Chapter-III

Role of expert system in Higher Education and Quality Assessment Measures

This chapter covers Introduction, Concept, Characteristics and Applications of Expert System. The information about status of higher education is presented with the use of tables and charts. Various regulating bodies and their role is given with their process of accreditation. The role of expert system with respect to higher education is found out by highlighting on expert system applications in higher education sector. Quality related terminology, Global accreditation scenario and regulatory framework is given in brief.

3.0 Expert System Concept

Expert system is a computer programme that can reproduce the behaviour of human experts in specific problem domains. Expert systems represent an opportunity to assist users lacking expertise in a specific area to carry out complex tasks, promote efficient governance and enable sustainable decision making in developing regions.

Research into mechanisms for reasoning in particular fields made considerable progress in, for example, medical diagnosis with Mycin (Shortliffe, 1976) and interpretation of geological data with Prospector (Duda et al., 1979). New enthusiasm grew for developing general tools for representing knowledge, which would apply equally in all fields, expert system research could then be considered as truly forming a part of AI. Meanwhile great progress had been made in automatic proof of theorems and solution of general problems, laying the theoretical foundations for the methodology of knowledge-based systems.
The first lesson drawn from the development of programs such as Dendral – which contained a huge amount of specialized chemical knowledge – was that the cost of making even the smallest change was prohibitive, because the special knowledge was closely integrated into the reasoning mechanism. A fundamentally important idea gradually emerged that the mass of knowledge and the reasoning mechanisms should be kept completely separate; another way of saying that there should be ‘universal’ reasoning mechanism that could be applied in any field. Thus there developed the concept of the ‘inference engine’, a sort of empty shell that could be filled with the special knowledge relating to any particular field.

**Fig. 3.1 Figure Showing Areas of Artificial Intelligence**

![Diagram showing areas of AI](image)

**Source:** - “Artificial Intelligence” – A modern Approach [6]


As **Figure 3.1** shows, AI has many areas of interest. The area of Expert System is a very successful approximate solution to the classic AI problem...
of programming intelligence. That is an expert system is a computer system that emulates the decision-making ability of a human expert. The term emulates means that the expert system is intended to act in all respects like a human expert. Emulation is much stronger than a simulation, which is only required to act like the real thing in some respects.

Expert systems is a branch of AI that makes extensive use of specialized knowledge to solve problems at the level of a human expert. An expert is a person who has expertise in a certain area. That is, the expert has knowledge or special skills that are not known or available to most people. An expert can solve problems that most people cannot solve or can solve them much more efficiently. (but not as cheaply). When expert systems were first developed in the 1970s, they contained expert knowledge exclusively.

**Figure 3.2 Basic outline of Expert System**

![Diagram of Expert System]

**Source:** - “Artificial Intelligence” – A modern Approach [6]


**Figure 3.2**, illustrates the basic concept of a knowledge-based expert system. The user supplies facts of other information to the expert system and receives expert advice or expertise in response. Internally, the expert system
consists of two main components. The knowledge base contains the knowledge with which the inference engine draws conclusions. These conclusions are the expert system’s responses to the user’s queries for expertise.

3.1 ADVANTAGES AND FEATURES OF EXPERT SYSTEMS:

**Expert systems have a number of attractive features:**

- Increased availability: Expertise is available on any suitable computer hardware. In a very real sense, an expert system is the mass production of expertise.
- Reduced cost: The cost of providing expertise per user is greatly lowered.’
- Reduced danger: Expert systems can be used in environments that might be hazardous for a human.
- Permanence: The expertise is permanent. Unlike human experts, who may retire, quit, or die, the expert system’s knowledge will last indefinitely.
- Multiple expertise: The knowledge of multiple experts can be made available to work simultaneously and continuously on a problem at any time of day or night. The level of expertise combined from several experts may exceed that of a single human expert.
- Increased reliability: Expert systems increase confidence that the correct decision was made by providing a second opinion to a human expert. The expert system should always agree with the expert, unless a mistake was made by the expert. However, this may happen if the human expert was tired or under stress.
- Explanation: The expert system can explicitly explain in detail the reasoning that led to a conclusion. A human may be too tired,
unwilling, or unable to do this all the time. This increases the confidence that the correct decision is made.

- Fast response: Fast or real-time response may be necessary for some applications. Depending on the software and hardware used, an expert system may respond faster and be more available than a human expert. Some emergency situations may require responses faster than a human and so a real-time expert system is a good choice.

- Steady, unemotional and complete response at all times: This may be very important in real-time and emergency situations, when a human expert may not operate at peak efficiency because of stress or fatigue.

- Intelligent tutor: The expert system may act as an intelligent tutor by letting the student run sample programs and by explaining the system’s reasoning.

- Intelligent database: Expert systems can be used to access a database in an intelligent manner.

   The process of developing an expert system has an indirect benefit also since the knowledge of human experts must be put into an explicit form for entering into the computer. Because the knowledge is then explicitly known instead of being implicit in the expert’s mind, it can be examined for correctness, consistency, and completeness. The knowledge may then have to be adjusted or re-examined, which improves the quality of the knowledge.

**3.2 CHARACTERISTICS OF AN EXPERT SYSTEM:**

An expert system usually designed to have the following general characteristics:

- High performance: The system must be capable of responding at a level of competency equal to or better than that of an expert in the field. That is, the quality of the advice given by the system must be very high.
- Adequate response time: The system must perform in a reasonable amount of time, comparable to or better than the time required by an expert to reach a decision. An expert system that takes a year to reach a decision compared to an expert’s time of one hour would not be too useful. The time constraints placed on the performance of an expert system may be especially severe in the case of real-time systems, when a response must be made within a certain time interval.

