1 Introduction

1.1 Chapter Introduction

This chapter is about the meaning and significance of Key Performance Indicators (KPIs). Application of this concept is explained in relation to the educational environment prevailing in the Sultanate of Oman. The objectives, research design, methodology and limitations (of KPIs) are covered.

KPIs and the Academic set up in Engineering Education in Oman

The academics are rightly described in many literatures as an ocean of knowledge. The entire population is encouraged, at one time or other, to set sail in this ocean of knowledge – but for unfortunate many, it can be very brief.

It is extremely difficult to contain and spell out specifications and standards for the knowledge, it self and define and contain the knowledge in boundaries. But, for the Institutes of learning – it is quite a different matter altogether as they can be compared to the ships that sail in the ocean of knowledge – there can be specifications /standards that would depict the quality for this higher learning institutes.

The theme of my research is closely related to the quality of higher Institutes of education offering engineering programs in the sultanate of Oman. – The topic of the research reflects the focus – “Design of Key Performance Indicators for an Engineering College in Oman”. This research is done based in the context of the higher learning context and the climate prevailing in Oman.

Key performance Indicators (KPI) provides parameters for measuring the quality and standards of the institutes. The definition of Quality, is “Meeting or exceeding customer expectations “as per Dr.Edward Deming,and he notes that only the customer can define quality. However, when it comes to Quality of education, the entire society becomes the customer. The responsibility for defining the parameters of quality of education reverts to the higher learning institutes based on precepts and perceptions of the society itself. The question, therefore, is how these quality parameters are referred and defined.
On reflection, the Key Performance Indicators (KPI) reflects the critical success factors of an organization. (ASQ, Global voice of Quality). The reason being that KPIs, set standards for the institute and the performance is tracked and measured against these standards.

Should there be a uniform pattern in designing the KPIs for the Institutes that offer engineering programs?

Is there a methodology in designing the parameters?

How many parameters should exist and how these can be monitored and controlled?

What should be the benchmark standards against which these parameters should be checked?

How to monitor the KPIs and use it as a performance measurement dashboard, once they are decided by the respective university or college?

These are preliminary posers that would bog any institution that is keen to raise its quality of education standards. Taking cognizance of the vital need for setting standards, by having KPIs, many universities across the world have designed, approved and track KPIs which suit their own environments. Further a growing body of literature also evidences the influence of KPIs in the performance measurement of the Universities and Institutes.

Designing a set of ‘SMART’ (Specific, Measurable, Achievable, Realistic, Timebound), Key Performance Indicators that suits the specifics of a particular Engineering college and also takes into account, the geographical, locational and reputational needs, assume prominence in the backdrop discussed above. Adding another dimension to this requirement is the globalization that is taking place in the region. For Instance in Oman, there are institutes having affiliation with UK, West Germany and USA. Therefore it can be said, without any ambiguity, that the challenge of competition is in the air – and the only way to foster sustenance and success is to offer programs that spell quality in all its facets. The features of these facets form the Key Performance Indicators. The critical importance of KPIs in institutes of higher learning is further amplified by a statement made by Oman Accreditation Authority in their audit report of ‘Sultan Qaboos University (HEI Quality Audit Report, 2010) The only public University, established first in 1986- in the Sultanate of Oman.
Quote:

The most significant need for improvement is for the University to increase its collection, analysis, interpretation and application of evaluative information (particularly feedback data, Performance Indicators and benchmarks) and other data with which progress against objectives can be monitored.

Unquote

The audit report goes on to say that in the absence of KPIs and Benchmarks and other data the decision making is not as effectively supported as it could be. This audit report coming from OAAA(Oman Academic Accreditation Authority), effectively, highlights the weakness of the premier university, Sultan Qaboos University (SQU) and its requisition for effective decision making.

This message is further highlighted, by OAAA in its ‘Summary of recommendations to SQU as follows:

‘The Oman accreditation Council, recommends that the Council of Sultan Qaboos University regularly receive from senior management more information on quality for all key areas of activities using systematic qualitative and quantitative performance indicators.

The Oman Accreditation Council also recommends that Sultan Qaboos University expand the capabilities and capacity of the department of planning and statistics in terms of Institutional research so that it may more effectively collect, analyzes, report, and monitor data in support the University’s Key Performance Indicators and other issues as may arise.

As mentioned earlier, Sultan Qaboos is the first University established by the Government of Oman, also offering Engineering programs. The remarks made by the OAC( Now referred as OAAA) to this premier institute of learning, evidences the imperative need for other Engineering Colleges /Universities to design and implement KPIs for their own performance measurement and to satisfy OAAA as a part of regulatory requirement of Ministry of Education, Government of Oman.
Context of Engineering Education In Oman: In the Context of the Sultanate of Oman, there are 14 institutes that offer Engineering programs in their curricula. They are listed in Table 1.1.

