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Balanced Scorecard evaluation in Research & Development(R & D) Activities in Indian Engineering Institutions

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ABSTRACT

Balanced scorecard (BSC) still didn't show its full face in the performance evaluation of Higher Education Institutions especially in Engineering Institutions. Also there is a lack of knowledge in the application of the balanced scorecard in Educational Institution's. The strategic management of an educational institution depends on SWOT analysis and BSC. A decrease in the awareness of strengthening, the R and D activities in the institution results in the poor income of the management. The proposed study evaluates the research and development activities of an institution with BSC as a performance indicator. The four BSC views are considered for the evaluation of the R and D activities. A survey of some important parameters is considered for evaluating the research and development activities of an institution. This study helps to improve the implementation of the strategic plan and management in Research and Development.

Keywords: *BSC, Customer satisfaction, Engineering education, internal processes, R and D activities*

1. INTRODUCTION

In general, Higher Education (HE) point out professional, technical education and academic learning that is offered by any universities (Government or Non –government), affiliated colleges and stand-alone institutions[1].According to the MHRD survey in the year 2016,in AISHE web portal list, there are 799 Universities, 39071 colleges and 11923 Stand-Alone Institutions and 307 Universities are located in rural area.

Figure 1 shows the survey of different HEIs in India.

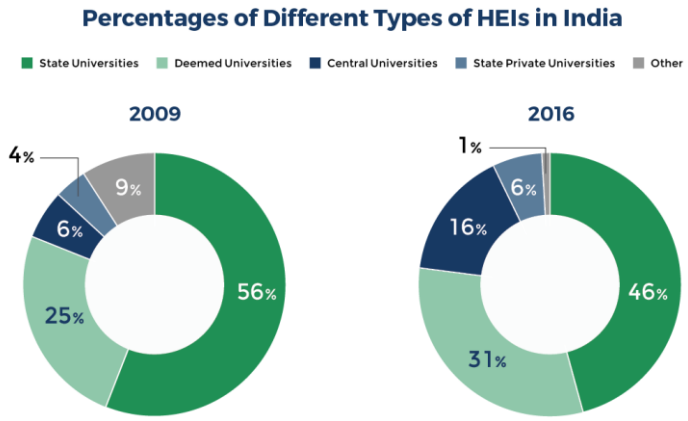

Fig.1. Percentage of HEIs in India [1]

According to the survey, it is visualized that more HEIs are existing for stressing more importance in education. So quality of education system plays a vital role in India. So there is a need for a continuous assessment system in an institution to keep up their standards. The important parameters that are measured to improve the quality of the education system are academics teaching learning, Research& Development activities, Finance administration, Quality Assurance(Planning & development), stakeholders input and feedback . Lot of rubrics exist to evaluate the quality of the education and analyze the feedback from various stakeholders improve the education system in various aspects. One of the important rubrics is the BSC to evaluate the performance of the organization in both financial and non-financial aspects.

Balanced Scorecard is a standard metric to measure the organizational performance to develop a strategic planning to measure the outcome in four acute areas: finance, learning and growth, customers, and internal processes [2].

Both financial and non-financial aspects are included in the BSC model which differs from the other parameters. In a nut shell, it includes drive performance and evaluates the outcome. Long term planning depends on the benchmark performance parameters taking in to account financial indicators. Organizations use BSC to visualize the monetary benefits based on the continuous progress of the organization and derive immovable assets for the prospects.[3]
It is necessary to define the clear mission, vision and objectives of the institution or organization involved in the strategic plan with the certain rubrics to evaluate the performance of the institution. Some institution doesn't have the complete cycle of strategic plan and struggle because of its non-determination of measures and attention.
This article focuses on the effective strategic plan of the institution by introducing balanced score card in the research & development activities.

2. RELATED WORKS

There are only articles explaining about BSC in the engineering education. Also only few points about R and D are discussed in the survey papers. Few papers are explained:

In [3], the authors explained a case study in a private university Arab Academy for Science, Technology and Maritime Transfer, for a period of 2016-2021 using BSC concept. The paper discusses the implementation of BSC with the predefined four perspectives in the improvement of strategic plan and its future research scope.
In [4], the authors overview the validation and maintenance of score card. A software program describing the score card is discussed. It discusses about the various courses offered in the engineering college. The implementation of innovative methods in teaching learning is also discussed by the authors. Also the paper depicts that no rubrics exist to monitor the performance of the institution.
In [5], the authors discussed the implementation of BSC as a metric in Emirati higher education institutions. The paper discusses the improvement in the performance based on BSC. Also the paper is explains the case study as a research method. The paper explains the SWOT analysis and BSC for an effective strategic plan. Stakeholders input are also considered for an effective implementation of strategic plan.