- Good reliability: The expert system must be able to explain the steps of its reasoning while executing so that it is understandable. Rather than being just a “black box” that produces a miraculous answer, the system should have an explanation capability in the same way that human experts can explain their reasoning. This feature is very important for several reasons.

- Flexibility: Because of the large amount of knowledge that an expert system may have, it is important to have an efficient mechanism for adding, changing, and deleting knowledge. One reasons for the popularity of rule-based systems is the efficient and modular storage capability of rules.

- Justify the knowledge of the program: The expert system should be in position to explain its own capacity in terms of knowledge. Also knowledge about knowledge (meta knowledge)

3.3 APPLICATIONS OF EXPERT SYSTEM IN HEI –

The expert system has been successful in medicine, engineering, analysis for business. The expert systems have also been used in higher education field for following process

1) Teaching Learning process and help through advanced intelligent programs.

2) Online learning and Online search engines on Internet
3) Design and development of innovative concepts theories in engineering.

4) Decision making and planning the educational activities.

5) Quality control and Evaluation

6) Examination and other educational activities.

7) Selection Process of Teachers

8) Research Area

The post graduate and technical courses are listed in the UGC recognized courses list and All India Council for Technical Education (AICTE) gives approval to various technical courses in India. The Government of India and University Grants Commission is responsible for maintaining the activities of the Higher Education.

3.4 LIMITATIONS OF EXPERT SYSTEMS:

Present-day expert systems are still very rudimentary, even though they often given spectacular results. The limitations are the following:

1) The over-importance of one individual expert in establishing the knowledge base, giving too strong a personal stamp. This will be reduced by the appeal to other experts for evaluation and criticism of the prototype, but the basic knowledge remains that of the leading expert.

2) The restricted coverage of the field being studied, and the fallibility of the system at the boundaries.

3) The limitations imposed by the methods for knowledge representation now available, despite recent improvements, especially for multi-model representations.
3.5 Quality and Accrediting Bodies in HEI

3.5.1 Quality: The Introduction and Concept

“Quality in higher education is nebulous notion. Its attributes are complex and intangible. It remains highly resistant to assessment by means other than judgments that represent personal values as much as professional standards”

- Lindsay (1994).

“Quality in the context of higher education can be defined as judgment about the level of goal achievement, and the value and worth of that achievement”.


“We have defined quality as the degree of excellence of the entire educational experience”.

-D. Doherty-Delmore and E. Shaker (2002)

“A key measure of quality is the satisfaction of customers”.

-Universities, UK (2000)

Introduction to quality

It is common to ask for quality in almost every sphere of human activity. However, quality is an elusive attribute, an attribute of values, which cannot always be measured and quantified. The Webstar’s Dictionary describes it, amongst other things, as a ‘degree of excellence’ and ‘superiority in kind’. The meaning assigned to quality differs with context. Quality of life, for example, has a somewhat abstract connotation covering varied aspects like health, education, living conditions, the physical environment and the mental state. The quality of a product, on the other hand, can be described in terms of prescribed standards that are easily measurable. And in the case of the atmospheric environments it is determined in terms of numbers expressed in parts per million (ppm). Thus, quality as expressed by Rona – Tas (2001) has
philosophical and pragmatic aspects. While discussing quality in higher education it may be necessary to consider both these aspects.

3.5.2 Quality in Higher Education:-

Quality in higher education is the proper appreciation of the term ‘quality’. It has to be recognized that quality means different to different people (Sallis, 1993 ; Green and Harvey 1993 ; Green 1994) And with the number of stakeholders in higher education being varied – students, parents, teachers, educrats, bureaucrats, prospective employers, economic research group, research and development institutions and the community- the matter may become both complex and confusing. The focus of students may be on the facilities provide, of teachers on the teaching – learning process, of parents on the overall ethos and the grades or scores achieved, of educrats and bureaucrats on the efficiency of the education system, of future employers on employability of the graduates and of society at large on the prospect of the students ending up as responsible citizens.

Green and Harvey (1993) have identified the following five different approaches to quality:

-in terms of the exceptional (highest standards)
-in terms of consistency (without defects and getting it right the first time).
-as fitness for purpose.
-as value for money.
-as a transformative (transformation of the participants).

Of these five approaches the two that appeal the most are ‘fitness for purpose’ and ‘value for money’. Industry, business, research institutions and even governments would probably classify as ‘good’ those Universities and colleges that provide graduates who fit into their activities with the minimum amount of training/orientation. However, in the present knowledge era,
when higher education is fast becoming a business, most students and their parents would most likely identify quality with ‘value for money’ with public funds becoming scarce and fees spiralling for these stakeholders. Quality education is one that ensures employment, a quick return on money invested and continued income thereafter.

The modern society focuses on creating, sustaining and improving the quality of life. Therefore, good higher education is that which optimally contributes to the betterment of the quality of life. Good quality education should produce individuals who:

- Are able to work with maximum effectiveness and thereby contribute to the economy.
- Make effective use of and also generate knowledge for the ‘knowledge society’.
- Develop individuals having the capacity to enhance social and cultural values.

The real indicator of quality is however the value added to the product, in this case the graduating students.

