A Holistic Conceptual Measurement Framework for Assessing the Effectiveness and Viability of an Academic Program

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Abstract—In today's very competitive higher education industry (HEI), HEIs are faced with the primary concern of developing, deploying, and sustaining high quality academic programs. Today, the HEI has well-established accreditation systems endorsed by a country's legislation and institutions. The accreditation system is an educational pathway focused on the criteria and processes for evaluating educational programs. Although many aspects of the accreditation process highlight both the past and the present (prove), the "program review" assessment is "forward-looking assessment" (improve) and thus transforms the process into a continuing assessment activity rather than a periodic event. The purpose of this study is to propose a conceptual measurement framework for program review to be used by HEIs to undertake a robust and targeted approach to proactively and continuously review their academic programs to evaluate its practicality and effectiveness as well as to improve the education of the students. The proposed framework consists of two main components: program review principles and the program review measurement matrix.

Keywords—Academic program, program review principles, curriculum development, accreditation, evaluation, assessment, review measurement matrix, program review process, information technologies supporting learning, learning/teaching methodologies and assessment.

I. INTRODUCTION

IN today's competitive and regulated education industry, HEIs are faced with several challenges, including cost of education, employability of graduates, compliance with accrediting bodies, and most importantly, providing academic programs that meet the highest possible standards [20]. The key question that comes to mind here is, how can universities truly measure an academic program effectiveness to be able to benchmark it and eventually improve it to meet the highest standards?

Financial constraints and stiff competition in the education sector are forcing colleges and universities to seeking new ways to achieve high performance in their business operation that will allow them to offer relevant programs to meet: student, community, and employer needs; and their mission and goals. To achieve this, HEIs should connect program reviews to institutional planning and decision-making processes. Continuously improving their academic programs is essential by regularly reviewing their programs and by using a well-defined evaluation process and model.

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Bulmetis and Dutwin [7] state that a program's effectiveness is "*measured in terms of substantive changes in knowledge, attitudes, or skills on the part of the program's clients*". The quality of an academic program is determined by a review of the many components that comprise the educational environment of the institution. It is a measure of the breadth and depth of how the program fulfils its mission and goals. Program effectiveness relates to the level of student performance as a measurement of the achievement of program objectives or outcomes.

There are many instruments to measure an academic programs' quality, one of these instruments is "program review". Per Macau University of Science and Technology, a program review is:

"a rigorous, systematic, objective, impartial, expert-based examination, evaluation and self-evaluation of how effectively a program is working, as part of the ongoing pursuit of higher levels of achievement and quality in the university, and in the service of program improvement" [14].

Academic program reviews provide an opportunity for each academic unit to reflect, self-assess, and plan. By stimulating program planning, academic program evaluations can be a central mechanism to advance the unit mission and the plan for academic program improvement. Educational program evaluation can provide empirical evidence of a program's SWOT analysis. Evaluation assessments are conducted through a variety of methods: self-study by the HEI; external accreditation bodies; and a few research-based methods [20]. Program evaluation should not only provide a measurement of the results of a program but should also provide a continuous assessment of measuring all the components of a program including the measurement of the effectiveness of the graduates in society. In addition, it should provide guidance for making decisions regarding accreditation of programs, continuance, worth or merit of a program, modification, expansion, or curtailment of programs, feasibility of adopting innovative programs and the apparent mode of procedures used with the programs [2]. In developing a process for evaluation, it is important to remember the purpose of evaluation. Per Stufflebeam et al. [21]: *"The purpose of evaluation is to <u>improve</u>, not <u>prove</u>."*

For the purpose of this study, the term university or college will be used interchangeably with HEIs.

The purpose of this study is to present a conceptual framework for "Program Review" that can help academic

units effectively assess the quality of their academic programs.

The remainder of this paper is organized as follows. First, the research gap, a statement of the problem and contribution of the study is given. Then, the methodology of the study is introduced. Next, the framework to assess the effectiveness of an academic program is presented. Then, the program review measurement matrix is presented. Finally, the conclusion of the paper is drawn.

II. Research Gap, Statement of the Problem and Contribution of the Study

In this section, we describe the research gap, the statement of the problem, and the contribution of this study.

