Introducing and Evaluating Key Performance Indicators and Generating Awareness of Competence among Inter-Departments for Quality Performance and Quality Assurance in Large Academic and Research Multidisciplinary Institutions

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This research article establishes the relationship between key performance indicators and the academic and research quality performance and assessment and quality assurance of any large multidisciplinary academic and research institution or university. The indicators in terms of qualitative and quantitative are being proposed below and are initially based on benchmarks, and then a strategy and method are proposed to publish results considering internal rankings. This may be a fruitful initiative contributing to the decision-making, follow-up, advanced planning processes, and continuous development and improvement and also performance comparisons between the participating academic and research units within the institution. Obviously, some tools are in place to assess the quality performance, such as world university rankings, domestic rankings, accreditation, external peer review, academic and industry peer perception, faculty self-appraisal, and magazine-based domestic rankings. In this research article, we have discussed a set of KPIs derived and proposed to implement and evaluate the outputs and outcomes for each academic and research unit once a year after the academic session is over. We have then proposed to calculate the scores of each sub-indicator under each major indicator, then the scores of each major indicator, and then the overall score for each participating academic and research unit on the parameters and weightages, and then publish the internal ranking results based on percentiles and the rank obtained as an institution as a whole, and make the provision to nominate for awards and honours for the top three performers every year. Each institution will have the freedom and choice to define appropriate weights for each major indicator, along with some sub-indicators, according to their regional, financial, and access-to-institutions factors. The whole process will enforce competitions and races (consistent pressure) among each academic and research unit within the same institution to continuously improve their academic and research systems compared with the top three performers every year. In order to achieve this, the academic and research leadership of the institute will have control and will monitor the quality of performance continuously. Depending on these indicators, it will also require sustainable, appropriate, and effective data collection to calculate these indicators in terms of scores and percentiles and then use them to judge the quality of academic and research performance and future planning. As a result, the whole process will project the institution as a good performer during participation in the world university rankings, domestic rankings, accreditation, and external peer review.

INTRODUCTION

In the very beginning of the introduction section, we need to emphasize that every academic and research department/unit must have a very clear mission, vision and goals and always be in readiness for new entrants' academic preparation. According to A Novel System, Method, and Perspective Plan for the Assessment of Higher Education's Progress Towards the UN Sustainable Development Goals, we also need to state that education is considered an integral element of sustainable development, and sustainable development goal (SDG) 4 on quality education is a key enabler for all other SDGs under the purview of UN 17 SDGs. Therefore, we are committed to quality education so that the outcomes will also provide all possible support for the UN 17 SDGs.

We have gained experience and knowledge of various performance indicators and weights about the quality performance of HEIs through participating in world university rankings such as QS WUR and THE World University Rankings, THE impact rankings, ARIIA rankings, domestic NIRF rankings and other magazine-based domestic rankings, external peer review that was conducted by the ministry of education, faculty self appraisal and compliance with the ministry for consideration of the institute of eminence and preparing a roadmap for the next 15 years to bring the institute at par with world class. In addition to aforesaid, we have surveyed and studies literature including 'Re-imagining Assessment and Accreditation in Higher Education in India', 'Research Policy Framework Document', 'Performance evaluation of higher education; a necessity', 'Academics' Perceptions on Quality in Higher. Education Shaping Key Performance Indicators', 'Key Performance Indicators, Iowa State University College of Engineering', 'Best Practices, Program Evaluation and KPIs', 'Performance measurement in universities: Managerial Perspective', 'Management of Key Performance Indicators by Heads of Higher Education Institutions', 'Improvement of Quality of Higher Education Institutions as a Basis for Improvement of Quality of Life', 'An Exploration of Key Performance Indicators for Academic Quality, University of Canterbury, New Zealand', 'Application of Key Performance Indicators –In an Engineering College In Oman', 'Development of Key Performance Indicators for the Engineering Technology Education Programs in Taiwan', and 'KPIs and Assessment Table 1437-1438 H, College of Engineering, Electrical Engineering Department, Najran University'.