In higher education the concept of quality has been drawn from industry. Not very long ago education and industry functioned independent of each other and displayed very contrasting ethos and values. This is no longer true as in recent years the two have moved towards each other, borrowing ideas and practices. Educational Institutes are adopting the corporate cultural of business organizations including strategic planning, delineation of responsibility and accountability. The British Standards BS 5700, its international equivalent ISO 9000 and Indian equivalent IS 14000 have attracted the attention of academics. Indian Institutions in professional discipline have started flaunting their ISO 9000 certification. The definition of quality as used in these and related standards is therefore important. They define Quality as “the totality of features and characteristics of a product or
service that bear on its ability to satisfy stated or implied needs” (Bureau of Indian Standards, 1988). In the present social and economics milieu this definition of quality will appeal too many in the field of education, and especially to those students who join universities only to acquire professional skills and training that will establish them in the employment market. It may however be argued that in education the assessment of quality cannot be only student oriented for it is mainly society that largely pays for operation of the education system. The other approach of quality is ‘fitness for purpose’-the ability to meet the stated purpose of education. As corollary one can add that unless the objectives of education or more specifically of an educational institution are clearly defined.

3.5.3 Quality related Terminology
Along with the concept of quality, higher education has adopted from industry a variety of terms like Quality control, quality assessment, quality audit, quality assurance and quality management. It has added accreditation to the list. These are often used with overlapping connotations, sometimes with markedly different meanings. It is therefore desirable to review the usage of these terms.

3.5.4 Assessment of Quality
It is accepted that for implementing programmers of quality assurance it is necessary to first assess the functioning, performance and current standards of an institution and that this assessment has to be made against the institution’s mission, goals and objectives. However, there is a debate perhaps non ending on the manner in which the assessment is to be conducted-through internal mechanisms [self-assessment] or by external review [external audit].
Quality assessment through external review is now a standard practice in practically all developed, and many developing countries. It provides the outsiders’ perception, validating the conclusions of self-assessment and offering suggestions for improvement. However, what is really important is not the evaluation or suggestions but what is done with these. Post-accreditation actions are what really lead to improvement. They should include activities that are innovative and aimed at continuous improvement.

3.5.5 The Global Accreditation Scenario and Regulatory Frameworks

Introduction- Global Scenario:-

The global accreditation scenario is not encouraging since many countries still have their higher education sector available to only few students due to cost of education and dropout at school level.

Globalisation of trade and economy has considerable increased opportunities of employment beyond national borders and this, in turn, has focused attention to the need to ensure that the quality in higher education. Keeping in tune with worldwide requirement the leading universities and academic institution in developing countries are taking steps to ensure that the quality of education imparted by them meets international standards and quality demands.

The Role of Quality Assurance Agencies

The scenario of international higher education is continuously changing, making it difficult to monitor the quality aspects. New initiatives are being taken to facilities in what could be GATS–controlled regime. Privatization of higher education is taking place on an increase scale in practically all countries as education
**United Kingdom**: in the United Kingdom, there are no accreditation agencies per se educational evaluation is however, done by the advisory board of research council, the council of national academic awards and the committee of Vice Chancellor and Principal a higher education quality council (HEQC) was set up in 1992 and it functions as it functions as the quality audit unit for UK higher educations.

**United States**: in the United States of America, quality assurance is the responsibility of the accrediting agencies whose activities are coordinated by the council for higher education accreditation (CHEA), a private US organization of degree-granting colleges, universities and accrediting agencies. Out of the 100 voluntary organization that call themselves accrediting agencies, 78 accreditors (national regional and specialsed) are recognized by the CHEA and the US department of education

**Australia and New Zealand**: in Australia the reasonability of ensuring the quality of ensuring the quality of education has traditionally been that of the universities themselves. They have been fulfilling this through their executive councils and committees. The universities develop quality assurance and development plans. Academic standards panels have been constituted in some disciplines to oversee undergraduate programmes.

**Europe**: the bologna declaration, signed in 1999, calls for the creation of an European Higher education area- by 2010 , and points at the necessity of European cooperation in quality assurance. This in implies that an international agreement will have to reached on levels and standards can be assessed (de has and Frederick’s; 2001)

**Russia and east Europe**: the Russian federation adopted, in 1992, a law on education that laid down procedures for licensing, attestation and accreditation, for licensing, attestation and accreditation, for the control of
evolution of educational institutions. It provides for accreditation to be undertaken by various Russian and international non-governmental accreditation agencies established by them (Prokopchuck, 1993)

**Japan and China:** After World War II Japan accepted, in principal, that all institution must use a process of evaluation in the creation of all new programmes and is working on process of internal institutional evaluation. In the 1980 a decision was taken by the universities councils by which the universities were required to undertaken the process of internal institutional evaluation.

**South America** In Argentina the Commission National de Evaluation y Accreditación University (CONEAU) is the agency responsible for evaluation and accreditation. This is done on the basis of self study reports and peer visits. The evaluation involves comparison by peers of each programme with theoretical model over 125 such standards have been approved by the Ministry of Education with agreement of the Council of Universities.

**Regulatory Frameworks**

Globally efforts are being made to evolve an international code of practice for trans national higher education and also develop regulatory frameworks that world be acceptable to quality assurance agencies all over the world. At a meeting of the UNESCO Global Forum on Quality Assurance, Accreditation and the Recognitions of qualification in higher education, held in Paris in October 2002, the issue of developing a framework, structure or mechanism for quality of higher education at the global level discussed it emerged that there could be

- A single set of international quality standards for institutions, programmes or quality assurance agencies.
• Quality standards on regional basis covering countries that are geographically contiguous and share a common history and culture.
• Nation based quality standards that take into consideration national models for higher education and quality assurance.