A. Research Gap

Several researchers and practitioners have proposed various methods, techniques and frameworks for academic program review. Some of the names include: [3]-[6], [8]-[10], [12], [13], [15], [16], [19], [21].

Hanoover [11] concluded that "there is no universal approach to academic program review", but showed that there are an established set of accepted models that have been used over the last 10 to 15 years [11]. Below we briefly examine several such models.

Majdalawieh et al. [15] illustrate seven key areas of measurement to assess an academic program. The seven areas of measurements are: reference curriculum, perception of the specialization, enrolment in the specialization, employment of the graduates, staffing the program, IT and facilities' infrastructure, and competitiveness of the program.

Blaikie [5] identified the following main categories of measurements to be included in the program review: (1) Planning, Governance and Leadership (Planning: Alignment with University Strategic Direction and Frameworks; Faculty of Education Planning); (Governance: Bylaws of the Faculty); (Leadership: committed to the Faculty; communication; direction of the unit); (2) Undergraduate Programs (size of the faculty complement; enrolment; Faculty's research agenda; admissions process; curriculum mapping; external stakeholders (advisory committee); STEM initiative); (3) Faculty And Staff (Faculty: Faculty renewal; academic staffing plan; recruitment strategy); (Staff: staff supports the current administrative structure); (4) University Support: (Space: labs); and (5) Public Engagement And Partnerships: (Stakeholder Partnerships: Government; Conferences; Alumni Relations Officer).

APU [3] identified eight components to evaluate the quality of the program: Component 1 - Mission and Context Programs; Component 2 - Faculty Characteristics and Qualifications; Component 3 - Quality of Curriculum and Student Learning; Component 4 - Student Enrolment and Success; Component 5 - Academic Opportunities and Class Size; Component 6 - Student and Constituent Feedback; Component 7 – Faith Integration; Component 8 – Resources and Institutional Capacities. The guideline provides an evaluation matrix with rubric to measure the quality of each component.

Dickeson's [10] model identifies 10 primary criteria that should drive any program review or evaluation. These criteria are: History, Development, and Expectations; External Demand; Internal Demand; Quality of Program Inputs and Processes; Quality of Program Outcomes; Size, Scope and Productivity; Revenue and Other Resources Generated; Costs and Other Expenses; Impact, Justification and Overall Essentiality; and Opportunity Analysis.

Bresciani [6] shares the good practices of program reviews of some 40 institutions in the United States and presents the components of outcomes-based assessment program and mainly focused on students learning.

Collins's [8] introduced a book with a title "Good to Great". Collins focused on the factors that define corporate success. Collins' model "examines the differences between good and great based on what he identifies as an institution's inflection point—the moment when an institution chooses to concentrate on what it does best, and channels its energies accordingly" [11]. Collins' model began to get interest within non-profit and academic sectors after he released a companion volume entitled "Good to Great and the Social Sectors". "Good to Great" is designed around four stages, Stage One: Disciplined People; Stage Two: Disciplined Thought; Stage Three: Disciplined Action; and Stage Four: Building Greatness to Last.

Konstantinos and Efrosini [12] described five evaluation methods classified as either qualitative or quantitative. These models are: *Efficiency Analyses*, *Impact Analysis*, *Planning Balanced Sheet*, *Goal Achievement Matrix, and Multi-Criteria Analysis*.

Satterlee [19] conducted a comprehensive survey of literature review pertaining to academic program reviews. He identified seven themes related to the program review process. In the criteria used in the program review dimension, he cited four major kinds of criteria used in program reviews: mission/ centrality (the program is in-line with college goals and mission), quality (of faculty; students; curriculum; facilities; equipment; library; administration), cost (cost/ revenue; benefits to the students, the college, and society; faculty; facilities; equipment; enrolment), and demand (past, present, and projected future enrolment; demand for graduates, job opportunities for graduates; student interest; justification of need; comparative advantage to other similar programs offered in the service area; benefit to society).

Richards and Minkel [16] identified several elements that should be included in the program review including assessment of: program functions and objectives, descriptions of the program, its faculty, and students, library resources and physical facilities, students' outcomes, other evidences of program quality.