Then we finally we have come to a conclusion on robust and stable KPIs and viable and scalable methodology steps for their implementation, outputs, and outcomes. According to Re-imagining Assessment and Accreditation in Higher Education In India, the basic objectives of education and the assessment of its outcomes must get aligned to the spirit of the National Education Policy (NEP) 2020 in India and Sustainable Development Goals 2030, which can be unified by formulating the ultimate purpose of education in terms of the well-being of the individual, society, nation, human species, and the planet with all its creatures.

According to Quality Management System in Higher Education, education is the prime mover of the society and the pillar of National Development. Therefore, it is important to focus on appropriate human resource

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development which becomes the basis of development in all other domains of human activity. It is therefore very important to ensure the quality of higher education which makes the nation progressive and advanced in personal, professional and national spheres. A quality assurance system in higher education has to incorporate several elements such as the core values, vision, mission and goals of the institutions, the formation of the quality management system, and internal evaluations of programmes at the level of the institution, external evaluations by the External Assessment Agency based on some predetermined standard criteria and finally publishing the assessment outcome.

According to Quality Management System in Higher Education, being quality-minded in higher education means, caring and meeting the expectations of the stakeholder especially the students. All processes in any higher education institution contributes directly or indirectly to quality as the customers define it. Quality systems in higher education will help to improve professional standards by comparing them with international educational qualifications. There are three concepts of quality assurance in higher education 1) objectivistic concept of quality which includes an instrumental measurement of quality 2) A methodology that should be used which is acceptable to all, based on inputs, processes and outputs which should ultimately relate to the fitness of purpose 3) The third aspect is the Evolutionary concept of quality which is part of the internal culture of institutions. Continuous improvement is based on this concept.

According to Quality Management System in Higher Education, and according to National Assessment and Accreditation Council (NAAC), the present criteria of evaluation in Higher Education Institutions are in the following areas; Curricular Aspects, Teaching-Learning and Evaluation, Research, Innovation and Extension, Infrastructure and Learning Resources, Student Support and Progression, Governance, Leadership and Management and, Institutional Values and Best practices.

According to Quality Mandate for Higher Education Institutions in India, in its constant endeavour to ensure quality and excellence in higher education, UGC has been striving to take initiatives to continuously improve the quality in Higher Education Institutions (HEIs) in India. Moving ahead in this direction, UGC in 2018, set forth the Quality Mandate, an initiative, with the all-encompassing priority to improve teaching learning and innovative skills, critical thinking, inclusiveness, employability, learning outcomes curriculum framework, gender sensitization, social connect, sustainable development competitiveness, and skill development of students in the tertiary education system in India.

According to Research Policy Framework Document, for an institution to improve and then excel, attention should be directed across many of its dimensions and activities: teaching, research, human capital, infrastructure, funding, and administration, to name a few. According to Performance evaluation of higher education; a necessity, higher education has vital role for developing human resource in the economic and development growth of countries. Thus, in order to gain the better future, containing strategic planning is essential.

According to Academics' Perceptions on Quality in Higher. Education Shaping Key Performance Indicators, institutions in higher education (HE) continuously strive to develop and deliver impactful educational programs. At the same time, they should continue to fulfil their mission to educate students in basic applied subjects and in parallel respond to the need to equip students with new skills. For this reason, higher education institutions (HEI) perform periodical curricular reviews adhering to internal and external quality assurance systems. The subsequent curricular reforms are of a transformative nature, preparing graduates to tackle the challenges of globalization, unemployment and vanishing professions. For these reforms to lead to sustainable curricula, the integration of quality into educational programs is instrumental. A suggested way of achieving a transformative stance is to provide the context for the application and diffusion of quality metrics in teaching and learning. According to Key Performance Indicators, Iowa State University College of Engineering, Key Performance Indicators (KPIs) measure students and their success, as well as faculty and their accomplishments in teaching, research, and engagement.

