Chapter - I

Introduction and Research Design

This Chapter covers the introduction, concept and research design about the selected topic. The quality parameters, problem identification, objectives, hypothesis, limitations, methodology and sample design is given in brief about the selected topic of the research.

1.1 Introduction

The motive of the research is to enhance the quality of higher educational Institutes the research area is important to the student’s community and Institutes of higher learning. The stakeholders of higher education are now forcing the Institutes to maintain the quality at all the levels of the academics. The use of advance Computer system like expert systems will add to the quality enhancement process of the Institutes. The proper planning of quality measures which will enhance the quality management efforts of the higher educational institutes. The study is proposed to find out the role of expert system in higher educational Institutes and design the expert system to manage the quality of education to benefit learners and bring the awareness to the Institutes to enhance the quality. The researcher has taken the quality parameters inline with the National Assessment and Accreditation Council (NAAC) quality parameters. There are various types of accrediting agencies and controlling bodies which are responsible to accredit the Institutes of higher education. But the size of the higher education does not match the efforts taken by these bodies. Higher Education has become the crucial areas with respect to education sector and use of advance technology in assessment of quality and enhancement will be the major contribution to the learners and stakeholders of the higher education.
The expert system have been developed for many kinds of applications involving diagnosis, predication, consultation, information retrieval, control, planning interpretation and are successful in performing the tasks of the expert from the year 1989. Applications of expert system have been increased to a large scale in different business applications. The extraction of knowledge from the human experts and transferring this into computer codes and storing it in the knowledgebase for the proper utilization and further processing which is knowledge engineering are the important stages in constructing the expert system.

Higher education in India in the present scenario is in growth stage as compared to developed nation. The Indian education system follows 10+2+3 pattern in which last 3 years and professional courses constitute the students from various streams of sciences and social Sciences. 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. Due to various social and financial problems the students enrolled in higher education studies is very less as compared to the potential of the country.
1.2 Quality at Higher Educational Institutes.

Higher Education is the final stage of student’s academic career which when seriously taken. The student can be the productive citizen of the country. The Quality being the comprehensive term cannot be declared in one statement. Various factors are responsible for maintaining quality at higher educational Institutes. Teachers, Management, Students, Parents, Companies and Society have some role to play in quality assessment and improvement activities at higher educational Institutes. Without a sound and goal-oriented system of education, the dream of reconstructing nation’s economic, social and political life cannot be realized. In order to fulfil the ideals, the quality of education imparted has to be improved, which naturally depends upon the quality of teachers. Teachers’ professional competence and commitment determine the quality of education. No doubt, we have an impressive quantitative growth in higher education, but perhaps the quality of higher education has not improved over the years which may be attributed to a number of reasons. Concerns on quality of education have been expressed and voiced by all commissions/committees constituted from time to time since independence. However, it is widely accepted that the quality of teaching has deteriorated drastically over the years which in turn has contributed to the decline of overall quality of higher education. As such, in the context of teaching being recognized as a profession, the lifelong approach to professional development has become all the more essential. It is cardinal responsibility of faculty to be the primary innovators and initiators of change in education system. Thus, there is no debate that faculty development is a significant key to the continued success of higher education. This is, however, a discordant time for higher education – a time influenced, in part, by accelerated technological advance, expanded globalization, and declining financial
resources. According to Peter F. Drucker (1980), during such turbulent
times, the first task of management is to make sure of the institution’s
capacity to survive, to adapt to sudden change, and to avail itself of new
opportunities. Meanwhile the general public, state and central governments,
and media have increasingly voiced apprehension about the competence of
universities and colleges to meet these challenges and to address effectually
the evolving needs of our society. Hence confronted by rapid changes in
knowledge, technology, and even by the way academic works being
conducted, higher educational institutions must redefine themselves and in
essence that means the faculty must either obsolescence or continuously be
participating in developmental activities for producing quality and
excellence.

