EXCELLENCE IN QUALITY EDUCATION THROUGH IMPLEMENTATION OF STRATEGIC FRAMEWORK AND SMART KPIS IN HIGHER EDUCATION INSTITUTES

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Abstract - A strategic framework for the excellence in higher education has been presented in this research. The major input to the frameworks is the requirement of regulatory bodies, need and expectations of customers. The complete components of strategic framework are discussed in this paper, which are supported by the SMART KPIs. To measure the effectiveness of strategic objectives, SMART Key Performance Indicators (KPIs) are designed, which are continuously monitored by the management. These key performance indicators not only mitigate the risk but are also helpful to focus organization towards the higher HEI ranking as well as the quality assurance throughout the institution. The KPIs are used to define the objective for the management to different level of leadership and management. It has been observed, that the implementation strategic approach has not only increased performance of the NED University but also reduced the audit observations recorded during the internal and surveillance audits.

Keywords - Higher Education Institute, Key Performance Indicators, SMART, Strategic Framework

I. INTRODUCTION

Strategic planning, its implementation and evaluation is the main function of corporate in every organization. Where vision and mission provide the future and present state of the organizations attained through the smart strategies, long term objective and annual objectives [1]. Progressive organizations having foresight keep on visiting their strategic plans, vision and mission to align their moves according to the new trends and requirements. In higher education, the trends are changing drastically. Education from tradition system has changed entirely towards the Bloom’s taxonomy and now the education trends for the Generation Z. A comprehensive literature review has been performed to include the strategic framework of higher education institutes in this area.

Tufail and Lodi implement the ISO 9001 Quality Management System in the higher education institute to improve the teaching learning process and standardize the other processes of the university for better results [2-3]. Wasif et al used risk-based approach to link the key performance indicators of the higher education institutes with the different types of risk faced by the higher education institutes, such as academic risks, financial risks, projects related risks, procurement risk etc [4]. Rockwell et al presented an approach for the excellence in higher education through the incentives and motivation eliminating the obstacles in the path of success [5]. Rudzki et al presented a strategic framework for the UK based institution to identify the core components in any process of internationalization and developed a new framework for assessing levels of international activity within institutions. Author also suggests that it can be implemented in other educational institutions, countries and other subject areas [6]. Kanji et al discusses the results of a survey which they conducted to measure the implementation of total quality management in higher education. They related the maturity of TQM implementation and its effects over the higher education institute outcomes [7]. Fumasoli and Lepori presented a strategic framework to measure the positioning of higher education institution and to implement a flexible environment and framework to cater the changes in the requirements of the stakeholder in Switzerland. They highlighted the stage-wise standardization in structures and standards in HEIs in the specified environment [8]. Teichler et al performed research in the field on higher education on the possible risk analysis of globalization and overall impact on the higher education [9]. Garrison et al analyzed the issues related to the administration and leadership, for which the controls are developed to improve the blending learning approach [10]. Meyer presented the analysis of survey-based risk assessment of a higher education institution. He developed the controls for the safety and other risk related issues [11]. In the previous research, the focus of the authors is either to present a framework or to apply the techniques for the continual improvements. In this research, SMART KPIS aligned with the strategic framework in the higher education institutes is discussed in detail. In the proposed SMART KPIS of higher education Institutes, sample data of NED University along with its analysis has been presented in the research. Benchmark and targets are also presented in this research.

II. METHODOLOGY

The methodology of the research has been performed using a sequence which is presented in the following sequence. Several processes in the methodology has been taken from the standard strategic framework
developed by the David et al [1] and other strategic developers.

- Organizational Assessment
- External Assessment
- Developing Vision and Mission Statement
- Devising Strategic Objectives
- Developing Departmental Objectives
- Developing SMART KPIs and benchmarking
- Periodically collecting data to measure KPIs
- Performing Analysis on SMART KPIs
- Corrective Actions / Recommendations

The strategic framework of any organization begins with the study of Strength-Weakness-Opportunities and Threat analysis which is also called SWOT Analysis [1]. SWOT analysis is performed using organizational assessment and external assessment performed by the Quality Enhancement Department (QEC).