The indicators must cover to evaluate excellent learning, teaching, research, placement, collaboration, internationalization and infrastructure and we have taken proper care of it. According to Best Practices, Program Evaluation and KPIs, experts agree that a few specific KPIs can be a more effective measurement tool than a vast host of indicators. Having a limited number (between, say, five and ten) can allow for the entire organization to be bought in to the evaluative initiative. Ensuring that these limited KPIs adequately reflect

the institution's mission and emphasize aligning key stakeholders such as faculty, students, and business partners with the financial, operational, and organizational performance of programs will make these KPIs particularly effective. A five-year plan is a standard model for programmatic evaluation.

Therefore, we have suggested major nine indicators. The main objective of this paper is to look at the academic leader and managerial perspective of performance measurement and strategy planning in large multidisciplinary academic and research institutions or universities and to develop a framework in institution or university settings using a set of KPIs proposed. The objective of this research article is also to introduce KPIs for evaluating the quality of academic and research programmes including all other parameters as we have discussed in a set of KPIs in each academic and research unit and institute as a whole, compare the progress with all other academic and research units, and publish results in the form of institutional internal rankings. The topic is so important to put consistent pressure on all academic and research units to continuously grow on the path of the world-class and to establish and obtain a good position in various evaluation agencies. We have also acquired current knowledge after going through literature of various academic and research evaluation processes, such as accreditation (All India Council for Technical Education (AICTE), Association of Indian Universities (AIU), National Assessment and Accreditation Council (NAAC), National Board of Accreditation (NBA), and AACSB. Also acquired knowledge through participating in various performance evaluating agencies . Please see the details in research articles 'A General Perspective about Institutional Rankings, Ranking Framework, Benefits of Rankings and Ranking Methodological Flaws and Best Approach for Being A World Class Institution' and 'Detailed Review of National Institute Ranking Framework (NIRF) India Rankings including Uncertainty and Sensitivity' pertaining to world university rankings and domestic rankings for the evaluation of higher education institutions. A lot has been done for the evaluation of higher education, as stated above. We have proposed here the evaluation process for any large multidisciplinary institution in terms of internal rankings initially based on benchmarks, then evaluating scores, percentile and rank obtained. The approach is completely new, based on a survey of published literatures. In this research article, we have discussed introducing and evaluating key performance indicators (KPIs) and generating awareness of competence among inter-departments/units for quality performance and quality assurance. We have then proposed to calculate the scores of each sub-indicator under each major indicator, then scores of each major indicator and then overall score for each participating academic and research unit on the parameters and weightages, then publish the internal ranking results based on percentiles and the rank obtained as an institution as a whole, and make the provision to nominate for awards and honours for the top three performers every year. The whole process may certainly put consistent pressure on each academic and research unit to continuously improve their academic and research systems compared with the top three performers every year. In order to achieve this, the academic and research leadership of the large institute may continuously control and monitor the quality of performance and to ensure quality assurance. As a result, the whole process will project the institution as a good performer during participation in various evaluation agencies

Why Should Quality Assurance And Quality Studies Be Conducted ?

Every higher education institution authority and connected ministry they want to see ecah institute must attempt to offer (sustainable) the best and most satisfactory quality education, research, employability and outcome-based human capital, a succesfull collaboration, a satisfactory academic administrative system, and projecting the institute at the best place in the participating performance evaluation and quality assurance assessment agencies, and finally to get more and more funds either from the public or private agencies. Therefore, the quality assurance and quality studies are necessary to conduct by each institution.