Conrad and Wilson [9] identified four conceptual models of academic program review. These four models are: *Goal-based model*, Responsive model, *Decision-making model*, and Connoisseurship model. Most of the academic program reviews were based on one of the above conceptual models or a combination of them [9].

Barak [4] classifies three types of academic program

review: Internal Academic Program Review, System-Level Academic Program Review, and State-level Academic Program Review. Barak's distinguished four different characteristics of internal program review: Institutions develop their own formal processes; Institutions use multiple program review indicators; Institutions encourage wider distribution of review results; and recommendations focus on program improvement.

There are numerous other evaluation approaches and frameworks which have their supporters, but the above summaries represent the best-known.

TABLE I
PROGRAM CURRICULUM AND INSTRUCTION MEASUREMENT COMPONENTS

Measurement sub-category	Attributes and criteria of measurements
1. Appropriateness of the Program	*Is the* <u>*mission statement*</u> <u>*consistent*</u> *with the establishment charter of the institution?*
	Is the <u>*mission statement appropriate for an institution of its type*</u>*?*
	Is the <u>*mission relevant to needs of the community*</u> *or communities served by the institution?*
	Is the <u>*mission consistent with the economic and cultural requirements*</u> *of the country in which the institute is operating?*
	Is the <u>*appropriateness of the mission explained to stakeholders*</u> *in an accompanying statement commenting on significant aspects of the environment within which it operates?*
2. Perception of the Program	*What is the level of students' perceptions of the program* <u>*learning environment*</u>*?*
	What is the level of students' perceptions of the program <u>*usefulness?*</u>
	What is the level of students' perceptions of the program <u>*quality?*</u>
	What is the level of students' perceptions of the program <u>*acceptability?*</u>
	What is the level of students' perceptions of the <u>*value of the program?*</u>
	What is the level of students' perceptions of the program meeting their <u>*need and*</u> *satisfaction?*
3. Enrollment and Retention	*Is the number of* <u>*new first time undergraduate students*</u> *applied and accepted has been increased?*
	Is the number of <u>*new undergraduate transfer students has been increased?*</u>
	Is the number of undergraduate students' participation in <u>*the Honor's Program has been increased?*</u>
	Is the first time <u>*full-time fall to fall retention rate has been increased?*</u>
4. Curriculum Framework	*Emphasizing an* <u>*encompassing view of curriculum.*</u>
	Commitment to an <u>*explicit acknowledgement of core values.*</u>
	<u>*Commitment to inclusivity.*</u>
	<u>*Commitment to flexibility.*</u>
	<u>*Commitment to Integration, breadth and balance.*</u>
	<u>*Commitment to a developmental approach.*</u>
	<u>*Commitment of collaboration and partnerships.*</u>
5. Special study options	*The program is complemented by special study options.*
6. Economic viability of the Program	<u>*Enrollment-Based Measurements:*</u>
	Is the program meeting a minimum enrollment viability metric and graduation rates?
	<u>*Activity-Based Costing Models (ABC):*</u> *Is the program meeting the cost associated with each identified activity?*
	<u>*Cost Benefit Analysis: I*</u>*s the benefits and costs associated with an academic program bring monetary values?*
7. Competitiveness of the academic program	*Students are joining the program instead of similar programs nearby?*
	The academic program is different and better than similar programs nearby?

B. Statement of the Problem

The academic excellence of the programs of a HEI is determined by an evaluation of all components of the program. ABET [1] defines an educational program as "an integrated, organized experience that culminates in the awarding of a degree. The program will have program educational objectives, student outcomes, a curriculum, and facilities." Academic program review or program evaluation is one of the main three academic program management processes: academic program <u>planning</u>, academic program <u>development</u>, and academic program <u>evaluation</u> [4]. Academic program evaluation falls into program approval and program review [4]. Per Barak, program approval refers to a process of examining potential value of newly proposed academic programs, while program review is recognized as "a conceptual framework for assessing academic programs already in existence".