In [6], the authors explain implementation of BSC in business and higher education institutions. The paper explains the parameters needed for BSC in business and parameters considered for the BSC in HEI. The authors highlight the importance of BSC as a performance indicator and better management system in academic institutions.

In [7], the author overviews the improvement of education quality and a metric to evaluate the performance in education institutions. The parameters needed for the academic excellence is discussed by the authors. The authors discuss the need for the continuous visualization of the performance of the organization. The implementation of BSC in higher education is discussed in the paper.

Only a few literatures are available depicting the details of the BSC implementation in different organization in various domains. Still now a better implementation of the BSC is not involved in the R and D activities performance improvement. BSC has not completely shown its face in engineering institutions. Inspired by this, BSC rubric is proposed to be implemented in Research & Development activities in Engineering Education.

The major contribution of the proposed method is,

1. Four Perspectives of BSC related to R and D activities

2. Important Rubrics evaluating R and D activities

3. Improvement in Financial considerations due to R and D and Validation of BSC

The organization of the paper based on the major features is as follows: Section 1 gives a brief introduction about BSC. Section 2 consolidates the previous literature review related to the BSC role in different types of organization. Section 3 describes the proposed method in R and D based on the 4 perspectives of the BSC and Section 5 deals with rubrics related to BSC in R and D activities to improve the performance of the institution. Based on the rubrics the financial improvement and validation of BSC is illustrated in Section 6. Section 7 concludes with emphasizing the important features related to BSC and future prospects in the organization.

3. PROPOSED METHOD BASED ON 4 BSC PERSPECTIVES

The four BSC perspectives are shown in Figure 2.

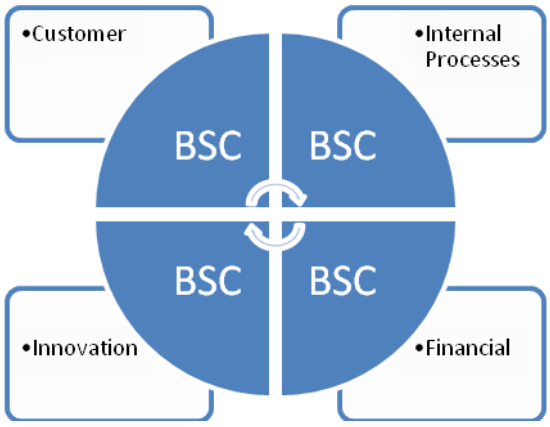

Fig.2 Balance Score Card Perspectives

The four factors, the BSC depends are the 1. Financial aspects 2. Internal processes 3. Customer and 4. Innovative practices.[8]

In an Engineering education, all the four process are clearly adopted by the Internal Quality Assurance Cell (IQAC). The strategic plan on par with the institution objectives, Vision and mission improves the quality of the education based on the stakeholders input(Alumni, Employers, Parents , Faculty, Industry and students). Based on the above said perspectives, BSC implementation in Research and Development activities in an Engineering Institution is planned to improve the finance and quality of the institution.

Four important R and D factors related to BSC perspectives:

1. **Customer:** In R and D aspects, lot of consultancy projects can be executed based on the faculty competency. The employers or industry can have a tie up with the organization in terms of product design in any of the domain and increase their value in term increase the assets of the Institution.

2. **Internal Process:** The Institution can have an internal system to monitor the activities of the research and outcome in terms of equipment's or finance to upgrade the institution. The organization head can have a periodic review of the research activities of the Institution. The review shall focus on the projects submission, Standard papers, Innovative start up projects and consultancy to improve the Internal Revenue Generation (IRG).

3. **Finance:** The foremost important factor in BSC is the financial aspects of the Institution. It is a two way analysis such as Income as well as outcome basis. The incomes generated through important factors such as accreditation, Research grants, Innovative contests, outreach programs, consultancy programs etc., are the main financial assets.

4. **Innovation:** In order to improve and strengthen the research and development activities, the institution can promote can promote various innovative practices such as research award for a project approvals and paper awards based on the quality of the journal. Also the faculty involved in the Consultancy projects, can be awarded and appraised. These are the factors which improve the R and D activities of the institution.

The important parameters or rubrics needed for the performance validation is explained in the above said four important features related to BSC.