Organizations like the International Association of University Presidents (IAUP) and International Network of quality Assurance Agencies in Higher Education (INQUAAHE) that are central to quality review are needed for quality in higher education.

3.5.6 The Indian Approach to Quality Enhancement

Since India attained independence in 1947, concerted efforts are being made in the country for the improvement of quality of higher education. Various measures have been outlined in policy documents of the government including, for example, the report of the education commission (1964-66), the national policy on education, 1986 and the programme of action, 1992(Government of India, 1966,1986,1992).the responsibility of assuring quality is basically that of the university grants commission (UGC) and the different statutory bodies dealing with professional education. The university grants commission act, 1956, empowers the UGC to take “all such step as it may think fit for promotion and coordination of university education and for determination and maintenance of standards in teaching, examination and research in the universities” (University grants commission, 1994).In keeping with this objective the UGC has formulated and issued, from time to time, guidelines and regulations related to:

• Minimum infrastructure facilities to be fulfilled before a university is declared fit for central assistance.
• Minimum infrastructure facilities to be fulfilled before the grant of affiliation to a college by a university.
• Essential qualifications for the appointment of lecturers, readers, and professors.
• Workload of teachers, duration of courses, and minimum number of teaching days for first degree programmes.
• Schedule of academic events.
• Evaluation and assessment of performance of teachers.

3.6 Accrediting Bodies and Status of Accreditation

3.6.1 Accreditation Concept and Meaning:

Accreditation is a process in which certification of competency, authority, or credibility is presented to the applicant organization. Recognition or accreditation of courses of study is under the authority of a set of professional councils established by statute and other autonomous coordinative or regulatory bodies established or recognized by the University Grants Commission.

• All India Council for Technical Education (AICTE) to be superseded by the National Board of Accreditation (NBA) for technical and management colleges
• Quality Council of India (QCI)
• Distance Education Council (DEC)
• National Council for Teacher Education (NCTE)
• Indian Council of Agricultural Research (ICAR)
• Bar Council of India (BCI)
• Scientific Institute and Research Organizations (SIROs)
• National Council for Teacher Education (NCTE)
• Rehabilitation Council of India (RCI)
• Medical Council of India (MCI)
• Pharmacy Council Of India (PCI)
• Indian Nursing Council (INC)
• National Council for Indian Education (NCIE)
• Dental Council of India (DCI)
• Central Council of Homoeopathy (CCH)
• Central Council of Indian Medicine (CCIM)
• National Assessment and Accreditation Council (NAAC)
• Ministry of Human Resource Development (MHRD)
• Association of Indian Universities (AIU)

3.6.2 Why accreditation is necessary?
• Accreditation helps and Encourages quality improvement in Higher Educational Institutions.
• It Helps the Institution in securing necessary funds from govt. bodies.
• It Enhances employability of graduates
• It facilitates transnational recognition of degrees and mobility of graduates and professionals.
• Accreditation Motivates faculty to participate actively in academic and related Institutional or departmental activities

3.6.3 Introduction to Accrediting Bodies under study:

The Main trace is given to following accrediting agencies by the researcher in order to study the quality parameters for evaluation of the higher educational Institutes

Expert System has been developed giving emphasis on following accrediting agencies.

1) National Board of Accreditation (NBA)
2) National Assessment and Accreditation Council (NAAC)
3.6.4 NBA an Overview

The National Board of Accreditation (NBA), India was established by AICTE (All India Council of Technical Education) as an autonomous body under section 10(u) of AICTE act, 1987 for periodic evaluations of technical institutions & programmes basis according to specified norms and standards as recommended by AICTE council. It has the full authority to recognize or derecognize institutions.
NBA Process of Accreditation:-

Fig – 3.3 Shows the Steps in Accreditation Process of NBA

![Accreditation Process and Decision Making Diagram]

**Source :-** NBA Publication-2013.

The above chart shows process of NBA accreditation and decision making process, the Institutes opting to get accreditation has to follow above procedure.
3.6.5 NAAC - An Overview

The **NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC)** is an autonomous body established by the University Grants Commission (UGC) of India to assess and accredit institutions of higher education in the country. It is an outcome of the recommendations of the National Policy in Education (1986) which laid special emphasis on upholding the quality of higher education in India. To address the issues of quality, the National Policy on Education (1986) and the Plan of Action (POA-1992) advocated the establishment of an independent national accreditation body. Consequently, the NAAC was established in 1994 with its headquarters at Bangalore.

3.6.6 ISO – An overview (Certification for educational Institutes)

**What is ISO?**

ISO (International Organization for Standardization) is the world’s largest developer of voluntary International Standards. International Standards give state of the art specifications for products, services and good practice, helping to make industry more efficient and effective. Developed through global consensus, they help to break down barriers to international trade.

**What ISO Does?**

ISO develops International Standards. Which was founded in 1947, and since then have published more than 19,500 International Standards covering almost all aspects of technology and business. It also gives quality certification to educational Institutes. It has identified various parameters of quality.
The existing system used for quality assessment and enhancement in Higher Education is through accreditation by NAAC, NBA, ISO and the grade accorded by these accrediting bodies. Following tables shows the status and quality related assessment data for the higher educational Institutes.

3.7 Status of Higher Education in India Sample Data Presentation

Higher Education Growth In India Since-1950-51.