A Set of KPIs Proposed, Methodological Steps Including Research Design, Strategy, Data Collection Methods, Analysis and Justification

A.   A Set of KPIs Proposed

According to knowledge and experience gained for the quality performance evaluation and quality assurance of academic and research programmes of any large multidisciplinary higher education institute or university and survey of some literatures, we have suggested following KPIs into eight major categories; academic (enrolment, teaching, learning, graduate outcome, and recognition), research and research Influence,

infrastructure resource, collaboration, internationalization including student exchange programs, knowledge transfer, social protection, peer perception and donations (endowment Funding).

A.1 Academic (Enrolment, Teaching, Learning, Graduate Outcome, and Recognition) including International Participation

Growth comparison pertaining to academic with the last academic year, either in numbers, average, or percentage, wherever the case is applicable are identified by selecting following indicaators as; 'diversity (students [economical backward, caste, physically handicapped, gender, and foreign national] and faculty [gender and foreign national])', 'enrolment (sanctioned Vs. enrolment)', 'selective credits to average graduation credits earned by graduates', 'average academic grading of graduates', 'one-year retention', 'project internship to another institution (outbound)', 'project internship from another institution (inbound)', 'graduates of last academic year immediately continuing postgraduate education in the same department/unit or in another department/unit of the institute', 'graduate outcome in minimum stipulated time', 'total degrees conferred', 'doctoral degrees conferred', 'graduate outcomes aggregate with placement, higher studies, and entrepreneurship', 'overall rating of final year students for the quality of learning in each academic programme offered through an annual survey', 'overall rating of final year students for the quality of courses through an annual survey', 'full-time faculty against sanctioned strength', 'ratio of students to full-time faculty', 'introducing new course curriculum according to current market demand', 'introducing new academic programme including joint academic programme according to current market demand', 'no. of prestigious award and honour by faculty and students', 'per student administrative cost', 'per faculty administrative cost' and, 'satisfaction perception of department/unit students by the collaborative institutions during workbased practicum'.

A.2 Research and Research Influence including International Participation

Research and Research Influence including international participation are identified by selecting following indicators as; 'annual sanctioned budget through industrial consultancy and sponsored research Project including socially relevant', 'overall amount received through industrial consultancy and sponsored research project', 'overall expenditure', overall income to Institute', 'setting-up of tinkering laboratory and research outcomes including number of internal and eternal students and faculty benefited through, 'special annual institutional research grant received', 'overall expenditure', 'patents (filed, granted, licensed and commercialised, income to institute)', copyrights (filed, granted, licensed and commercialised, income to institute)', 'publications (WoS, Scopus, others in top rated journals)', 'citations (WoS, Scopus, others in top rated journals) excluding self-citation', 'citations per paper', 'papers per faculty', 'best innovation in practices', 'financial grant by institute for incubation centre/start-up/spin-off', 'income to institute through incubation centre/start-up/spin-off', 'published patents in collaboration with industry', 'number of research active staff members'and, 'technical reports'.

A.3 Infrastructure Resource

Key indicators pertaining to infrastructure resource are identified by selecting as; 'sanctioned Amount', 'utilized Amount', 'smart classrooms', 'laboratories', 'hostels adequacy', 'library resource' and, 'sports and cultural events infrastructure'.

A.4 Collaboration

Key indicators pertaining to collaboration are identified by selecting as; 'academic', 'research', 'industry' and, 'alumni engagement'.

A.5 Internationalization including Student Exchange Programs

Key indicators pertaining to internationalization including student exchange programs are identified by selecting as; 'no. of foreign students', 'no. of foreign faculty', 'project internship to foreign institution', 'project Internship from foreign institution', 'no. of prestigious award and honour by faculty and students (international)', 'research in collaboration with foreign agency', 'joint academic programmes with foreign institution(s)', 'inbound faculty at-least stay in campus for three months or more', 'outbound faculty at-least stay in campus for three months or more', 'inbound students at-least stay in campus for three months or more either for research or credit earning (semester away)', 'outbound students at-least stay in campus for three

months or more either for research or credit earning (semester away)', 'research publications with foreign author(s)', 'research supervision at-least with one foreign supervisor', 'patents (internationally filed, granted, licensed and commercialised, income to institute)', 'published patents in collaboration with foreign industry', 'conducting International Conference, workshop and symposia', 'no. of students and faculty short visit to foreign industry to share or gain experience', 'no. of experts short visit from foreign industry to deliver lecture', 'no. of students and faculty short visit from foreign institute to share or gain experience and, 'no. of students and faculty short visit to foreign institute to share or gain experience'.