4. IMPORTANT RUBRICS EVALUATING R and D ACTIVITIES

The performance improvement in terms of BSC related parameters are discussed for Indian engineering Institutions.[9]

1. The main priority in engineering education to improve our R and D aspects is curriculum. Curriculum for the students to update them in recent research challenges and solutions to real time problems. Technology Forecast to be included in curriculum. This improves the quality of the education system.
2. Next important parameter is the internal processes. This parameter involves a sequence of processes to decide the efficient outcomes necessary for the performance improvement in engineering education focusing R and D. The process should include periodic review of the students and faculty research and innovation and perform gap analysis. Based on the gap analysis necessary changes in the process have to be initialized. This improves the strategic plan of the institution in terms of R and D.
3.Based on the key performance indicators, improvement in the process need to be initialized. Engineering educational institution prerequisites which internal processes can fulfill the target requirements of the parents, employers and which requirements need strategic changes.

4.The placement records are important performance indicator which depends on the innovation aspects. The profile of the student can be improved or emphasized by means of various consultancy projects, R and D projects-I and R and D projects-II. The students and faculty improve the requirement of the employers based on their co-curricular involvement. These factors need to be analyzed in the internal process.

5. Identifying key components and need for the priority improvement process are the important factors in engineering education. The process should focus on the survey questions which identify the components of internal processes which roots to the improvement obligatory in the final outcome. The most significant one is identified for the earlier improvement in the performance.

6. The factors related to National Institute Ranking Framework (NIRF) and Atal Ranking of Institutions on Innovation Achievements (ARIIA) also paves way for the identification of key components related to research and Development activities in the engineering education.

7. Identifying the innovative teaching methodology or pedagogical initiatives can improve the critical thinking of the faculty and students which in turn improves the performance of the institution. The students can differentiate themselves by collaborative learning, self-learning activities, innovative projects and internships which are the baseline for the high quality research.

8. In addition, for full time research scholars, research fellowship, scholarships can be given more importance to support their research.

9. Not only the performance indicator such as scholarship, services, another parameter need to be considered is workplace satisfaction for faculty. In addition, the infrastructure is considered for the students. For faculty, attractiveness parameters such as workplace, turnover, compensation, assessment of workplace and ambience needs to be considered. These factors are assessed by the Institutional data and perceptual data from faculty.

10. Financial:

The final and important indicator is the revenues generated in the institutions through research grants tuition fees, donation etc., Also expenditures such as budgets, salary, infrastructure development, consultancy equipment's and maintenance budget need to be considered. Figure 2 depicts the various metrics used for assessing the R and D activities in engineering education.