One of the early models used by most management-oriented evaluations was developed by Shufflebeam et al. [21]. The model is called the CIPP (Context, Input, Process, and Product) evaluation model. Stufflebeam et al. [21, p. 40] defines evaluation as: "The process of delineating, obtaining, and providing useful information for judging decision alternatives.". The CIPP model's core consists of (1) context evaluation to analysis of the actual and desired conditions and leading to anticipated decisions; (2) input evaluation is the extent to which the reviewer provides assistance in program design and directing structured decisions; (3) process evaluation focuses on implementation using and guiding implemented decisions; and (4) product evaluation reports on the degree of objectives achievements and serving to recycle decisions.

Strategies for using Stufflebeam's CIPP model are described. Two of the five important shortcomings that greatly

limit the value of program assessment to decision-makers in their effort to improve an educational program, as described by Stufflebeam et al. [21], are: the esoteric nature or poor quality of the information generated through the evaluation; and the narrowness' of quantitative criteria which, too often, lead to the improper conclusion of no significant difference.

The literature reveals more than 100 cited techniques of evaluation [17]. Lagos and Linos [13] state that the big crowd of evaluation techniques triggers the need for a unified evaluation value framework and an acceptable theoretical background uniformly used.

TABLE II
RESOURCES AND SUPPORT MEASUREMENT COMPONENTS

Measurement sub-category	Attributes and criteria of measurements
1. Students' Recruitment/ Enrollment	*Does the program have a proactive recruitment agenda?*
	There are sufficient students enrolled in the program?
2. Support Services	*How do you rate the academic services provided by the program?*
	How do you rate the social services provided by the program?
	How do you rate the personal services provided by the program?
	How do you rate the financial services provided by the program?
3. Graduates' Employment	*How successful graduating students enrolled in graduate program?*
	placement in employment related to field of study,
	first employment after graduation,
	rates of graduates' employment (in areas relating to the program/ not relating to the program),
	percent employed within one year of graduation,
	percent employed in a position directly related to their degree,
	type of positions held by graduates,
4. Students Satisfaction and Feedback	*How well does the program solicit and respond to students' feedback?*
	How well the program communicates results of feedback analysis to its current students?
	How did the program improve in its use of students' feedback?
5. Constituent/ Stakeholders Feedback	*How well does the program solicit and respond to its constituent's feedback?*
	How well the program communicates results of feedback analysis to its constituents?
	How did the program improve in its use of constituent feedback?
6. Faculty & staff recruitment and retention	*The unit has a well-defined procedure for identifying the unit need to recruit faculty and staff?*
	The unit has a well-defined procedure for recruiting faculty and staff?
	The unit/ university has an established exit interview instrument and procedure in order to better understand the exact causes and influences that induce faculty/staff to separate from the unit/ university.
	The unit is satisfied with the retention rate of its faculty/staff?
7. Administrative, secretarial and technical support personnel	*The unit has sufficient administrative and secretarial support?*
	The unit has sufficient skilled and qualified administrative and secretarial support?
	The unit has sufficient technical support?
	The unit has sufficient skilled and qualified technical support?
8. IT & Facilities Infrastructure	*Class sizes are sufficient to support student learning and program effectiveness.*
	Number of labs are sufficient to support the academic program?
	The labs are well equipped to support the academic program?
	The IT infrastructure is sufficiently robust, scalable, and efficient to support the academic program?
	Physical resources include facilities, hardware, software, and tools are sufficient to support the academic program?
	The help/service desk objectives ensure that a reliable, consistent level of service is available to support the academic program?
9. Library support	*library resources or needs around information literacy are sufficient?*
	library resources and budget contribute to program effectiveness?
10. Budget allocation	*The budget is allocated based on the program needs?*

C. Contribution of the Study

This study is directed at developing a feasible conceptual framework for "program review" to assess the effectiveness and viability of an academic program and to improve the academic program and the education of the students. The proposed framework is based on the analysis of the common elements of the literature as presented earlier in the article.

The aim of our modest contribution is to engage the community in the development of best practice framework to be used in the review of academic programs.

III. METHODOLOGY

The purpose of this study is to develop a conceptual review model to be used by HEIs. The authors of this study are trying to do so by conducting literature review to evaluate the current academic program reviews and to build upon the work of other researchers and practitioners to develop a conceptual model for assessing an academic program. The need for a well-defined, effective, robust, flexible and reliable conceptual model is essential that can no longer be overlooked.