**A. Organizational Assessment**

Organizational assessment is the first step to devise the strategic framework in the organization. It includes the assessment of strengths and weaknesses of the higher education institute (HEI) which might affect the context or scope of the HEI. This may be performed using the previous audit observations, resources available in the HEIs, stakeholders’ feedback such as employers, alumni, students or other feedbacks. Each academic and supporting department of the university was asked to prepare a list of their strength and weaknesses. Following are the top five strength and weaknesses of NED University of Engineering and Technology.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Well-developed infrastructure for the higher education</td>
<td>Being a public sector university, finances are limited for the resources</td>
</tr>
<tr>
<td>2. Well qualified faculty members available in the university</td>
<td>Due to government-based jobs, performance-based reward system is not present</td>
</tr>
<tr>
<td>3. High merit intermediate students apply for the admission</td>
<td>Due to public sector university setup, approvals and initiatives are very limited and slow</td>
</tr>
<tr>
<td>4. University is situated at the centre of the city</td>
<td>Departments of the university works is Silos and interaction between the departments are low</td>
</tr>
<tr>
<td>5. Well implemented QMS system (ISO 9001:2015) in the university</td>
<td>SPPRA process makes procurement slow and costly</td>
</tr>
</tbody>
</table>

**B. External Assessment**

External assessment of the environment and stakeholders’ requirements are majorly gathered through the feedback from industry (employers and alumni), regulations and compliance of regulatory body such as Higher Education Commission (HEC) and Pakistan Engineering Council (PEC) and best practices at the HEIs. According to the 4th Chapter of ISO 9001:2015, gathering of context of organization is to be compiled. That is the external issues and requirements of the interested parties (stakeholders). Hence the working for the ISO 9001:2015 is also helpful in compiling it. Several opportunities and threats have been collected, however top five are presented here.

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. About 11,000 applicants apply for the admission amongst which 25% are admitted due to the limited seats</td>
<td>Private universities are competitive in their fee and may threaten in case of self-finance students.</td>
</tr>
<tr>
<td>2. Industry requirements for the projects and consultations are increased by 20% in last two years.</td>
<td>Similar technology-based institutes are approaching industries for the linkages.</td>
</tr>
<tr>
<td>3. Corporate trainings and short courses requirements are increasing, enrolments are doubled within last 2 years.</td>
<td>Due to the high inflation (dollar rate) procurements are getting expensive and inconsistent.</td>
</tr>
<tr>
<td>4. High-tech infrastructure and qualified faculty members are available to be used for the industry and trainings.</td>
<td>Higher Education Commission (HEC) are reducing the grants and insisting to be sustainable.</td>
</tr>
<tr>
<td>5. Requirement of graduates from engineering related fields are increasing in the market.</td>
<td>Due to high inflation, industry production is going low which may result in unemployment of graduates.</td>
</tr>
</tbody>
</table>

**C. Developing Vision and Mission Statement**

Using the organizational and external assessment SWOT analysis has been performed such that the opportunities are exploited using the strengths and the threats and weaknesses are suppressed using the strengths and opportunities. Based on SWOT analysis, vision and mission statement of the NED University has been developed. The components of the vision and mission statements are gathered from all the stakeholders, such as faculty members, students, industry, alumni and even the competitors. Using the SWOT analysis and Quality Policy of the NED
University, the components of the vision and mission statements are short listed, and 4 to 5 statements are developed by the Quality Enhancement Cell (QEC). Finally, the statements are discussed in several Board of review meeting and a final vision and mission statements are developed. Following are the finalized vision and mission statement.