<table>
<thead>
<tr>
<th>S.No</th>
<th>College/University</th>
<th>Programs offered</th>
<th>Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Al Musanna College of Technology</td>
<td>Computer /Electrical power /Electronics and communications /Mechanical /Quantity surveying</td>
<td>Ministry of Manpower, Govt. of Oman /1993</td>
</tr>
<tr>
<td>2</td>
<td>Ibra College of Technology</td>
<td>Computer,/Electronics and communications, Electrical power, Mechanical and Architecture Engineering</td>
<td>Ministry of Manpower, Govt. of Oman /1993</td>
</tr>
<tr>
<td>3</td>
<td>Nizwa College of Technology</td>
<td>Electrical Power Engineering, Electronics and Communications Engineering, Mechanical Engineering, and Oil and Gas Engineering</td>
<td>Ministry of Manpower, Govt. of Oman /1993</td>
</tr>
<tr>
<td>4</td>
<td>HCT Muscat</td>
<td>Electrical power, computer Engineering, Telecommunications, Civil, Architectural Engineering and quantity surveying, Mechanical, Refrigeration and air conditioning and oil and gas</td>
<td>Ministry of Manpower, Govt. of Oman /1984 /7300</td>
</tr>
<tr>
<td>5</td>
<td>College of Technology,Ibri</td>
<td>Information Technology, business Administration</td>
<td>Ministry of Manpower, Govt. of Oman - Established Sep 2007 /637 students</td>
</tr>
<tr>
<td>6</td>
<td>Shinas College of Technology</td>
<td>Electrical power, civil and Mechanical Engineering</td>
<td>Ministry of Manpower, Govt. of Oman /2005</td>
</tr>
<tr>
<td>7</td>
<td>Salalah College of technology</td>
<td>Computer, Electrical power, Electronic and telecommunications, Civil, Architecture, Quantity surveying, Mechanical, Chemical and Petro chemical engineering</td>
<td>Ministry of Manpower, Govt. of Oman /1993</td>
</tr>
<tr>
<td>8</td>
<td>Sultan Qaboos University</td>
<td>Civil and Architectural, Electrical and computer, Mechanical and Industrial, Petroleum and chemical and Mechatronics</td>
<td>Public university owned by the Government /Ministry of higher education /1986</td>
</tr>
<tr>
<td>No.</td>
<td>College Name</td>
<td>Disciplines Offered</td>
<td>Type</td>
</tr>
<tr>
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</tr>
<tr>
<td>9</td>
<td>Middle East College of Information and technology</td>
<td>Computer Science, Mechanical Engineering and Management</td>
<td>Private College.</td>
</tr>
<tr>
<td>10</td>
<td>Sohar University – Engineering College</td>
<td>Electrical and Computer Engineering, Mechanical and Mechatronic Engineering, Civil Engineering, Chemical Engineering</td>
<td>Private University</td>
</tr>
<tr>
<td>11</td>
<td>Waljat College of Applied Science, Muscat</td>
<td>Biotechnology, Computer science, Electronics and Communications, Business Administration</td>
<td>Private College</td>
</tr>
<tr>
<td>12</td>
<td>G.U.Tech</td>
<td>Mechanical, Process and environmental engineering</td>
<td>Private University</td>
</tr>
<tr>
<td>13</td>
<td>Salalah College of technology</td>
<td>Computer, Electrical power, Electronic and telecommunications, Civil, Architecture, Quantity surveying, Mechanical, Chemical and Petro chemical engineering</td>
<td>Ministry of Manpower, Government of Oman</td>
</tr>
<tr>
<td>14</td>
<td>Dhofar University</td>
<td>Chemical, Civil, Electrical &amp; Computer, Mechanical, Mechatronics, Graphic design and interior architecture</td>
<td>Private University</td>
</tr>
<tr>
<td>15</td>
<td>International College of Engineering and Management (Formerly Fire safety Engineering College)</td>
<td>Aviation, Fire &amp; Rescue, Risk and Management.</td>
<td>Private College</td>
</tr>
<tr>
<td>16</td>
<td>Caledonian College of Engineering</td>
<td>Electronics, Electrical Power, Computer, Telecommunications, Mechanical, Mechatronics, Process operations and Maintenance, Chemical, Civil, Construction and Measurement and cost engineering</td>
<td>Private – University College</td>
</tr>
</tbody>
</table>

Table 1-1  List of Engineering Colleges/ Universities in Oman
Taking reference to the comments made by OA(OAAA) and noting that even till date KPIs have not become part of any monitoring mechanism in the Sultanate, clearly establishes the gap in the knowledge base for design and implementation of KPIs in the universities /Colleges, in the Sultanate of Oman.