The proposed framework is aimed at enabling institutions to achieve improved program reviews outcome. The authors

went through several iterations to come up with the proposed framework. After the literature review, the initial components have been identified and guided us to the early design of the framework. Then, the authors went through an iterative process of designing, collecting evidence, evaluating the design in terms of meeting the objectives of the study, and use these insights to redesign the conceptual framework to improve the effectiveness and the efficiency of the framework. The authors gradually learned new things about the completeness of the design over several iterations in brainstorming sessions with graduate students and colleagues.

TABLE III
PARTNERSHIP AND COLLABORATION MEASUREMENT COMPONENTS

Measurement sub-category	Attributes and criteria of measurements
1. Governments & Industry partnership & collaboration	*The administration responsibility of the program is characterized in a way that mirrors the community or communities within which the institution operates.*
	The administration responsibility of the program is characterized in a way that mirrors the skills, capacities and abilities of staff instructing in the program.
	The commitments to the community made by staff instructing in the program are recorded and announced upon on a yearly premise.
	Faculty and staff promotion and appraisals criteria incorporate commitments made to the community.
	Departmental or program activities in working with the community is facilitated with capable units in the institution to dodge duplication and conceivable perplexity.
	Staff are urged to take an interest in gatherings and forums in which critical community issues are examined.
	In a professional program relationships are established with local industries and employers to participate on advisory committees and assist program delivery.
	Local employers and members of professions are invited to join proper admonitory advisory committees or groups.
	Contacts are built up with schools in the locale offering help and support in territories of specialization, giving data and information about the program and consequent profession open doors for graduates, and orchestrating advancement exercises for understudies at the schools.
	Continuous contact is kept up with alumni, keeping them informed about institutional advancements, welcoming their cooperation in activities, and inspiring their monetary and other help for new activities.
	Opportunities are brought in participation with institutional administrators to look for funding support from people and organizations in the community for scholarly activities and different improvements related to the program.
	Records are kept up of community engagements embraced by people and groups or different associations within the department and gave routinely to recording in a focal information base inside the institution.
2. Research & Conferences	*The right environment for faculty to balance between teaching and research is established.*
	Faculty assigned to the program are producing quality papers and publishing their work in journals or conferences, and presentation in conferences.
	Faculty are integrating their research in their courses and classroom.
	The Institute has an established and clear policies to provide active researchers with appropriate teaching load/ release time to establish their research agenda and conduct research in their area of expertise.
	The university/ unit has a well-established research collaboration with the firms in its community.
3. Alumni Relationships	*The unit/ university has a well-established alumni service office.*
	Alumni are serving as mentors, volunteers, ambassadors and advocates for the unit/ university.
	Alumni are providing feedback, generate financial support, participate in university's governance, assist with student recruitment, serve as guest speakers, and serve as a resource and talent pool for faculty.
	The university/unit has established an alumni engagement strategies and a metric to measure the alumni engagement by tracking all proactive actions taken by alumni.

IV. PROPOSED FRAMEWORK

The program evaluation needs to be open to more than one way of looking at the program [18]. As such, the triangulation approach [18] will be used in this paper to develop the framework to assess the effectiveness of an academic program. In addition, we will use the *Goal-based model, Decision-making model, impact analysis (assessment)* and *the planning balanced sheet (PBS) methodologies* to develop the conceptual framework since they are more appropriate to academic program reviews.

In the below sections, we layout the four core areas and the 32 sub-areas of the proposed framework.

V. THE FRAMEWORK CORE AREAS OF MEASUREMENT

The following are the proposed four core areas of measurement to help create the framework for a sustainable academic program review:
1. Program Curriculum and Instruction
2. Institute Resources & Support
3. Industry Partnership & Collaboration
4. Planning, Leadership and Governance

The key areas of measurement for assessing academic programs will provide senior management with guidance on the quality of the academic program including the breadth and depth of its capacity to fulfil its mission and goals.

All the principles in the program review framework will be used in the program review measurement matrix to measure the overall effectiveness and viability of an academic program.

We will discuss each one of the above core areas of measurements of the framework and its components in more detail in the following sections.

A. Program Curriculum and Instruction

The program curriculum and instruction area of measurement consists of seven sub-categories. Table I describes the measurement sub-category, their attributes and

criteria of measurements.