A.6 Knowledge Transfer including International Participation

Key indicators pertaining to knowledge transfer including international participation are identified by selecting as; **'d**evelopment of on-line academic and research materials', 'publication of book and monograph', 'publication of book chapter and monograph', 'conducting short-term course', 'conducting national and international conference, workshop and symposia', 'no. of students and faculty short visit to industry to share or gain experience', 'no. of experts short visit from industry to deliver lecture', 'no. of students and faculty short visit from another institute to share or gain experience' and, 'no. of students and faculty short visit to another institute to share or gain experience'.

A.7 Social Protection

Key indicators pertaining to social protection are identified by selecting as; ''student financial aid', 'tuition costs' and, 'on-campus housing'.

A.8 Peer Perception

Key indicators pertaining to peer perception are identified by selecting as; 'academic' and, 'industry'.

A.9 Donations (Endowment Funding)

Key indicators pertaining to donations (endowment funding) are identified by selecting as; 'by alumni' and, 'by other public and private agencies'.

Then finally according to Inside Higher Ed, Best Practices, Program Evaluation and KPIs, we project financial, operational, and organizational effectiveness at academic and research department/unit and institutional level in-terms of financial; 'profitability, 'financial surplus' and, 'level of endowment funding'. In-terms of operational; 'faculty quality', 'student quality', 'research quality', 'teaching quality', 'program efficiency' and, 'measures of market positioning'. In-terms of organizational; 'university/institutional rankings', 'reputation', 'student satisfaction', 'employer satisfaction' and 'accreditation'.

B. Methodological Steps including Research Design, Strategy, Data Collection Methods, Analysis and Justification

B.1 Methodology Steps including Research Design and Strategy

According to the Performance Measurement in Universities: Managerial Perspective, University of Twente, the performance can be mainly divided into academic and management performance. The academic performance dimension can be further divided into research and educational dimensions. Education and research are two traditional activities in most universities. The management performance dimension can be further divided into financial and human resource dimensions. Both of them are the enablers to the performance in university management.

An overall methodology is a qualitative and quantitative approach based on KPIs proposed by reviewing existing literature and the experience gained by participating in the world university rankings, domestic rankings, magazines-based rankings, faculty self appraisal, external peer review and the perspective plan under the framework of Institute of Eminence. Also attempted to fill the gap of missing KPIs to be used by institutions or universities for measuring quality performance and ensuring a transparent mechanism for the quality assurance. The outcomes of this research include a list of KPIs, a conceptual performance measurement framework, and the implementation of the framework.

According to Performance Measurement in Universities: Managerial Perspective, University of Twente', a common character from the frameworks applied in higher education is that established dimensions are translated from clear organizational goals.