Vision of the NED University is;
“Be a leader in enabling Pakistan's social and economic transformation”

Mission of the NED University is;
“Acquire education and research excellence in engineering and allied disciplines to produce leadership and enabling application of knowledge and skills for the benefit of the society with integrity and wisdom”

D. Devising Strategic Objectives

Based on institutional Vision, Mission and Quality Policy of the organization, strategic objectives of the organization have been developed. The strategic objectives are devised such that each component discussed in all the three statements must be taken in consideration for the compliance of these statements. NED University aims to excel in the following strategic directions;

i) **Research**: increasing the scale of research and development and create a conducive environment to attract the research activities in the institution

ii) **Effective Teaching**: increase the effectiveness of teaching by using new technology, training faculty members and deploying new tools such that the employers of graduates and other universities must satisfy

iii) **Strong Networking**: collaborating with government institutions, other universities locally or globally to facilitate them and to learn from them.

iv) **Enterprise focus**: to develop a conducive environment for collaborative and coordinated teaching and research

v) **Participation in National Policy Making**: to be the part of policy making process

vi) **Industry Linkage**: to develop a strong relationship with the industry to enhance their productivity, solve their problems and to fetch resources from them

vii) **Financial Stability**: to be financially sustainable

viii) **Efficient Operations**: to develop a waste free management system

These strategic objectives and organizational goals along with the vision and mission statements are communicated to all the stakeholders, such as; faculty members, staff, management, students, researchers, graduates and industry so that the awareness to these must be developed. It is necessary to align all the stakeholders to work in the same direction.

E. Developing Departmental Objectives

Although the ISO 9001 Quality Management System already derive the university to develop annual quality objective for the continuous improvements, but the new strategic framework also pushes the system to devise departmental annual objectives based on the strategic objectives and goals. Hence different divisions of the departments were given annual objectives based upon their functions, such as academic departments were given following annual objectives;

1) Implement outcome-based education system to comply with the requirement of Pakistan Engineering Council

2) To implement OBE-based software in the department for the ease in assessment and communicating it to the students.

3) To increase the research output such that each researcher in the department must generate publications, patents or commercialized product

4) To acquire funding from different sources

5) To improve the effectiveness of teaching using new tools and techniques, such as augmented reality, smart university tools etc.

The department of Industrial Liaison was given following objectives;

1) To develop an online portal for the job placement of the graduates

2) To double the number of internships for the students

3) To increase the number of projects from the industry

4) To double the on-campus hiring activities

5) To increase the number of visits of the students to the industry

Objectives of the Registrar Department were;

1) Increase the number of full-time faculty members

2) Develop funding opportunities for the PhD scholarships

3) Increase number of national and international training to the faculty members and staff

4) To develop an online block-chain based system for the degree verification by the employers/universities

5) To reorganize the department to increase the efficiency of the department

Such types of the objectives were given to each teaching and supporting department and the department head was held responsible to attain these objectives. The measurement of these objectives was performed using the key performance indicators, which are developed by the Quality Enhancement Cell (QEC) to measure the progress of objectives. Each objective may be measure through one or more KPIs such that the KPIs must meet or exceed the benchmark.
F. Developing SMART KPIs and benchmarking

To measure the progress of the objectives and ultimately the strategic objectives, Quality Enhancement Cell (QEC) was asked to develop a matrix to measure the performance of the University using few Key Performance Indicators (KPIs) which would be based on all the requirements. QEC team put immense time and efforts to review and finalize the KPIs. Finally, the KPIs were discussed in the Board of Review meeting, where these were approved and implemented. These KPIs are targeted to be completed for each year, however the progress of it are measured and analyzed on quarterly basis. Benchmarking of the KPIs are taken from the guidelines of HEC and the best practices in Pakistan and globally, following table represents the benchmark and few important KPIs;

