

Designing and Implementation of a Flexible Institution System According to New Standards to Ensure the Quality of Educational Process in Higher Education Institutions

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Abstract

This paper aims to benefit from advanced Information and Communication Technology (ICT) to improve teaching and learning process. This will be done through the design of a flexible system to measure the performance and quality of educational institutions according to new standards to ensure quality in the educational process, based on the components of the educational process, represented in members of the academic staff, the level of students, academic programs, university administration and buildings & utilities, in order to cope with the difficulties encountering the educational process in its current situation, which acts as an obstacle for ensuring the quality of its output.

The paper concluded (through the designed model) to provide a flexible standard that commensurate with the various educational environments, through which measurement of standard implementation range, quality standards and practices in the institution, in addition to points of weakness that necessitate improvement process to guarantee quality of its output by what achieves the entire targets of the institution.

Keywords

Higher Education, Standards, Educational System, New Institution, Education Quality.

I. Introduction

Higher education sector is witnessing great interest in most countries globally, and at all levels. Educational techniques and patterns have developed; knowledge has become a necessity of life, a basis for the advancement of contemporary societies, and is an independent economy. The development of knowledge and spending on it has become significant, and the knowledge economy a basic pivot for all scientific aspects as an available open economies, the field of knowledge a center of competition among countries, and societies that compete with each other to acquire the sources of power and cultural superiority.

Reform processes in this important sector have received special attention because of their great significance and key role in the development of the society and its advancement for the better to cope with the new needs that appear in human societies by providing them with qualified technical cadres that are qualified technically and experientially, through the preparation of leaders for the future in various aspects and fields.

In view of the rapid changes around us, higher education institutions in developing countries encounter highly serious challenges and threats that have arisen from variables that played a major role in changing the world's shape, thus creating highly developed and advanced technologies and a new world order based on science and accelerated technological development. It is based on highly distinctive technologies, which leave no room for hesitation in initiating comprehensive programs for development and modernization, that guarantees for these

institutions the ability to overcome their problems and points of weakness [1-3].

The issue of quality assurance and accreditation for higher education institutions is considered one of the important issues that have attracted and continues to attract the interest of decision makers, educational policy planners and the administrations of these institutions, especially after the quantitative spread of universities and colleges, in addition to the increase in the students' number (male and female) to which they are affiliated, beside the large diversity of education patterns and intense competition between these institutions.

Quality is one of the most important means and methods to improve the structure of the educational system with its material and human components and promote its performance, where talk about the quality of education is no longer theoretical, or an alternative that can be adopted or rejected by the institution, but has become a logical response and inescapable option and urgent necessity dedicated by the contemporary life movement to many of the unprecedented changes facing these institutions. It is therefore recognized that quality control is a prerequisite for obtaining accreditation (programmatic and institutional).

In this regard, it is possible to refer to the close relationship between quality assurance and accreditation through the definition of quality assurance as the design and implementation of policies and mechanism to ensure that the institution meets the quality requirements according to specific standards. These standards are established by accreditation bodies. The one tracing movement of higher education in countries whose universities rank high in the various international classifications, finds that these institutions pay special attention to achieve academic quality through the review of teaching methods, research activities, management systems, the environment of education and community service. These activities will be placed at the top of the priority.

Therefore, there must be a complete conviction at the senior management and academic councils of higher education institutions of the importance of quality concept, the significance of its implementation, and adoption, considering it in the forefront of its strategies, and work to disseminate its convictions to all employees, in addition to that the significance, of applying quality in education emerges through [2, 4-6]:

1. The universal of total quality management system, as one of the features of modern age.
2. Correlation of productivity quality and its continuity while improving the output of the educational process.
3. Comprehensiveness of the quality system for all fields.
4. Quality strengthening of the process of continuous improvement in higher education.
5. Working to develop administrative leaders for the future.
6. Increasing work, optimal utilization of available resources, minimizing waste and losses.
7. Conduct of further improvement and continuous development in the educational process that is based on the services

beneficiaries aspirations of these institutions.