Table No.-3.1

Growth of Universities and Colleges

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Year</th>
<th>Universities</th>
<th>Colleges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1950-51</td>
<td>25</td>
<td>700</td>
</tr>
<tr>
<td>2</td>
<td>2013-14</td>
<td>614</td>
<td>33,023</td>
</tr>
</tbody>
</table>

Source :- NAAC Publications 2013.

Chart No.-3.1 Growth of Universities and Colleges in India

Source :- Table No-3.1
Interpretation

There is considerable growth in higher educational Institutes from the year 1950. The growth in the number higher education Institutes has been increased to a large extent. The Universities in India were only 25 in 1950 where as now there are more than 614 Universities providing higher educational facilities to the students community. The Colleges number has increased from 700 to 33023 in the country which shows the interest shown by students in higher education learning.

Table No. -3.2 Growth in Number of Teachers in HIE

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Year</th>
<th>Number of Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1950-51</td>
<td>15000</td>
</tr>
<tr>
<td>2</td>
<td>2012-13</td>
<td>817000</td>
</tr>
</tbody>
</table>

Source :- NAAC Publications 2013.

Chart No. -3.2 Increase in Number of Teachers in Higher educational Institute

Source :- Table No-3.2
Interpretation

From the above table it is interpreted that the number of teachers in 1950-51 were only 15000 and in 2013 it has increased to 8.17 lack.

Table No. -3.3 Increase in of Number of Students in HIE

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Year</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1950-51</td>
<td>100000</td>
</tr>
<tr>
<td>2</td>
<td>2012-13</td>
<td>16975000</td>
</tr>
</tbody>
</table>

Source : - UGC Publication 2013.

Chart-3.3 Chart Showing Increase in Number of Students

Source : - Table No-3.3.

Interpretation

From the above table it is observed that student’s strength has increased from 1 lack to 169.75 lacks at higher educational Institutes which are showing the growth in the higher education.
Table No. -3.4

Status of accreditation of Indian Universities by NAAC

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A- Grade</td>
<td>67</td>
</tr>
<tr>
<td>B-Grade</td>
<td>99</td>
</tr>
<tr>
<td>C-Grade</td>
<td>6</td>
</tr>
<tr>
<td>Not Accredited</td>
<td>442</td>
</tr>
<tr>
<td>Total</td>
<td>614</td>
</tr>
</tbody>
</table>

Source: NAAC Publications- 2013

Chart No. -3.4

Chart Showing status of accreditation of Indian Universities by NAAC

Source :- Table No.-3.4

Interpretation

From the above table and chart it is observed that 67 Universities are in ‘A’ grade. 99 are in ‘B’ grade, 6 are in c grade and 442 Universities are yet to be accredited.
Table No. 3.5:-

Sample Universities with Highest Scores and ‘A’ Grade accredited by NAAC

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of the University</th>
<th>Grade</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jawaharlal Nehru University, New Delhi (Central University)</td>
<td>A</td>
<td>3.91</td>
</tr>
<tr>
<td>2</td>
<td>University of Hyderabad, Hyderabad-500 046. (Central University)</td>
<td>A</td>
<td>3.89</td>
</tr>
<tr>
<td>3</td>
<td>Andhra University, Visakhapatnam-530003. (State University)</td>
<td>A</td>
<td>3.65</td>
</tr>
<tr>
<td>4</td>
<td>Indira Gandhi Institute of Development Research Mumbai (Deemed University)</td>
<td>A</td>
<td>3.64</td>
</tr>
<tr>
<td>5</td>
<td>Guru Nanak Dev University, Amritsar-143 005 (State University)</td>
<td>A</td>
<td>3.50</td>
</tr>
</tbody>
</table>

Data Extracted from NAAC Publication - 2013
Chart No. -3.5

Chart Showing Scores of the Sample Universities by NAAC

Source :- Table No-3.5

Interpratation

From the above table and chart it seen that Jawaharlal Nehru University, New Delhi is on first position with NAAC Score of 3.91 out of 4.00 which is model university as far as quality is considered. University of Hyderabad has scored of 3.89 is on second position. Andhra University has 3.65 NAAC Score. Other two Universities have 3.64 and 3.5 score.
Table No.-3.6

Status of accreditation of Indian Colleges by NAAC

<table>
<thead>
<tr>
<th>Grade</th>
<th>A Grade</th>
<th>B-or C Grade</th>
<th>Not Accredited</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>515</td>
<td>4641</td>
<td>27867</td>
<td></td>
<td>33023</td>
</tr>
</tbody>
</table>

Source: NAAC Publications 2013

Chart No. -3.6

Chart showing the status of accreditation of Colleges

Source: Table No.-3.6

Interpretation

From the above table and chart it is observed that Only 515 Colleges are in ‘A’ grade in India with 4641 colleges in B or C grade other 27867 colleges are yet to be accredited.
Table No. -3.7

Status of accreditation of Colleges by different accrediting and affiliating Bodies in India.

<table>
<thead>
<tr>
<th></th>
<th>UGC</th>
<th>AICTE</th>
<th>NCET</th>
<th>DTE</th>
<th>NBA</th>
<th>NAAC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2150</td>
<td>4968</td>
<td>3240</td>
<td>191</td>
<td>299</td>
<td>5335</td>
<td>16183</td>
</tr>
</tbody>
</table>

Source: Target study.com & NAAC.gov.in Publications Till July - 2013

Chart No.-3.7

Status of accreditation of Colleges by different accrediting and affiliating Bodies in India.