The institution is often interested in ensuring that its current academic and research programs perform at the best possible level. Therefore, the institution wishes to improve its effectiveness at measuring and evaluating its academic and research programs. For a better understanding of the practices adopted, we have further surveyed some additional literatures including the knowledge previously acquired through participation in various performance evaluation tools. Finally, we proposed a robust, stable, and scalable set of KPIs.
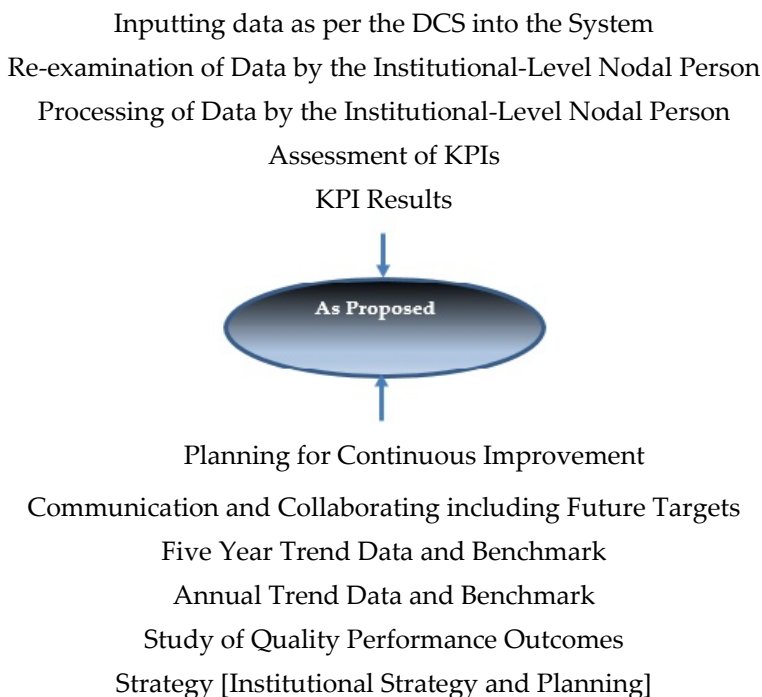
According to Management of Key Performance Indicators by Heads of Higher Education Institutions, at the heart of the methodology, based on key performance indicators, are principles that provide a set of quantifiable indicators that an institution can use to assess or compare performance in the context of achieving strategic and operational objectives. A management system based on key performance indicators provides the head of the institution with a powerful and effective tool to evaluate, adjust and motivate employees to work more intensively, thus bringing more benefits to the common cause.

B.2 Conceptual Framework

Summary Input and Outcomes Model

Data Collection	Data Validation	Benchmarks	Inputs	Process	Outputs	Outcomes

B.3 Methodology Steps including Research Design and Strategy in Details

Inputting data as per the DCS into the System

Re-examination of Data by the Institutional-Level Nodal Person

Processing of Data by the Institutional-Level Nodal Person

Assessment of KPIs

KPI Results

As Proposed

Planning for Continuous Improvement

Communication and Collaborating including Future Targets

Five Year Trend Data and Benchmark

Annual Trend Data and Benchmark

Study of Quality Performance Outcomes

Strategy [Institutional Strategy and Planning]

Normally, KPIs derive from aggregate institutional data, and other factors may also be considered to further strengthen KPIs. A set of KPIs proposed needs approval from the competent authorities after the final outcomes of the workshop.

According to Improvement of Quality of Higher Education Institutions as a Basis for Improvement of Quality of Life, it is possible to develop a system for decision support and the selection of the optimal strategy for improving the performance of study programs and higher education institutions with regard to quality .

B.4 Data Collection Methods, Processing and Analysis and, Justification

Therefore, once a set of KPIs is approved, a computer software system in three different modules needs to be designed and developed to collect the data for each academic and research department/unit, process the data

to calculate scores of each sub-indicator within the major indicator, scores of each major indicators, then calculate the overall scores of each participating academic and research department/unit, then publish the results based on percentiles and ranks obtained as institution as a whole, and finally release the ranking results. The institute will identify a nodal person for the institute and from each academic and research department/unit as well. The responsibility of the department/unit-level nodal person would be to collect the data within the department/unit, validate the data, transform the data into a data capture system (DCS), and finally input the data into the system within the timeframe in collaboration with other supporting staff. The responsibility of the institution-level nodal person would be to re-examine the data and then process the data for publishing the ranking results. During the process of re-examination of data, the nodal person may contact the concerned academic and research departments/units. As data is captured at the source and there is two-phase data examination checking, we may justify the validity of ranking results. Once an evaluation of the KPIs is finished with accuracy using the defined methods, the results need to be effectively and transparently communicated to stakeholders (department/unit's head, institutional's head, and also to faculty, alumni, students, employers, and collaborative agencies of each respective department/unit if required). Also, to do exercises for evaluating trend analysis and benchmarking annually and once every five years. We may also justify our approach as very viable and scalable.