1.2 The role of the Government in Engineering Education
MoHE

All these institutes are guided by the Ministry of Higher education (MoHE), Government of Oman. The main focus of MoHE with respect to the higher education institutes are as follows:

Formulation of Policies for the Higher Education Sector. Allocation of public funds and other physical resources to Universities and Advanced Technological Institutes. Appendix A gives the Mission/Strategic objectives of the Ministry of Higher Education in Oman. It is under the third strategic objective of MoHE, that the Ministry is initiating efforts for performance Measurement of Private higher education institutes in the Sultanate Of Oman. Referring to Table 1-1, we could notice, that the first university (Sultan Qaboos University) offering Engineering Education was established in 1986 and since then, sixteen institutes have sprung up in the span of last 25 years. It is really a factor that the higher education in this kingdom is as young as 26 years. Having realized the emphatic need for quality in higher education across all the institutes in the Sultanate, the ruler of Sultanate of Oman, His Majesty, Sultan Qaboos bin Said, established an organization, Oman Accreditation council in 2001 – In 2009, this set up has come to be known as Oman Academic Accreditation Authority (OAAA).

OAAA

The aim of OAAA is to set the quality standards for higher education institutions and programs, and to accredit institutions and programs against those standards. It is believed that the graduates from these institutes will be as good as any other graduates from elsewhere in the world. OAAAs scope of work would encompass following: (1). Set policy guidelines for quality standards in the higher education institutes in the Sultanate of Oman. (2). Provide accreditation to the institutes and the programs of the institute (3) Provide training and offer information sharing facilities to all the stake holders with the specific purpose of creating and sustaining quality in the higher education institutes.
OQNHE

Oman quality network for higher education (OQNHE) is an independent, not for profit, network-promoted by the higher education institutes of the Sultanate. It came into existence in the year 2006 with representatives of most of the institutes nominated in the board for governance. The Mission of OQNHE is to enhance quality in higher education in the Sultanate of Oman through the sharing of ideas, strategies, research, and practices. The objectives listed are: to develop a quality culture by providing leadership and support in quality enhancement initiatives to the higher education sector and continue to build capacity through the provision of enhancement of support and training opportunities. Annexure 1 gives the Mission/ vision statement of MoHE as released by the Government of the Sultanate. MoHE(Planning, Policies, Approvals), OAAA(Quality assurance, Quality accreditation) and OQNHE(Awareness, sharing and training on quality matters) – The three organizations encompass the governance, and quality administration of the entire Higher education segment in the Sultanate of Oman.

Figure 1-1 Accreditation Process in Oman
Figure 1.1 (ref: Ref: PPT presentation ‘Oman System of Quality Management for Higher Education by S. Razwi et al (2009) Round Table conference in Malaysia) illustrates the process or quality accreditation by OAAA. Stage 1 of the process of accreditation that was carried out in SQU and OAAA remarked that the system of KPIs needs to be implemented effectively. OAAA will carry out stage 2 of accreditation, within next 4 years and would then issue the HEI accreditation certificate, if all recommendations / observations made in the first accreditation is carried out by SQU.

1.3 Objectives

In the context of the Engineering Education in Oman being provided by the higher education institutes, the question is how to develop such parameters of measurement and how it can be modeled for application in an engineering College (Caledonian College of Engineering, Oman). Further, to examine if the KPI cover primary stake holders like the staff, students and the management for effective monitoring of the KPIs.

With this problem statement in focus, the objectives of the research are:

1. Develop a system of Key Performance Indicators incorporating with a tracking and monitoring process to compare with the institutes mission and vision statements.

2. To ensure that the Key Performance Indicators cover the students, staff and the management of the teaching institutes for effective monitoring of the KPIs.

3. To validate the Key Performance Indicators so designed by conducting a survey amongst the staff of the college.

1.4 Research design

The research design would involve:

1. Deciding on the types of information needed based on the objectives of the research.

2. Identifying the sources of information – This would be at this stage, the colleges and universities in the Sultanate of Oman and also the MoHE and OAAA.
3. Strategy and collection of data and information. Depending on the information to be collected interviews, questionnaires and secondary information will have to be collected.

4. Analysis of data – Using appropriate soft wares for the analysis.

5. Interpretation of analysis

6. Design and validation of measuring system.

To support the research design, a few conferences related to the quality in higher education will also be attended.