Source :- Table No 3.7

Interpretation

The above table and chart shows that accrediting status of colleges. NAAC has accredited 5335 and AICTE has affiliated 4968 Institutions of higher learning in India. NBA though its important body so far it has accredited only 299 courses. Minimum accreditations have been done by DTE 191 Institutions of higher learning.
Table No.-3.8

Status of NBA Accreditation Sample top Five States in India

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>State</th>
<th>Number of Acc. Programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tamil Nadu</td>
<td>184</td>
</tr>
<tr>
<td>2</td>
<td>Maharashtra</td>
<td>137</td>
</tr>
<tr>
<td>3</td>
<td>Andhra Pradesh</td>
<td>96</td>
</tr>
<tr>
<td>4</td>
<td>Karnataka</td>
<td>78</td>
</tr>
<tr>
<td>5</td>
<td>UP</td>
<td>65</td>
</tr>
</tbody>
</table>

Source : NBA Publications 2013

Chart No. -3.8

Chart Showing Sample top five States with NBA Acc. (Only Engi.)

Source :- Table No. 3.8

Interpratation

From the above it is observed that the accreditation by NBA is seen highest in Tamil Nadu with Maharashtra on second place only engineering stream data is given. Other states are not willing or do not have awareness about the accreditation process of NBA.
Table No. -3.9

Status of NAAC Accreditation sample top Five States in India for Universities -Till July -2013.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>State</th>
<th>Number of Acc. Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tamil Nadu</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>Maharashtra</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>Andhra Pradesh</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Karnataka</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>Gujarat</td>
<td>09</td>
</tr>
</tbody>
</table>

Source NAAC News Letter August-2013

Chart No. -3.9

Status of NAAC Accreditation sample top Five States in India for Universities -Till July -2013.

Source : - Table No-3.9

Interpratation

Tamil Nadu again is at first place as far as NAAC accreditation is considered since 25 Universities have been accredited with Maharashtra on 2nd place with 22 Universities accredited by NAAC the recent data published on NAAC web site.
Table No. -3.10
Status of NAAC Accreditation Sample top Five States in India for Colleges -Till July -2013.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>State</th>
<th>Number of Acc. Colleges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maharashtra</td>
<td>1046</td>
</tr>
<tr>
<td>2</td>
<td>Karnataka</td>
<td>534</td>
</tr>
<tr>
<td>3</td>
<td>Tamil Nadu</td>
<td>437</td>
</tr>
<tr>
<td>4</td>
<td>Gujarat</td>
<td>408</td>
</tr>
<tr>
<td>5</td>
<td>UP</td>
<td>398</td>
</tr>
</tbody>
</table>

Source: - NAAC News Letter August-2013

Chart No. -3.10
Status of NAAC Accreditation Sample top Five States in India for Colleges -Till July -2013.

Interpratation

From the above table and Chart it is seen that the Maharashtra is leading by 1046 colleges accredited by NAAC till Sep 2013 data published in NAAC News Letter. Karnataka is on second position with 543 colleges which is followed by Tamil Nadu with 437 Colleges accredited by NAAC. Gujarat and UP have 408 and 398 Colleges accredited by NAAC respectively.
Table No. :- 3.11

List of Sample Colleges with ‘A’ Grade (NAAC)

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of College</th>
<th>Grade</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tata Institute of Social Sciences Mumbai</td>
<td>‘A’ Grade</td>
<td>3.88</td>
</tr>
<tr>
<td>2</td>
<td>KLE’s Nijalingappa College Bangalore</td>
<td>‘A’ Grade</td>
<td>3.82</td>
</tr>
<tr>
<td>3</td>
<td>HR College of Commerce &amp; Eco. Mumbai</td>
<td>‘A’ Grade</td>
<td>3.72</td>
</tr>
<tr>
<td>4</td>
<td>R.A. Potdar College of Commerce &amp; Economics Mumbai</td>
<td>‘A’ Grade</td>
<td>3.63</td>
</tr>
<tr>
<td>5</td>
<td>B.M.S. College of Engineering (Autonomous ) Bangalore</td>
<td>‘A’ Grade</td>
<td>3.41</td>
</tr>
</tbody>
</table>

Data Extracted from NAAC Publications 2013.

Chart no. 3.11

Chart showing List of Sample Colleges with ‘A’ (NAAC)

Source :- Table No - 3.11

Interpratation

The above table and the graph shows 1st five Institutions with highest score in India. The Tata Institute of Social Sciences Mumbai has highest score 3.88 out of 4. KLE’s Nijalingappa College Bangalore has 3.82 score. Other three colleges have 3.72, 3.63 and 3.41 scores respectively given by NAAC during accreditation process.
Table No. :- 3.12

List of Sample Colleges Accredited by NAAC with Grade and Score (CGPA) given by NAAC- Only from Maharashtra under Shivaji University for Kolhapur and Satara District