- The correlation of quality process and comprehensive evaluation of the educational system.

II. Literature Review

The process of implementation of applying the quality of education in institutions of higher education is based mainly on a set of elements and components, through which a number of procedures with characteristics and attributes, accurately reflecting their essence and condition, are achieved, including all its dimensions: **input, process, output, and feedback.**

The researcher sees that these major and overlapping elements representing the higher education system, responsible for its achievement of are represented in the following elements: **members of the academic staff** (teaching staff and their equivalents), **students' level, academic programs** (all details of study plans, sources of knowledge "references", etc.), **university administration, and buildings & utilities.** Fig. 1 illustrates the overlap between these elements, which should be taken into account when determining the accreditation standards for universities and educational institutions. These elements have been identified as follows:

A. Members of the Academic Staff

The quality and levels of education at the university are influenced by the quality of its professors more than any of the other elements, which determine the extent of its quality. This is due to the fact that members of the academic staff are responsible for setting of curricula and determining the content of courses, teaching them, dissemination of scientific values and norms among students. The academic staff includes teaching staff and their assistants at the university, their qualifications and talents (certificate, achievements, research, inventions, and awards). What distinguishes firmly established universities in the world from good ones, ordinary or undistinguished universities is the quality of its academic staff and the size of grants assigned for scientific research obtained by professors from academic and civil institutions outside the university.

B. Levels of Students Admitted to the University

The admission requirements determine the type of students the university attracts to belong to, with the presence of many universities, attracting students with good abilities and achievement means that it succeeds in achieving higher academic quality standards. The distance between entry and graduation points is often related to student competencies and abilities when joining the university.

C. Academic Programs

The quality lies here in the diversity of the main and subsidiary specialties, the comprehensiveness and depth of the program, modernity of the content, method of programs or organization, their requirements and curricula, and the consistency between the diversity of programs and objectives with the university's policy and objectives on the other hand.

D. University Administration

It means the human element, organizational environment, systems and abilities that govern administrative work at all levels.

E. Buildings & Utilities

It includes classrooms, laboratories, libraries and service utilities

provided by the university and others.

As a result of the interaction of these elements, each university has its own environment that determines the type of experiences that students live during their years of study and what results from its growth and learning, in addition to the direct learning received by the student in the courses he studies, the university environment provides or deprives in many of learning experiences indirectly through student activities, public lectures, university publications, sports competitions and others.

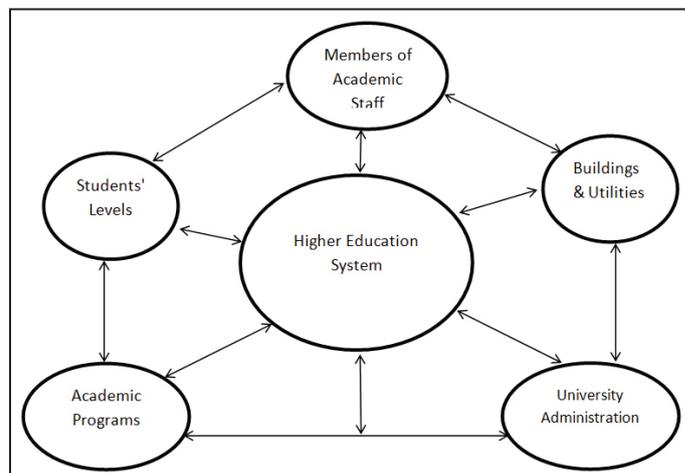


Fig. 1: Quality Components in Education Process [Source Researcher]

III. Proposed Model

The idea of designing the proposed system to ensure the quality of the educational process in university education institutions is based on the standards and elements defined by the researcher, which is composed of the higher education system, fig. 1, that will be used - or its detailed elements of them - in the process of building the main matrix, which contains elements of the field of practices divided into six fields representing the main matrix and are described as follows:

$$M = \begin{bmatrix} x \\ y \\ z \\ q \\ v \\ s \end{bmatrix}$$

The value of any of the areas described in the matrix above, if not applicable, all standard values are equal to (N/A), and if the field value applies (1), then the standard values take one of two values, either applicable and existing (1) or applicable but not existing (0), and the total matrix output is equal to 1 [100%]. Accordingly, the elements of the main matrix [M] will be separated, and each field will be dealt with separately, and build its own matrix, which consists of elements representing rows, and the performance indicators representing the columns of the matrix as follows:

A. Member of teaching staff [x_{ij}]

This field contains five standards representing the rows in the construction of matrix standards [i] they are (the scientific level and the cognitive background, the adherence to the scientific approach, understanding students' needs and working on the development of competitive intellectual skills, the use of modern tools, and techniques and accepting feedback). Each standard has performance indicators to measure, and represents the columns

- **Standard availability of scientific reference** [i₂]: Measured by: department letters related to the references and their updating [j₂], opinions of academic experts [j₃], list of books and references [j₄], and the ratio of books and references to students [j₅].
- **Standard of authenticity of the scientific subject** [i₃]: measured by: external examiners' evaluation of the quality of textbooks in terms of authenticity, the extent of its coverage of the researches, modern theories [j₁], and opinions of academic experts [j₃].
- **Standard type directions which are developed by the scientific reference** [i₄]: measured by: opinion of academic experts [i₃], students evaluations of the textbooks in terms of their comprehension, and their usefulness in understanding the syllabuses courses [j₆].
- **Standard of the format and method of scientific reference production** [i₅]: measured by: opinions of academic experts [i₃], and the opinions of students and teaching staff members [j₇].

Accordingly, the matrix is as follows:

$$z_{ij} = \begin{bmatrix} 1 & 1 & 1 & N/A & N/A & N/A & N/A \\ N/A & 1 & 1 & 1 & 1 & N/A & N/A \\ 1 & N/A & 1 & N/A & N/A & N/A & N/A \\ N/A & N/A & 1 & N/A & N/A & 1 & N/A \\ N/A & N/A & 1 & N/A & N/A & N/A & 1 \end{bmatrix}$$

D. Scientific Content (Curriculum) [q_{ij}]

This field contains five standards representing the rows in the matrix structure of the standard [i]: which are: degree coverage of basic subjects. suitability in the ability of the student comprehension at this stage, correlation with the practical reality, continuing development of plans and programs to ensure its continuity of consistency, quality and preparation of the students through learning a foreign language. Each standard has performance indicators measured by it, representing columns for the matrix[j], as follows:

- **Standard of coverage basic topics** [i₁]: measured by: course report [j₁], and test matrix [j₂].
- **Standard of proportionality in the ability of the student comprehension at this stage** [i₂]: measured by: the opinion of external examiner [j₃], evaluation of students' views [j₄], and benchmarking comparison [j₅].
- **Standard of correlation with practical reality** [i₃]: measured by: the opinion of the external examiner [j₃], employers' level of satisfaction with graduates and their skills [j₆], and the ratio of graduates with bachelor's programs, who are employed in post-graduate programs within six months of graduation [j₇].
- **Standard of continuous development in plans and programs** [i₄]: measured by: the recommendations of the boards of departments related to plans [j₈], rate of assistance programs internally and externally [j₉], extent of the use of experienced teaching staff members from other educational institutions in the program review process [j₁₀], ratio of programs whose quality indicators were compared with external, national, and global standards [j₁₁], and the ratio of educational institution getting assistance from consultancy teams in professional programs [j₁₃].

- **Standard of student preparation through learning a foreign language** [i₅]: measured by: ratio of students who are speaking more than one language to the total number of students [j₁₄].

