Pareto analysis of critical factors affecting technical institution evaluation

Victor Gambhir[a*], **N.C. Wadhwa**[b] and **Sandeep Grover**[b]

[a]*Manav Rachna International University, India*
[b]*YMCA University of Science & Technology, Faridabad, India*

A R T I C L E I N F O	A B S T R A C T
	With the change of education policy in 1991, more and more technical institutions are being set up in India. Some of these institutions provide quality education, but others are merely concentrating on quantity. These stakeholders are in a state of confusion about decision to select the best institute for their higher educational studies. Although various agencies including print media provide ranking of these institutions every year, but their results are controversial and biased. In this paper, the authors have made an endeavor to find the critical factors for technical institution evaluation from literature survey. A Pareto analysis has also been performed to find the intensity of these critical factors in evaluation. This will not only help the stake holders in taking right decisions but will also help the management of institutions in benchmarking for identifying the most important critical areas to improve the existing system. This will in turn help Indian economy.

1. Introduction

Over the recent years, technical education in India has gone through rapid, radical and even revolutionary changes. This has generated opportunities to open technical institutions with business orientation. Thousands of technical institutions have come into existence since 1992 in India. Some of these institutions are very good and have realized the importance of quality but there are many insitituations with low level of required educational requirements. So students are in a great confusion to select the best institution for their higher studies. Every year entrance exams are conducted in India and students have a lot of options in terms of institution according to their ranking. Although many agencies provide ranking of the institutions every year but these ranking are contradictory and instead of solving the problem, alleviate it. Moreover these rankings seem to be influenced or biased. An engineer with the thorough knowledge places a great role in Indian economy than to an engineer holding just a graduate degree. Even the technical institutions themselves want to be benchmark with the peers for improvement. So the problem of technical

* Corresponding author. Tel: +989126980426
E-mail addresses: gambhirvictor@hotmail.com (V. Gambhir)

institution evaluation is important for everyone and has great role to play in everyone's life because everybody is associated with education in one or other way. Seeing the importance of the problem, the authors have made an endeavor to find the critical factors for technical institution evaluation from literature survey. Many researchers in the past have identified different factors for institution evaluation but as per authors' knowledge no literature review has been attempted in the past to collect all critical factors at a single place. A Pareto analysis has also been attempted to know the critical factor intensity in evaluating technical institution.

In this paper a total of 35 quality research papers have been reviewed to find the critical factors. To find the good papers all the leading search engines as well as renowned publishing houses such as Elsevier, Taylor & Francis, Inderscience, Springer & Emerald have been searched. The remaining paper is organized as follows. Section 2 deals with identification of critical factors. Section 3 discusses pareto analysis and conclusion is provided at the end.

2. Identification of critical factors

Table 1 lists the critical factors with the name of the contributors. 40 factors were identified but with the opinions of experts and academicians these were reduced to 23, because other factors were either similar or they seem to be less important.

Table 1
List of Critical Factors for Technical Institution Evaluation

Critical Factors	Contributors
1. A well accepted vision and mission	Lisensky (1988), Sherr and Tecter (1991), Nadeau (1993), The Conference Board (1993), Downey et al. (1994), Finch (1994), Lewis and Smith (1994), Burkhalter (1996), Frazier (1997), Madhavan (1997)
2. Clearly defined and specific goals	Seldin (1988), Lawton (1994), Billing (1996)
3. Effective and efficient leadership	Reid et al. (1987), Teauber (1987), Scheerens (1989,1992), Lezotte (1989), Rossow (1990), West-Burnham (1992), Nadeau (1993), Oakland (1993), The Conference Board (1993), Finch (1994), Dahlagaard et al. (1995), Spanbaurer (1995), Lozier and Tecter (1996), William (1996), Frazier (1997), Scheerens and Bosker (1997), Tang Zairi (1998)
4. Clear & specific policies & procedures	Tang and Ziari (1998)
5. Strategic & operational planning	Shirley (1988), Lisensky (1988), Binney (1992), Finch (1994), Frazier (1997), Owlia and Aspinwall (1997), Tamg and Zairi (1994)
6. Clear organizational structure and design	West Burnham(1992), Downey et al.,(1994), Lewis and Smith(1994)
7. Delegation of authority/ power distribution	Developed by self
8. Budget priorities-proactive & objective driven	Finch (1994)
9. Well defined curriculum design	Adapted by Frazier (1997)
10. Suitability & relevance of curriculum content	Adapted by Frazier (1997)
11. Curriculum planning, design, periodic review	Frazier (1997)
12. Instructional competence-Expertise and adequacy	Trethowan (1987), also adapted from Pratt and Steanning (1989)
13. Instructional arrangement – class size, adequate infrastructure & facilities	Developed by self
14. Adaptive recourse allocation	Developed by self
15. Adequate and competent administrative staff/ support staff.	Adapted from Owlia and Aspinwall(1998)
16. Trustworthiness amongst all	Owlia and Aspinwall(1998)
17. Well defined channels of communication	Murgatroyd and Morgan (1993), the conference board(1993), Oakland and Oakland (1998), Gurnani (1999)
18. Customer focus/ need based	Binney (1992), Marchington (1992), West Burnham(1992), Downey et al.,(1994), Dahlgaard et al.(1995), Spanbauer(1995), Lozier and Teeter(1996), Owlia and Aspinwall(1998), Sirvanci(1996), Boaden(1997), Frazier(1997), Madhavan (1997), Gurmami(1999)
19. Reward policy and Incentives Schemes	Binney(1992), the conference board (1993), Raisbeck(1994), Gurnani (1999)
20.clear and well defined values and norms	Rutter et al.,(1979)
21. Differentiation- adaptive service for its customers	Horne and Pierce(1996), Scheerners and Boasker (1997)
22.Emphasis on training and development for all	The conference board (1993), Raisbeck (1994), Spanbauer (1995),Lozier and Teeter(1996), Boaden (1997), Owlia and Aspinwall(1997), Oakland and Oakland (1998), Gurnani(1989)
23.Collaborative decision making	Lewis and Smith(1994), Pashiardis (1998)