Kolhapur District

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of College</th>
<th>Grade</th>
<th>Score (CGPA) Accorded by Peer Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chh. Shahu Institute of Business Education and Research (SIBER), Kolhapur, Maharashtra (Second Cycle)</td>
<td>A</td>
<td>3.19</td>
</tr>
<tr>
<td>2</td>
<td>Chh. Shahu Institute of Business Education &amp; Research Trust's Kolhapur Dinkarrao K. Shinde College of Education Gadhinglaj, Maharashtra (Second Cycle)</td>
<td>B</td>
<td>2.08</td>
</tr>
<tr>
<td>3</td>
<td>Chh. Shahu Institute of Business Education and Research Trust’s College of Non-Conventional Vocational Courses for Women, Kolhapur, Maharashtra (Second Cycle)</td>
<td>A</td>
<td>3.02</td>
</tr>
<tr>
<td></td>
<td>Institution</td>
<td>Grade</td>
<td>CGPA</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>5</td>
<td>Khedut Shikshan Mandal's, R.B. Madkholkar Mahavidyalaya, Tal-Chandgad, Dist. Kolhapur, 416509 (Second Cycle)</td>
<td>B</td>
<td>2.57</td>
</tr>
<tr>
<td>6</td>
<td>Rayat Shikshan Santha's Prof. Dr. N.D. Patil Mahavidyalaya, Tal. Shahuwadi, Dist. Kolhapur, Malkapur -415101 (Second Cycle)</td>
<td>B</td>
<td>2.82</td>
</tr>
<tr>
<td>7</td>
<td>Rayat Shikshan Santha's Rajarshi Chhatrapati Shahu College, Kolhapur (Second Cycle)</td>
<td>B</td>
<td>2.84</td>
</tr>
<tr>
<td>8</td>
<td>Saraswati Shinde Education Society's D.D. Shinde Sarkar College, Kolhapur (Second Cycle)</td>
<td>B</td>
<td>2.71</td>
</tr>
<tr>
<td>9</td>
<td>Shikshan Prasarak Mandal's, Gopal Krishna Gokhale College, Subhash Road, Kolhapur, 416012 (Second Cycle)</td>
<td>B</td>
<td>2.85</td>
</tr>
<tr>
<td>10</td>
<td>Shikshanshastra Adhyapak Shikshan Santha's Vasantrao Naik Shikshanshastra Mahavidyalaya, Kolhapur - 416007 (First Cycle)</td>
<td>B</td>
<td>2.42</td>
</tr>
<tr>
<td>11</td>
<td>Shree Warana Vibhag Shikshan Mandal's Yashwantrao Chavan Warana Mahavidyalaya, Warananagar (Second Cycle)</td>
<td>B</td>
<td>2.85</td>
</tr>
<tr>
<td>12</td>
<td>Shri Acharyaratna Deshbooshan Shikshan Prasarak Mandal's Mahavir Mahavidyalaya, Kolhapur (Second Cycle)</td>
<td>B</td>
<td>2.61</td>
</tr>
<tr>
<td>13</td>
<td>Shri Doodhsakhar Shikshan Prasarak Mandal's, Doodhsakhar Mahavidyalaya, Tal. Kagal, Dist. Kolhapur, 416208 (Second Cycle)</td>
<td>B</td>
<td>2.64</td>
</tr>
<tr>
<td>No.</td>
<td>Institution</td>
<td>Grade</td>
<td>CGPA</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>14</td>
<td>Shri Mouni Vidyapeeth, Gargoti, Acharya Jawadekar College of Education Gargoti, Maharashtra (Second cycle)</td>
<td>B</td>
<td>2.19</td>
</tr>
<tr>
<td>15</td>
<td>Shri Mouni Vidyapeeth, Gargoti, Acharya Jawadekar College of Education Gargoti, Maharashtra (Second cycle)</td>
<td>B</td>
<td>2.19</td>
</tr>
<tr>
<td>16</td>
<td>Shri Prince Shivaji Maratha Boarding House's, The New College, Shivaji Peth, Kolhapur, 416012 (Second Cycle)</td>
<td>B</td>
<td>2.44</td>
</tr>
<tr>
<td>17</td>
<td>Shri Radhanagari Taluka Shikshan Prasarak Mandal's Radhanagari Mahavidyalaya Radhanagari, Maharashtra (Second Cycle)</td>
<td>B</td>
<td>2.15</td>
</tr>
<tr>
<td>19</td>
<td>Shri Swami Vivekanand Shikshan Sanstha's Vivekanand College, Kolhapur, Maharashtra (Second Cycle)</td>
<td>A</td>
<td>3.12</td>
</tr>
<tr>
<td>20</td>
<td>Shri Swami Vivekananda Shikshan Samstha Dattajirao Kadam Arts, Science and Commerce College, Ichalkaranji (Second Cycle)</td>
<td>B</td>
<td>2.89</td>
</tr>
<tr>
<td>21</td>
<td>Tararani Vidyapeeth's Kamala College Kolhapur, Maharashtra (Second Cycle)</td>
<td>B</td>
<td>2.87</td>
</tr>
<tr>
<td>22</td>
<td>The Kagal Education Society's, D.R. Mane Mahavidyalaya, Tal: Kagal, Dist. Kolhapur, 416216 (Second Cycle)</td>
<td>B</td>
<td>2.61</td>
</tr>
</tbody>
</table>
## Satara District

