for students, and (e) relations with the community.

A. Assessment of Administrators - The "As Expected" ratings show that 60% or 3 out of 5 areas of quality assurance reflects to "Very High" remarks while the rest of the areas reflects to "High" remarks. This means that the respondents expected the institution to provide the quality assurance as enumerated in ISA Standards. On the other hand, the "As Observed" ratings show that all of the areas of quality assurance reflect "High" remarks. This means that there is an existing quality assurance with some opportunities for improvement.

B. Assessment of the Faculty Members – The "As Expected" ratings show that 80% or 4 out of 5 areas of quality assurance reflects to "Very High" remarks while the rest of the area reflects to "High" remarks. This means that the respondents expected the institution to provide the quality assurance as enumerated in ISA standards. On the other hand, the "As Observed" ratings show that all of the areas of quality assurance reflect High remarks. This means that there is an existing quality assurance with opportunities for improvement.

C. Assessment of Students – The "As Expected" ratings show that 80% or 4 out of 5 areas of quality assurance reflects to "Very High" remarks while the rest of area reflects to "High" remarks. This means that the respondents have expected the institutions to provide the quality assurance as enumerated in ISA standards. On the other hand, the "As Observed" ratings show that all of the areas of quality assurance reflect "High" remarks. This means that there is an existing quality assurance with areas for improvement.

2. It is revealed that three out of five (3/5) or 60% of the "As Observed" and "As Expected" ratings are significantly different and two out of five (2/5) or 40% are not significantly different. It is also revealed that government and management, quality of teaching and learning and quality of professional exposure, research and creative work "As Expected" and "As Observed" ratings are significantly different while support for students and relations with the community "As Expected" and "As Observed" ratings are not significantly different. This is an indication that the educational institution in CAR has two areas for improvement. This expressly suggests that there is a need to focus the HEI in CAR on the support for students and relations with the community. It is also revealed that it is verified that there is no significant difference on the respondents' assessment when grouped according to the sector they represent on the "As Expected" and "As Observed" ratings with (p=0.096) and (p=0.28) respectively.

3. The regional educational quality assurance model was developed based on the inputs of the selected HEIs of CAR and mathematical model with the use of regression analysis was used to determine the significant predictors of educational quality assurance of HEIs in CAR.

Future study may focus with other aspects of quality assurance must be conducted to see whether the educational quality assurance may become simpler and yet effective. And factors that came out with negative relationship could be the subject for another deep study. Finally, further study may be conducted to evaluate the possible educational quality assurance framework for a wider scope not just for regional setting.

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