1.3 Higher Education System in India:-

Indian higher and technical education system which is huge and complex is moving through a new era and is facing immense challenges and problems that need to be addressed. Ours is a federal governmental structure, there is a central government and there are state governments. Education is funded both by central and state governments. The Ministry of Human Resource Development (MHRD) at the national level and the Education Ministry in each state decide on policy, its implementation, and give financial support. The University Grants Commission (UGC) is an apex body that decides national policy on growth and funding for higher education and also monitors standards and makes judgments on quality. In addition, there are Professional Councils like AICTE which are responsible for recognition of courses, promotion of professional institutions and provide support grants to initiate or strengthen undergraduate/graduate programmes and various awards.
The rapid developments in science and technology and the challenges of globalization are posing challenges to the higher education system in our country. In an environment of global competitiveness, it is important that Indian products of the higher education institutions are as competent as graduates of any other country not only in their scholastic attainments but also in terms of the value system and richness of their personality. This means that unless the quality and standard of Indian higher education institutions is enhanced zealously and sustained at a high level through innovation, creativity and regular monitoring, it seems to be difficult for the Indian academic/professionals to compete in the world scene. This naturally calls for suitable assessment and accreditation mechanisms to be available in the country as to ensure the quality and standard of the academic/training programmes at higher educational institutions.

1.4 Introduction of National Assessment and Accreditation (NAAC):-

The National Assessment and Accreditation Council (NAAC) is an organization that assesses and accredits institutions of higher education in India. It is an autonomous body funded by University Grants Commission of Government of India headquartered in Bangalore. NAAC was established in 1994 in response to recommendations of National Policy in Education (1986). This policy as to “address the issues of deterioration in quality of education”, and the Plan of Action laid out strategic plans for the policies including the establishment of an independent national accreditation body.

Under the new methodology introduced by NAAC w.e.f. 1st April, 2007, the higher education institutions are assessed and accredited by a two-step approach. In the first step, the institution is required to seek
Institutional Eligibility for Quality Assessment (IEQA), and the second step is the assessment and accreditation of the institute under the grades A, B, C for accredited institutions, and D for those not accredited. NAAC identifies seven criteria as given below:

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 as the basis for its assessment procedure.

NAAC follows the process of Grade accreditation only and does not undertake threshold accreditation, i.e. the Grade is only a relative value assigned to a university and does not denote an absolute attribute of quality.

To help educational institutions the researcher has developed an Expert system. This system generates the grade of the Institute by using seven quality parameters suggested by NAAC and helps the Institute to enhance the quality of the Institute over a period of time.

1.5 Introduction of Expert System

Expert System is an Intelligent Computer Program that uses knowledge and inference procedure to solve problems that are difficult enough to require significant expertise - Feigenbaum
The first step in solving any problem is defining the problem area of domain to be solved. This consideration is just as true in artificial intelligence (AI) as in conventional programming.

Although general solutions to classic AI problems such as natural language translation, speech understanding, and vision have not been found, restricting the problem domain may still produce a useful solution. For example, it is not difficult to build simple natural language systems if the input is restricted to sentences of the form noun, verb and object. Currently, systems of this type work well in providing a user-friendly interface to many software products such as database systems and spreadsheets. In fact, the parsers associated with popular Computer text-adventure games today exhibit an amazing degree of ability in understanding natural language.

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. Professor Edward Feigenbaum of Stanford University, an early pioneer of expert systems technology, has defined an expert system as “an intelligent computer program that uses knowledge and inference procedures to solve problems that are difficult enough to require significant human expertise for their solutions.” 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.
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.

An Expert system is the part of the program in which the knowledge is stored, using some method of representation, such as rules. These rules are constructed by codifying the experience and knowledge of a group of experts. The decisions are taken by checking these rules. The proposed Expert system is intended to supplement, but not replace, traditional quality assessment and enhancement efforts taken by the Higher education Institutes. The Expert system designed and developed by the researcher is system which takes the input in the form of quality parameters suggested by NAAC and it generates the score as per criteria and final grade with the score is displayed with tips to improve the grade of the Institute and helps the Institute to enhance the quality of the Institute.

1.6 SIGNIFICANCE OF THE STUDY

The Research study is significant to the higher education sector and its stakeholders. The quality awareness, quality checks and enhancement methods in this important sector will have positive impact on student’s passing out from higher educational Institutes.