Accordingly, the matrix is as follows:

$$q_i = \begin{bmatrix} 1 & 1 & N/A \\ N/A & N/A & 1 & 1 & 1 & N/A \\ N/A & N/A & 1 & N/A & N/A & 1 & 1 & N/A \\ N/A & 1 & 1 & 1 & 1 & 1 & 1 & N/A \\ N/A & 1 \end{bmatrix}$$

E. University environment [v_{ij}]:

This field contains five standards representing the rows in the matrix structure of the standard [i]: which suit the nature of the educational process, high technology, development and satisfaction of aesthetics. Security, safety, attraction and motivating. Each standard has performance indicators measured by it, representing columns for the matrix[j], as follows:

- **Standard of proportion with the nature of the educational process** [i₁]: measured by: ratio of available computer devices to total students [j₁], user satisfaction surveys of institution utilities and equipment [j₂], mechanisms and procedures for regulating the joint use of the institution's resources and utilities [j₃], rates of use of allocated teaching spaces [j₄], total operating expenses per student (excluding student and housing allowance amounts) [j₅], the area of land built for the number of students in full time, and the proportions of the use of this area for special purposes, such as teaching spaces and, laboratory spaces, green spaces, ... etc. [j₆], rate of quality and efficiency of companies performance contracting with educational institutions for cleaning, waste disposal and maintenance [j₇], ratio of hours in which different teaching utilities were booked compared to the number of hours in which they were actually used [j₈], reports on the results of the evaluation of the condition of the equipment and utilities [j₉], schedule of works showing the number of maintenance work that have not yet been achieved [j₁₀], and the rate of replacement of information devices [j₁₁].
- **Standard of advanced technology** [i₂]: measured by: ratio of available computer devices to total students [j₁], user satisfaction surveys of institution utilities and equipment [j₂], the area of land built for the number of students in full time, and the proportions of the use of this area for special purposes, such as teaching spaces, laboratory spaces, green spaces, ... etc. [j₆], reports on the results of the evaluation of the condition of the equipment and utilities [j₉], schedule of works showing the number of maintenance work that have not yet been achieved [j₁₀], annual spending on information technology to the number of students [j₁₂], bandwidth per Internet user [j₁₃], and having good plans to get important devices [j₁₄].
- **Standard of development and aesthetic satisfaction** [i₃]: measured by: user satisfaction surveys of institution utilities and equipment [j₂], the area of land built for the number of students in full time, and the proportions of the use of this area for special purposes, such as teaching spaces and laboratory spaces, green spaces, ... etc. [j₆], rate of quality and efficiency of companies performance contracting with educational institutions for cleaning work, waste disposal and maintenance [j₇], schedule of works showing the number of maintenance work that have not yet been achieved [j₁₀], and

- replacement rate of information devices [j₁₁].
- **Standard of Security and safety** [i₄]: measured by user satisfaction surveys of institution utilities and equipment [j₂], the area of land built for the number of students in full time, and the proportions of the use of this area for special purposes, such as teaching spaces and laboratory spaces, green spaces, ... etc. [j₆], rate of quality and efficiency of companies performance contracting with educational institutions for cleaning work, waste disposal and maintenance [j₇], reports on the results of the evaluation status of devices and utilities [j₉], schedule of works showing the number of maintenance work that have not yet been achieved [j₁₀], the ratio of replacement of information devices [j₁₁], and the ratio of achieving the security and safety requirements of the institution according to international standards [j₁₅].
- **Standard of attraction and motivating** [i₅]: measured by: user satisfaction surveys of institution utilities and equipment's [j₂], total operating expenses per student (excluding student and housing allowance amounts) [j₅], the area of land built for the number of students in full time, and the proportions of the use of this area for special purposes, such as teaching spaces and, laboratory spaces, green spaces, ... etc. [j₆], rate of quality and efficiency of companies performance contracting with educational institutions for cleaning, waste disposal and maintenance [j₇], reports on the results of the evaluation status of computer devices and utilities [j₉], schedule of works showing the number of maintenance works that have not yet been achieved [j₁₀], and replacement rate of information devices [j₁₁].