<table>
<thead>
<tr>
<th>No.</th>
<th>KPI</th>
<th>Calculation</th>
<th>Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Ratio of full-time faculty to total faculty Members</td>
<td>No. of full time faculty &lt;br&gt;No. of full time faculty members</td>
<td>0.8</td>
</tr>
<tr>
<td>ii)</td>
<td>Ratio of Full time PhD faculty to full time faculty members</td>
<td>No. of PhD faculty &lt;br&gt;No. of full time faculty</td>
<td>0.5</td>
</tr>
<tr>
<td>iii)</td>
<td>Full time teacher student ratio</td>
<td>No. of students &lt;br&gt;No. of full time faculty</td>
<td>19</td>
</tr>
<tr>
<td>iv)</td>
<td>Number of Scholarship arranged by the University other than HEC/Total number of students</td>
<td>No. of scholarships &lt;br&gt;No. of students x 100</td>
<td>25% of total number of students</td>
</tr>
<tr>
<td>v)</td>
<td>Total PhD output during target year</td>
<td>No. of PhD graduate</td>
<td>10</td>
</tr>
<tr>
<td>vi)</td>
<td>Trainings Provided to Full-Time Faculty Members (National or International)</td>
<td>Number of trainings</td>
<td>Total 50</td>
</tr>
<tr>
<td>vii)</td>
<td>Number of Publication in JCR indexed Journal</td>
<td>Numbers of publications in a year</td>
<td>300/year</td>
</tr>
<tr>
<td>viii)</td>
<td>Number of Publication in X and Y Category Journal</td>
<td>Numbers of publications in a year</td>
<td>200/year</td>
</tr>
<tr>
<td>ix)</td>
<td>International and local Conference hold by the institution</td>
<td>Numbers of conferences organized in a year</td>
<td>15/year</td>
</tr>
<tr>
<td>x)</td>
<td>Ratio of non-salary expenditure to total budget</td>
<td>Budget of non – salary expenditure &lt;br&gt;Total Budget x 100</td>
<td>50%</td>
</tr>
</tbody>
</table>

Table 3 – Sample University-wide KPIs along with benchmarking

G. Periodically collecting data to measure KPIs

To measure the effectiveness of objectives and strategic attainments, KPIs are to be analyzed periodically that either these KPIs meet the benchmark or not. To perform this operation, data is to be collected through all the departments and divisions relevant to the KPIs. In this regard, online forms have been developed for each department and division, which are communicated to send the data on quarterly basis. Online forms for following departments have been developed;

1) Academic Departments
2) Office of the Registrar
3) Directorate of Finance
4) Directorate of Industrial Liaison
5) IT Department
6) Engr. Abul Kalam Library
7) Controller of Examinations
8) Controller of Student Affairs

The collected data for the KPIs gathered in the form of MS-Excel sheets which are accumulated together and the KPIs are calculated.

H. Performing Analysis on SMART KPIs

Key performance indicators (KPIs) are monitored through the University level Board of Review (BOR), which is held bi-annually. Whereas, data for the KPIs are gathered on quarterly, bi-annually and annually basis defined by the Quality Enhancement Cell (QEC). Data for the University level KPIs are gathered through the online form for which each Area Coordinator (representative of QEC in academic and supporting department) is responsible. An intimation is sent to all the departments for gathering the data and the online form is enabled through which the data is gathered. Overall data is gathered in the form of MS-Excel worksheet on which the analysis is performed to
observe the progress in each KPIs. Following are the sample KPIs analysis taken on timeline.

Figure 1 shows the ratio of full-time faculty to total faculty members and ratio of full-time PhD faculty to full-time total faculty members along with their benchmarks marked as i and ii as mentioned in the Table 3. It shows that the ratio of full-time faculty to total faculty members has been improved to 0.796 in the year 2017-18. It was because many new faculty members were hired in the University in different academic department. The ratio of full-time PhD Faculty member to full-time faculty member is improved from 0.242 to 0.262 however it is still to be improved to 0.5. Although the KPI achieved in the year 2017-18 is still lower than the benchmark, i.e. 0.796 and 0.5 but the university is still starving for better KPIs.

Figure 2 shows the year-wise change in number of students per teacher. It is desired by the HEC that this number should be less than 20, whereas, the university has fixed the benchmark of 19 (shown as bar and marked as iii) which is maintained by the university. Decreasing the KPI is better since this KPIs shows the number of students per teacher.

Figure 3 shows the percentage of student who got scholarship other than the HEC scholarship. It clearly shows that the percentage drastically increased to 14% but still behind the set benchmark of 20%. Percentage in 2015-16 and 2016-17 are drastically low and the targets of the controller of student’s department is revised to attain large number of scholarships from the industry.