B. Institute Resources & Support

The institute resources and support consists of 10 sub-categories. Table II describes the measurement sub-category, their attributes and criteria of measurements.

C. Partnership & Collaboration

The partnership and collaboration consists of three sub-categories. Table III describes the measurement sub-category, their attributes and criteria of measurements.

D. Planning, Leadership and Governance

The planning, leadership and governance consists of three

sub-categories. Table IV describes the measurement sub-category, their attributes and criteria of measurements.

VI. PROGRAM REVIEW MEASUREMENT MATRIX (PRMM)

The program review measurement matrix will be used as a tool to record the weight of each component of the proposed program review framework based on the analysis of the collected data. The program review measurement matrix categorizes measures as being "Initial 1 – Basic (1-2)", "Level 2 –Emerging (2-3)", "Level 3 –Developed (3-4)", and "Level 4 – Advanced (4-5)".

TABLE IV
PLANNING, LEADERSHIP AND GOVERNANCE MEASUREMENT COMPONENTS

Measurement sub-category	Attributes and criteria of measurements
1. Academic Planning	*The academic planning process is aligned with the university strategic planning process.*
	The academic program strategy is enhancing the values that make the university unique.
2. Academic Leadership	*The academic leadership have an outstanding ability to know what knowledge and skills are more critical to teach, know what teaching techniques and practices are most effective.*
	The academic leadership have created a stimulating learning environment for students and peers, and using their energy and expertise to promote student learning.
	The academic leadership have the ability to identify, analyze and answer important research and practical questions and are profession in communicating their effort to others.
	The academic leadership have established systems to ensure that the unit essential operational functions are effective, protected, sustainable to meet the needs of the university.
	The academic leadership are respected for their balanced decision making, credibility, institutional knowledge and expertise.
3. Academic Governance	*Faculty has been involved in decision-making related to academic issues.*
	Administrators have been involving faculty in decision-making (as above) related to academic issues.

TABLE V
THE PROGRAM REVIEW MEASUREMENT MATRIX CATEGORIES

Level	Expectations	Score
Initial 1 – Basic	limited implementation of the subject area,	1-2
Level 2 – Emerging	+demonstrates competence in the Level 1 - Basic competency areas	2-3
Level 3 – Developed	+demonstrates effectiveness in the Level 2 - Intermediate competency areas	3-4
Level 4 – Advanced	+demonstrates mastery in the Level 3 - Advanced competency areas	4-5

TABLE VI
SUMMARY OF THE QUALITY OF PROGRAM SCORE RUBRIC

Area/ Component	Quality of Program: Score by the unit	Quality of Program: Score by the College/ University
Program Curriculum and Instruction		
Institute Resources and Support		
Industry Partnership and Collaboration		
Planning, Leadership and Governance		

The proposed core areas of measurement discussed in Section IV and all the sub-areas will be captured in a measurement table in which the program reviewers will be used to provide a score for each area. It is up to the HEI to come up with their own score based on the importance of the areas of measurement. The quality of program score rubric is provided below.

A complete quality of program score rubric with core areas and sub areas of measurement will be provided in an Excel spreadsheet.

VII. CONCLUSION

In a very high competitive education market, management

wants to ensure that programs are functioning at the highest possible levels of academic quality and are consistent with the mission of the education institution. The focus of the study was institutional approaches to academic program review. Based on the literature review of selected institutes and researchers, the proposed program review framework and the PRMM have been derived from current critical challenges facing HEIs. Decisions to grow, shrink or close existing programs, or to create new programs, should be based on the findings of the program review process since they should reflect a holistic, integrated, and long-term vision of the HEI or the academic unit. As such, program review is an important component of academic planning. The program reviews

should be based on a common and accepted set of findings and recommendations to assess senior management to make the right strategic plans for the academic program.

Through careful documentation and analysis, the proposed framework will be used as a continuous management tool to assess the quality, centrality, demand, and costs associated with specific programs and subsequently develop future plans for program enhancement that include concrete strategic planning and benchmarks for achieving improved quality. The results of the review should act as a guide to strategic decisions regarding development and resource allocation, significant restructuring, or in exceptional cases, program closure.

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