1.7 STATEMENT OF PROBLEM

The Research activity has to be supported by Problem. The Researcher has identified the higher education sector to study with respect to quality assessment and enhancement. Higher education is the important education sector where quality assessment and enhancement can be done through the
expert systems which will improve learner’s quality. It will have direct impact on employability and growth of the nation as a whole. Since the researcher has not found considerable work done in this area. The low quality education at higher education level will have negative impact on academics therefore it is necessary to enforce strict quality norms by using advance technologies like expert systems.

In the light of the above discussion, the researcher intends to carry out his research endeavour entitled as “A Role of Expert System in Quality Assessment and Enhancement With Respect to Higher Education.”

1.8 OBJECTIVES OF THE STUDY

The study is undertaken with specific objectives as under -

1. To study and analyze the existing system used for quality assessment and enhancement in Higher Education.
2. To collect and analyze the views from different academicians, domain experts in respect of quality parameters suggested by NAAC, NBA and other accreditation bodies.
3. To Design an Expert system by collecting (extracting ) knowledge from academic experts (Vice Chancellors, Directors of bodies like NAAC, NBA , IIT and other experts in the field of academics)
1.9 HYPOTHESES:

Based on the selected topic the following hypotheses have been stated

1. H0: There is quality consciousness in higher educational Institutes.

2. H0: There is no Significant difference between the score (CGPA) given by NAAC Peer Team and Score (CGPA) generated by the Expert System.

1.10 Research Methodology:

For accomplishing the above objectives, collection of both primary and secondary data was called for. Primary data is collected through survey method by administering separate structured interview schedule to sample respondents. A formal introductory letter from the Director of the Institute was taken, explaining the purpose of the research and to help the researcher in seeking the information needed. With this letter the researcher approached the concerned experts of various Institutions. A copy of questionnaire was given to the respondents and their responses were solicited.

In order to accomplish the research endeavour the data were collected through various sources, viz. primary and secondary.

A] Primary Data:

The respondents from various institutions were contacted and primary data were collected through the medium of pretested structured interview schedule. In all 150 respondents including Vice Chancellors, Directors, Principals, and Senior Professors having teaching experience of more than 25 years were contacted and the data was solicited from them.
Sampling Method Used: Purposive sampling Method.

What is Purposive Method of Sampling? : - In this method the data is collected with predefined purpose and deliberately the respondents are taken for the study to find out the research results. In this case the expert system is to be developed therefore the experts from academics are contacted from these Institutions taken from sample size and their suggestions are taken into consideration while developing the expert system on various quality parameters used in higher educational Institutes. Also to evaluate and enhance the quality at these Institutes. Therefore the researcher has used purposive sampling method

B] Secondary Data:

For discussing the theoretical aspect and review of literature of the topic under study, published sources available in the various libraries, archives and collections were extensively used. Particularly helpful were:

- Barr. Khardekar Library, Shivaji University, Kolhapur.
- Institute of Management, Kadamwadi, Kolhapur.
- Chh. Shahu Institute of Business Education & Research, Kolhapur
- Vasantrodada Patil Institute of Management Studies & Research, Miraj
- Chintaman Rao College of Commerce, Sangli
- Barr. Jayakar Library, University of Poona, Pune
- Internet Surfing

In this type of data collection institute’s website has been used to take Self Study Reports of the Institute. The Journals and magazine of quality assessment and expert’s system and design methodology were referred.
1.11 SAMPLE DESIGN:

The Researcher has used Purposive sampling method for the research study. Total number of Respondents is calculated using following formula.

Sample Size Calculation:-

The purpose of the study is to design and develop the expert system for generating Grade of the higher educational institutes using NAAC Quality parameters by taking experts view therefore the size of sample does not affect the design of the expert system. However the authors have considered the population of experts in educational area though out India as very large and as there is no separate list as such. Therefore researcher has calculated sample size by using following formula.

\[ n = \frac{(z^2 \times p \times q)}{e^2} \]  
(Ref. Research Methodology Methods and Techniques Second Revised Edition -2012) C.R. Kothari New Age International Publication (Page no. 179)- The Formula gives the size of sample in case of very large population when we are to estimate the population proportionate in the universe.

where

- \( n \) = size of sample for very large population
- \( p = 0.50 \), probability of success of the results (50% success in the result of the Study)
- \( q = 0.50 \), Probability of failure of the results (50% failure in the result of the Study)
- .50 is the optimal value of probability for success or failure therefore
Value .50 is taken for p and q due to qualitative data of the study

e=0.08 (8%), Tolerable error in the results (Since the estimate of the result should be within 8% of true value)

z=1.96 The Critical Value for 5% level of significance (95% Confidence Level)