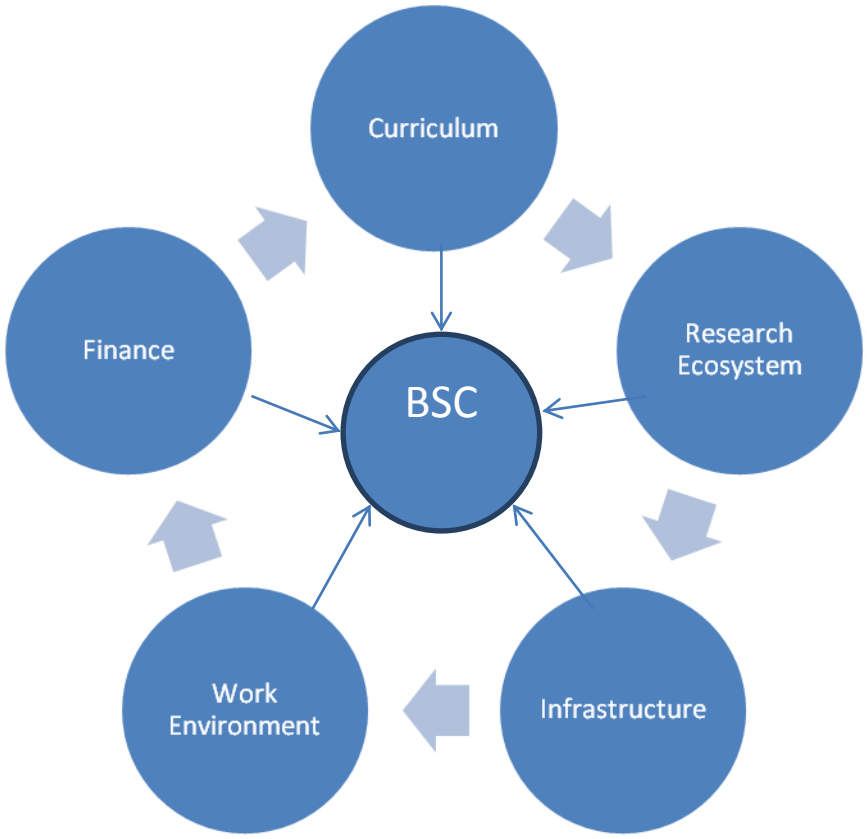

Fig.2 Rubrics used to evaluate R and D activities in Engineering Education

5. IMPROVEMENT IN FINANCIAL CONSIDERATIONS DUE TO R and D and VALIDATION OF BSC

If all the above factors are carried out effectively, the financial income of the institutions can be improved. BSC evaluates all the critical factors related to the R and D activities. If the BSC is implemented correctly and critical analysis if carried out, an improvement in the strategic plan will be visualized. The funds generated through the r and d activities improve the state of the art infrastructure. The research equipment's through grants can be emphasized more to improve the Internal Revenue Generation (IRG). Research ecosystem can be improvement by means of research funds. The quality of the institution can be improved by the more research focus. So the implementation of BSC can be validated through the performance improvement in the R and D activities.

Table 1 summarizes the various metric considered in BSC for the development of R and D activities

Table 1: Indicators and their value

Parameters	Objective	Indicator
Competency	Increase faculty competency in various research domains	Percentage of faculty and research programs as a baseline
Research Ecosystem	Creating a research ambience in terms of research equipment's and laboratory	Percentage of Students and faculty ; Performanceimprovement over time
Infrastructure	Contemporary facilities for the students and faculty	Percentage of Students and faculty ; Performance improvement over time
Resource Management	Revenues improvement and incentives for entrepreneurs	Projects tie up with industries Startups….
Curriculum	New technology forecast, technology based curriculum, industry based syllabus for students	Assessment based on project based learning and innovative assessment
Innovative Methodology	Pedagogical Initiatives and innovative teaching methodology.	Innovative Assessment- project based.
R and D Projects	Inclusion of consultancy projects, r and D projects I and II in curriculum	Patents, Innovative projects, startups , Entrepreneurs etc.,

6.CONCLUSION

Initially, balanced score card normally implemented in industries. But nowadays BSC has started showing its face in Educational institutions to measure the performance in various domains. It is rooted with vision, mission, objectives in turn strategic plan of the institution. BSC identifies the key performance indicators of the institution. Naturally implementation of BSC in higher education focuses on the resource improvement as well as financial improvement. BSC in engineering education improves the weaker session of the institution. This paper focuses on the BSC in R and D activities of the engineering education. The parameters such as research grants, faculty competency, environment, work satisfaction and efficient curriculum results in a better definition of BSC to improve r and d in engineering education.

REFERENCES

[1].JyothiBanwetDeshmukh, "Balanced Score card for performance evaluation of R and D organization" Journal of Scientific & Industrial Research , V0l.65,2006.

[2].Teresa García-Valderrama, Daniel Revuelta-Bordoy,Eva Mulero, " A Balanced Score card framework for R and D",European Journal of Innovation Management · April 2008

[3].Mohamed Wahba, "Balanced Scorecard in Higher Education Applied case study on "Arab Academy for Science, Technology and Maritime Transport", 2012.

[4].SasimaThongsamak, Glenda Scales, Cheryl Peed, "Development and Implementation of a Balanced Scorecard forEngineering Distance Learning Programs", American Society for Engineering Education, 2007 ,pp.12.501.1.

[5].KaïsLassoued"Balanced Score card implementation in Higher Education Institution:An Emirati Perspective"Corporate Ownership & Control / Vol.15, No. 3, Spring 2018.

[6].Archana Patro, "Using Balance scorecard in Educational institutions", International Journal of Business and Management Invention ,Vol.5, No.11, November. 2016.

[7].MichałPietrzak, Bogdan Klepacki,Joanna Paliszkiewicz "The Application of the Balanced Score Card in the higher Education setting of a polish university" Online Journal of Applied Knowledge Management,Vol. 3, Issue 1, 2015.

[8].Abdulsattar Mohammad Al-Ali, "Developing the Balanced Scorecard Framework for Higher Education: Conceptual Study", Proceedings of the 2012 International Conference on Industrial Engineering and Operations ManagementIstanbul, Turkey, July 3 – 6, 2012.

[9].DidikNurhadi, "Designing a Balanced Scorecard Model to EvaluateStrategies of Engineering Educational Institution", AIP Conference Proceedings, 2016.