Accordingly, the matrix is as follows:

$$v_i = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & N/A & N/A & N/A & N/A \\ 1 & 1 & N/A & N/A & N/A & 1 & N/A & N/A & 1 & 1 & N/A & 1 & 1 & 1 & N/A \\ N/A & 1 & N/A & N/A & N/A & 1 & 1 & N/A & N/A & 1 & 1 & N/A & N/A & N/A & N/A \\ N/A & 1 & N/A & N/A & N/A & 1 & 1 & N/A & 1 & 1 & 1 & N/A & N/A & N/A & 1 \\ N/A & 1 & N/A & N/A & 1 & 1 & 1 & N/A & 1 & 1 & 1 & N/A & N/A & N/A & N/A \end{bmatrix}$$

F. Administrative System [s_{ij}]

This field contains five standards representing the rows in the matrix construction of the standard [i].they are: (Availability of information required to operate and manage the system, heading towards the labor market, good climate for non-classroom activities, efficiency and effectiveness of the administrative system, the extent of clarity and efficiency of mechanism to receive complaints, and their response). Each standard has performance indicators measured by them and they represent columns for the matrix [j] as follows:

- **Standard of availability of information required to operate and manage the system** [i₁]: Measured by: monthly number of visitors to the knowledge content of the university site (ratio of local and global visits) [j₁], opinions of professional experts and academics [j₂], and ratio of programs whose quality indicators were compared with local and global standards [j₃].
- **Standard of heading towards labor market** [i₂]: Measured by: ratio of opinions of professional experts and academics [j₂], ratio of programs whose quality indicators were compared with local and global standards [j₃], The level of annual performance of the implementation of the strategic objectives of the university [j₄], the ratio of educational institution getting

assistance from consultancy teams in professional programs [j₅], and adequacy of infrastructure [j₆].

- **Standard of good environment for non-classroom activities** [i₃]: Measured by: opinions of professional experts and academics [j₂], adequacy of infrastructure [j₆], ratio of land area for full-time students, built for special purposes, such as the fields of squares, halls, green spaces ... etc., [j₇], and the level of satisfaction of teaching staff members, employees and students on the operational efficiency of utilities and services [j₈].
- **Standard of efficiency and effectiveness of the administrative system** [i₄]: Measured by: opinions of professional experts and academics [j₂], ratio of programs whose quality indicators were compared with local and global standards [j₃], level of annual performance of the implementation of the strategic objectives of the university [j₄], ratio of the institutions use of advisory teams in professional programs [j₅], evaluation of administrators and faculty members of the policy guide, organizational structure and job descriptions at the university [j₉], and ratio of complaints filed against the violation of instructions to the total grievances in the institution [j₁₀].
- **Standard of clarity extent and mechanism efficiency to receive complaints, and their response** [i₅]: measured by: opinions of professional experts and academics [j₂], evaluation of administrators and faculty members of the policy guide, organizational structure and job descriptions at the university [j₉], ratio of complaints filed against the violation of instructions to the total grievances in the institution [j₁₀], and beneficiaries' views on the efficiency of the supportive administrative system [j₁₁].

And accordingly, the matrix is as follows:

$$s_{ij} = \begin{bmatrix} 1 & 1 & 1 & N/A \\ N/A & 1 & 1 & 1 & 1 & 1 & N/A \\ N/A & 1 & N/A & N/A & N/A & 1 & 1 & 1 & N/A \\ N/A & 1 & 1 & 1 & 1 & N/A & N/A & N/A & 1 & 1 & 1 & N/A & N/A & N/A & N/A \\ N/A & 1 & N/A & 1 & 1 & 1 & N/A & N/A & N/A \end{bmatrix}$$

IV. The Algorithm

After the matrices are constructed, the process of measuring the quality of the educational process is carried out in the institution through the following steps:

1. Calculation of the weight of each element in the matrix by the equation:

$$wR_i = c / \sum \text{count} R_i$$

Where: c = 0 ... 100, count R_i = (0,1)

2. Calculation of the weight of all the rows in the matrix by the equation:

$$R_i = wR_i * \text{count} R_i$$

Where: count R_i =1

3. Finding the total values of the model's matrices through the equation:

$$a = \sum R_i, i= 0 \dots \text{mat. count}$$

4. Calculation of the total weight for the educational institution through the equation:

$$p = \sum a / n$$

5. Dropping the organization's weight on the scale.



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