Figure 4 shows the number of trainings provided to the full-time faculty members during the three years. The benchmark set to the total number of trainings to 50 training/year. It can be clearly seen that the number of training were high in the year 2015-16, which were 61 in total, whereas, the number drastically decreased to 12. In the year 2017-18 total number of trainings arranged by the QEC and other bodies were 60 which was much more than the set benchmark.

Figure 5 shows the KPI (v), which is the PhD output per year. It was planned to be 10 graduates per year is set as per benchmark, however due to the cycle time of 3.5 to 4 years, the number of PhD graduate output is stuck to 2 graduates/year. However, from the next year it is expected that the KPI will be increased.

Figure 6 shows the KPI No. (vi) and (vii), which shows the research publications in international JCR/ISI indexed journals and X or Y category (HEC) journals. It shows the research activities performed in the university. In the year 2015-16, 144 publications were noted, in 2016-17, 203 publications were published, whereas, in the year 2017-18 total of 224 publications were noted, whereas a benchmark of 200 was set. Hence this KPI satisfactorily met in last year.
III. RESULTS

The strategic plan has been implemented in the university along with the long- and short-term objective. KPIs are the integral part of the system which are monitored periodically to measure the attainment of long- and short-term objectives along with the strategic goals. Due to the implementation of this strategy, a drastic change in the organization has been observed due to which following achievements are made by the NED University.

1) Ranked 160th in TIME Impact Ranking 2019
2) Ranked 316th among 12,000 universities in Asia in QS Ranking 2019
3) Ranked 274th among global university in UI Green Metric Ranking 2019
4) Successfully shifted 80% of engineering programmes on Outcome Based Education system (Washington Accord)
5) Won five state-of-the-art National centers from Higher Education Commission (HEC) of Pakistan
6) Acquired 124 research projects of worth Rs. 762 million ($ 4.86m)
7) Successfully established National Incubation Centre (NIC)
8) Enhanced PhD faculty up to 190
9) Increased PhD induction up to 156

I. Corrective Actions / Recommendations

Based on the KPIs analysis, corrective actions and recommended actions are presented in the Board of Review (BOR) (University Level) meetings. These corrective actions are taken as the follow-up actions up to the assigned time and responsibility to the Deans of the faculty and Chairpersons of the departments. Table 4 presented few follow-up actions of BOR assigned to the responsible person in accordance with the KPIs presented in the Table 3.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Follow-up Action</th>
<th>Responsibility</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Induction of full-time faculty members to meet KPI nos. i and ii.</td>
<td>Registrar Office</td>
<td>December 2018</td>
</tr>
<tr>
<td>ii)</td>
<td>Acquire 600 new scholarships from industry/social services</td>
<td>Controller of Student Affairs</td>
<td>Next BOR (UL)</td>
</tr>
<tr>
<td>iii)</td>
<td>Increase PhD graduate outputs up to the benchmark and devise new policy to attract more PhD candidates</td>
<td>All Deans</td>
<td>December 2018</td>
</tr>
<tr>
<td>iv)</td>
<td>Hold international and national conference in the university to meet the benchmark</td>
<td>All Deans</td>
<td>December 2018</td>
</tr>
</tbody>
</table>

Table 4 – Sample Follow-ups from the Board of Review Meeting
IV. CONCLUSION

This paper presents a strategic framework and its alignment in a higher education institute, which is generic in nature and can be applied to any HEI around the globe. It outlines a complete component of strategy which are necessary to be implemented for the attainment of excellence in higher education and research in HEIs. This article briefly describes the implementation of Key Performance Indicators (KPIs), which are aligned with the strategic need and their benchmark. These KPIs are SMART in nature which does not only provide the insight of strategic implementation but also set the future targets and responsibilities to the concern authority. Hence it can be concluded that apply vision and mission are not only the components which derive the strategies in any organization, but also needs some specific, measurable, agreed, realistic and time bounded KPIs along with the best practices-based benchmark. Timely measurement of KPIs and their analysis provides the attainment of objectives and strategies and provide the intuition to work on the weak area.

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