It is sincerely felt that this research would benefit the engineering colleges and universities in Oman and perhaps even the institutes located in this region by providing a way of design of KPI and the methodology to be adopted for keeping track of the KPIs.

**KPIs data categorization:**

In general KPIs can be categorized under three categories.

**Raw data** – Relates to historic data that are generally available in the data base or published information. Example, is the number of students enrolled in a program or the number of programs offered in the college etc.,

**Progress information** – As the name indicates, it is the progress achieved interms of a project or an activity. Example -A wind mill project is being reported as 95% complete.

**Percentage change information**.-It is the change in percentage compared to a base value. Example – The percentage of students joining a program has gone up by 12% this academic year compared to the previous year.

We will be resorting to all these categories of KPIs as we progress in this research.

It will also be noted that the source of data collection and the frequency of KPI monitoring will be indicated in the Dash boards that will be prepared in this research.
1.5 Methodology

It has been observed that KPI is very much in the nascent stage of development in Oman. In many western countries, higher education institutes publish their Key Performance Indicators and the details of their performance are in the public domain.

Considering the status of KPI development in Oman, the following methodology is followed:

1. A questionnaire survey is sent across to 16 Universities/ Engineering Colleges in Oman. (Appendix B)
2. Based on the survey information collected, the status and percolation of information about KPI is ascertained.
3. As per the recommendations made at the time of initial synopsis presentation, three stakeholders are identified - Students (Customers/ Staff/ Management). These three stakeholders’ perspectives are considered to identification of KPIs.
4. A survey was conducted among the students and staff to understand the stakeholders interaction in general and the students English language problem. It helped in getting a view about their motivation and the cultural background. (Appendix C)
5. An interview was also held with MoHE Ministry about KPI and the Governments view about its installation in all colleges.
6. The information collected from MoHE is checked with the Engineering College where this thesis is being researched.
7. A literature analysis is done to get the current status of KPI adaptation by other universities in different countries.
8. The Mission / Vision statement of the college and the strategic goals of the college are taken up for identification and development of the KPIs of the Engineering College.
9. The identification process is further supported by interviews held with different department personnel to understand the factors that influence the performance.
10. The identified KPIs are discussed with the Acting Dean of the college for comments/ modification / inputs.
11. The identified KPIs are aligned with the Balanced Score Card as proposed by. Prof. Robert Kaplan of Harvard Business School.
12. Excel Based software is identified to represent the KPIs.
13. Assumed data is filled in the software to get a view of the dash board.
14. A recommendation is made to the College Management for KPIs/ dash board monitoring and a thesis report is submitted.

1.6 Limitations
This research thesis focusses on designing KPIs for the Engineering College – Caledonian college of Engineering, Muscat, Oman. The following points are considered in this work:

1. The financial factors are outside the purview of this study. The financial Performance Indicators are normally considered to be confidential by the college.
2. On the basis of this research, KPIs will be developed. These KPIs - Translated from qualitative performance Indicators to Quantitative ones- may not have ready data available to get a feel of the present performance status in respect of all KPIs.
3. Performance-This would become even more difficult if we have to check the performance status of the college for the KPIs for the past academic years. However, to get a sense of the degree of performance and to get a measure of the software monitoring results, likely data will be assumed for past academic years.

The KPIs developed in this research work, will be from the perspectives of Students/ Staff and the Management only. Such KPIs can also be developed for Employers’ (of students) and the MoHEs perspectives.

Ministry of Higher Education has dedicated a section for implementation of KPI system in the Sultanate of Oman. As per the meeting held with the officer in charge of the section, the Ministry has developed 116 KPIs applicable for all higher education institutes across the Sultanate. Individual college/ Universities Mission and Goals can be specific to their own objectives and specializations. Therefore, the existence of such KPIs, may not form the building blocks of KPI development of respective colleges. In a meeting held, in this academic year, the Ministry spokesperson informed that the goals of the KPIs are in alignment with the goals of the Education Ministry at the National (Macro)level.
1.7 Chapter summary

In this chapter, the role of the Ministry and their involvement in higher education institutes and the specific roles of other Governmental regulatory bodies such as OAAA and OQNHE are covered. Further, the objectives, research design and methodology of this research are listed out. In the next chapter on Literature Review, the genesis of KPI in the Sultanate will be examined and the views of other researchers in this area will be explored.

It is important to mention here that the MoHE in the Government has employed personnel to design the KPIs for private higher education institutes in the Sultanate of Oman. The perspective of this exercise from an Individual higher education point of view is also discussed in the chapter. Furthermore, even this exercise is also still under nascent stage of progress and development. In the next chapter, the literature support for KPI is examined.