(As per table of area under normal curve for the given confidence level of 95% i.e. at 5% level of significance)

\[ n = \left( \frac{z^2 \cdot p \cdot q}{e^2} \right) \]

\[ n = \left( \frac{1.96^2 \cdot 0.50 \cdot 0.50}{0.08^2} \right) \]

\[ n = \left( \frac{3.8416 \cdot 0.25}{0.0064} \right) \]

\[ n = 150 \text{ Respondents} \]

**Area of Respondents:** - Majority of experts are from Shivaji University Area.

Total number of Respondents - 150 out of that 125 respondents replied to questionnaire. The designation of the respondents is given below.

**Type of Questions:** - Open Ended and Closed ended. (Total number of Questions-23).

Similarly the sample size for Institutions of Higher educational Institutes is calculated the (Population size is 33637 Colleges and Universities in India sample size calculated for Institute is 149 Institutes using formula given below. The information is presented for quality evaluation of the Institutes selected randomly.)
The Institutions for the study with population size of 33637 Colleges

\[ n = \frac{(z^2*p*q*N)}{(e^2*(N-1) + z^2*p*q)} \]


Where \( z=1.96 \), \( e=0.08 \) \( N=33637 \), \( p=0.5 \) and \( q=0.5 \)

\[ n= \frac{(1.96^2*0.5*0.5*33637)}{(33636)+(1.96^2*0.05*0.5)} \]

\[ n=149. \]

Table No. -1.0

Respondents of the Research Study as per Designation

<table>
<thead>
<tr>
<th>Designation</th>
<th>Number of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vice Chancellors</td>
<td>10</td>
<td>06%</td>
</tr>
<tr>
<td>Directors</td>
<td>15</td>
<td>10%</td>
</tr>
<tr>
<td>Principals</td>
<td>50</td>
<td>33%</td>
</tr>
<tr>
<td>Professors</td>
<td>50</td>
<td>33%</td>
</tr>
<tr>
<td>Non Respondents</td>
<td>25</td>
<td>18%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>150</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: - Survey Data
1.12 STATISTICAL ANALYSIS:

The Chi Square test and paired ‘t’ test is applied to test the hypothesis of the study. Efficiency and Consistency Test is taken for the Expert system developed (EQAA).

1.13 SCOPE OF THE STUDY:

Higher education is the important education sector where quality assessment and enhancement can be done through the expert systems which will improve learner’s quality and it will have direct impact on employability and growth of the nation as a whole. Therefore it is necessary to enforce strict quality norms by using advance technologies like expert systems.

The expert system in quality assessment and enhancement for higher education has been developed in consultation with experts in the field of academics like Chancellors, Vice-Chancellors, Directors of Quality controlling bodies like NAAC and NBA.

Geographical Area is limited to Institutes affiliated to Shivaji University. Researcher has collected views and opinion from experts from Pune, Belgaum and Mumbai. All the views and suggestions have been taken in to consideration in order to design and develop an expert system.

1.14 The Chapter Scheme:

Chapter-I : Introduction.
Chapter-II : Review of Literature.
Chapter-III : Role of expert system in Higher Education.
Chapter-IV : Presentation and Analysis of Data.
Chapter-V : A) Rule based Expert System.

: B) Implementation of experts system.

Chapter-VI : Findings.

Chapter-VII : Suggestions.

Chapter-VIII : Conclusion.

Chapter – IX : Future Scope.

Bibliography

1.15 Limitations of the study

The analysis and the conclusion drawn in this research and endeavour are solely based on the information collected. There were some constraints that were faced during the span of the study, which might have affected the outcome and thus have to be taken into consideration. They are as follows:

1. The study is based on quality assessment and enhancement at higher education Institutes. The Rule based expert system is developed using parameters inline with NAAC. Hence findings are based on knowledge based system in quality assessment and enhancement in selected Institutes only.

2. The study is carried out by collecting tacit knowledge and explicit knowledge from experts in academics and hence some variations in response and actual facts may be observed.