<table>
<thead>
<tr>
<th></th>
<th>Institution Name</th>
<th>Grade</th>
<th>C.G.P.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M. B. S. P. Mandal's Arts, Commerce College, Tal. Khatav, Dist. Satara, Mayani – 415102 (First Cycle)</td>
<td>C</td>
<td>1.83</td>
</tr>
<tr>
<td>2</td>
<td>Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's Shikshan Maharshi Bapuji Salunkhe Mahavidyalaya, Dist. Satara, Karad-415110 (Second Cycle)</td>
<td>B</td>
<td>2.52</td>
</tr>
<tr>
<td>3</td>
<td>Shri Swami Vivekanand Shikshan Sanstha's Kakasaheb Chavan Mahavidyalaya, Tal. Patan, Dist. Satara, Talmavale -415103 (Second Cycle)</td>
<td>B</td>
<td>2.28</td>
</tr>
<tr>
<td>4</td>
<td>Panchkroshi Shikshan Mandal's, Sahakar Maharshi Shankarrao Mohite Patil Mahavidyalaya, Tal-Koregaon, Dist- Satara, 415511 (Second Cycle)</td>
<td>B</td>
<td>2.28</td>
</tr>
<tr>
<td>5</td>
<td>Rayat Shikshan Sanstha's Arts &amp; Commerce College, Tal. Khatav, Dist. Satara, Pusegaon-415502 (Second Cycle)</td>
<td>B</td>
<td>2.29</td>
</tr>
<tr>
<td>6</td>
<td>Rayat Shikshan Sanstha's Azad College of Education Satara, Maharashtra (Second Cycle)</td>
<td>A</td>
<td>3.14</td>
</tr>
<tr>
<td>7</td>
<td>Rayat Shikshan Sanstha's Chhatrapati Shivaji College ,Satara, (Second Cycle)</td>
<td>A</td>
<td>3.10</td>
</tr>
<tr>
<td>8</td>
<td>Rayat Shikshan Sanstha's Dhananjayrao Gadgil College of Commerce, Satara (Second Cycle)</td>
<td>A</td>
<td>3.05</td>
</tr>
<tr>
<td></td>
<td>College Name</td>
<td>Grade</td>
<td>Score</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>9</td>
<td>Rayat Shikshan Sanstha's Arts &amp; Commerce College, Tal. Khatav, Dist. Satara, Pusegaon-415502 (Second Cycle)</td>
<td>B</td>
<td>2.29</td>
</tr>
<tr>
<td>10</td>
<td>Rayat Shikshan Sanstha's Yashavantrao Chavan Institute of Science, Satara, (Second Cycle)</td>
<td>A</td>
<td>3.37</td>
</tr>
<tr>
<td>11</td>
<td>Satara Maratha Vidya Prasarak Samaj's Arts &amp; Commerce College Satara, Maharashtra (Second Cycle)</td>
<td>C</td>
<td>1.71</td>
</tr>
<tr>
<td>12</td>
<td>Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's Lal Bahadur Shastri College Satara, Maharashtra (Second Cycle)</td>
<td>B</td>
<td>2.86</td>
</tr>
</tbody>
</table>

Source: - Data Extracted from NAAC Publications - 2013

Interpretation :-

The Maximum Institutes have got ‘B’ grade in the NAAC accreditation. Majority of the Colleges score varies from 2.08 to 2.83 which lies in B grade and some Colleges have got ‘A’ Grade with score of 3.37 and 3.07.
Table 3.13

Status of NAAC Accreditation in Shivaji University Kolhapur

Status of Accreditation by NAAC of affiliated Institutions affiliated to Shivaji University

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Number of colleges accredited or reaccredited by NAAC</th>
<th>Colleges yet to be accredited by NAAC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>146</td>
<td>132</td>
<td>278</td>
</tr>
</tbody>
</table>

Data Extracted from NAAC Cell Publications Shivaji University.

![Graph showing the status of accreditation](image)

**Source:** - Table No. 3.13

**Interpretation :-**

The Maximum affiliated colleges under Shivaji University have not got accreditition. Only 26% colleges have been accredited by NAAC.
Table No.-3.14

NAAC Grades of affiliated Institutions in Shivaji University.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Grade</th>
<th>Number of colleges accredited /reaccredited by NAAC</th>
<th>Colleges yet to be accredited by NAAC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>11</td>
<td>132</td>
<td>278</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>146</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source :- Data Extracted from NAAC Publications – 2013.

Source: - Table No. 3.14

Interpretation :-

The Maximum affiliated colleges under Shivaji University have got ‘B’ grade and only 11 Colleges have been accredited by ‘A’ grade.
Table No.-3.15

Comparison NAAC Grades of two Universities Pune university and Shivaji universities affiliated Institutions.

<table>
<thead>
<tr>
<th>Grades</th>
<th>Shivaji University</th>
<th>Pune University</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>11</td>
<td>17</td>
<td>28</td>
</tr>
<tr>
<td>B</td>
<td>39</td>
<td>59</td>
<td>98</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>53</strong></td>
<td><strong>91</strong></td>
<td><strong>144</strong></td>
</tr>
</tbody>
</table>

Source: - Data Extracted from NAAC Publications-2013.

**Interpretation:-**

From the table no 3.15 it is observed that maximum colleges are in B grade in both the Universities. Out of 144 colleges only 28 are in A grade and 18 are in C grade. This data is used to test the hypothesis of the research study (Hypothesis-1).
3.8 **Expert system for selected domain.**

By knowing the basic concepts and applications of the expert systems in various fields now we are in position to design the prototype for the quality assessment and enhancement for the higher educational Institutes. The basic input for expert system is quality parameters and its score to evaluate various activities of the higher educational Institutes. The researcher has considered the widely accepted and trusted parameters of NAAC for its design of the expert system. The quality of the higher educational Institutes is assessed on seven criteria like-

i Curricular aspects.

ii Teaching-learning and evaluation

iii Research, Consultancy and extension

iv Infrastructure and learning resources

v Student support and progression

vi Governance and leadership and

vii Innovative practices.

The above criteria have sub criteria and key indicators for assessment of quality in higher educational Institutes.

**Conclusion :-**

The Researcher has taken a detail study about expert system its concept, applications, limitations and has explained various quality concepts with respect to higher education. The data related to present status and position of accreditation is tabulated and presented to get the feel of the quality status in higher educational Institutes.