Results

The results are based on five different stages: the first is the benchmark with the last academic year in some cases during the input of data; the second is the process and outputs; the third is ranking based on scores, percentiles and ranks obtained; the fourth is the outcomes; and finally, the fifth is the projection of the annual and five-year trend of quality performance and the assessment of quality assurance. We may also find that the process is robust, stable, and scalable.

Limitation of Study

However, the indicators that have been considered on any platform by any performance evaluation agency have often been criticized for a variety of reasons, including a weakness in providing guidance for improvement. Not considering the regional, financial, and access to the institute factors. The peer survey is not properly done by those who are properly aware of the strengths and weaknesses of the respective institution. We have proposed to take proper care of all those issues, but the final decision would be made by the respective institute for the selection of KPIs and the evaluation process. We have surveyed some of the literature mentioned above and in the reference column.

Announcement of Further Research

In the next phase, we would try to give proper weights to each major indicator and sub-indicator based on strong value statements and prioritisation and weights are to be determined in a percentage, design and develop the computer software system, input the data into the system, and then finally process and publish the results on a pilot basis. A complete manual for data definition, benchmarking, weightage priority and methodology, DCS formats, data validation mechanisms, data processing, outputs, and outcomes has also to be prepared in the near future. We would also try to prepare and write a case study.

Conclusion

The primary goal of this study and research is to examine academic leaders' and managers' perspectives on quality performance and quality assurance assessments at a large multidisciplinary higher education institute or university and to propose a set of robust, stable and scalable KPIs and the evaluation process. A set of robust, stable, and scalable KPIs is proposed based on personal experience and knowledge gained during engagements in Times Higher Education World University Rankings, THE Impaact Rankings, QS World University Rankings, ARIIA rankings, NIRF India Rankings, magazine-based domestic rankings, working for participation in a selection of the Institute of Eminence and preparing a document for an action plan to work for the next 15 years to get the institute at par with the world-class institution, Department of Higher Education External Peer Review, faculty self appraisal and other literature surveyed and reviewed. Each of the above-mentioned agencies is having their own certain areas of performance evaluation and quality assurance assessments with their own mechanism of assessments. In this paper, we have proposed a very robust KPIs, frameworks and evaluation process covering mostly academic, research, collaboration, financial, and

sustainable parameters. Reasons for selecting the robust, stable, and scalable evaluation criteria that is attempting to determine not to skip any evaluation area for the large multidisciplinary higher education institute. A consensus on objectives, proposed KPIs, and the evaluation process has to be reached after a workshop and the approval of the competent authority of the respective institute. The approach can easily be applied to any institution. Based on the acceptance level in the academic and research departments/units and the institution as a whole, efforts can be taken in the near future to develop a computer software system using the proposed KPIs, following the methodological steps stated above. By developing a system for assessing quality performance and ensuring the quality assurance through benchmarks and rankings, academic leaders and managers can monitor the growth of academics and research, and the system will also contribute to better, higherquality, more efficient, market-oriented academic and research programmes. The approach will help in careful planning, including evidence-based assessment. This approach is intended to encourage institutions to consider how to build up or improve academic and research activity at their institution. A high-power oversight committee should also be constituted at the institutional level to oversee the implementation. We also suggested each institution may choose the weights for major and sub-indicators according to their own judgement. We also suggest that each large higher education institution must have a quality assurance and enhancement cell.

Ethics Approval
The formal ethics approval needs to be granted by author.
Conflict of Interest

The author declares no conflict of interest. The approach is completely new.

Contribution Rates of Authors to the Article
Single author contributed 100% with citation of other articles published.

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