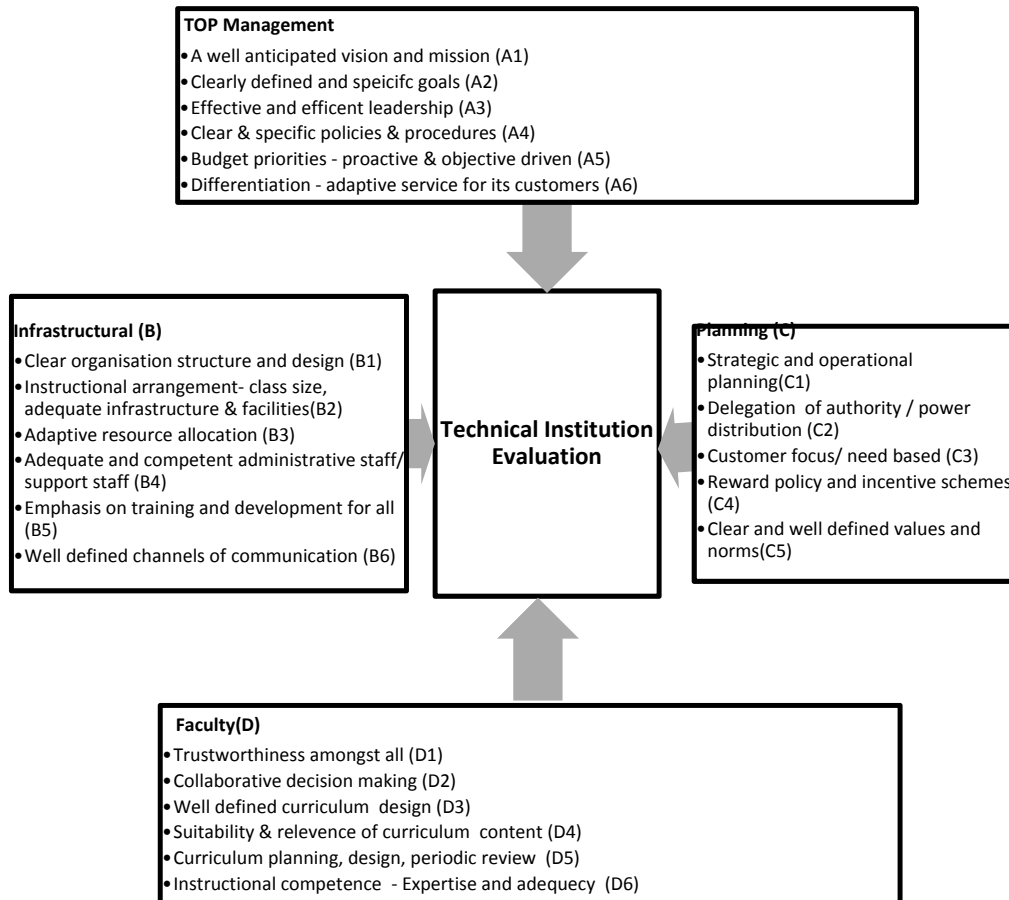These 23 factors are further divided into four clusters by consulting with experts, which are shown in Fig.1.

TOP Management
- A well anticipated vision and mission (A1)
- Clearly defined and speicifc goals (A2)
- Effective and efficent leadership (A3)
- Clear & specific policies & procedures (A4)
- Budget priorities - proactive & objective driven (A5)
- Differentiation - adaptive service for its customers (A6)

Infrastructural (B)
- Clear organisation structure and design (B1)
- Instructional arrangement- class size, adequate infrastructure & facilities(B2)
- Adaptive resource allocation (B3)
- Adequate and competent administrative staff/ support staff (B4)
- Emphasis on training and development for all (B5)
- Well defined channels of communication (B6)

Technical Institution Evaluation

Planning (C)
- Strategic and operational planning(C1)
- Delegation of authority / power distribution (C2)
- Customer focus/ need based (C3)
- Reward policy and incentive schemes (C4)
- Clear and well defined values and norms(C5)

Faculty(D)
- Trustworthiness amongst all (D1)
- Collaborative decision making (D2)
- Well defined curriculum design (D3)
- Suitability & relevence of curriculum content (D4)
- Curriculum planning, design, periodic review (D5)
- Instructional competence - Expertise and adequecy (D6)

Fig.1. Technical Institution Evaluation clusters and detailed criteria

3. Pareto analysis of critical factors for technical institution evaluation

Pareto diagrams are named after Vilfredo Pareto , who studied the distribution of wealth in 19th century Italy, that is, the number of people in various income classes. Juran (1989) extended this idea beyond the principle of wealth to problems in general. Pareto diagram are a special type of histogram, which helps determine which factors are most important and in what order they contribute. The bars in Pareto diagrams are rearranged in descending order of their heights, showing the individual contribution of each factor as well as the cumulative contributions. The purpose is to identify high priority items by separating the "vital few" from the "trivial many". The preparation of Pareto diagram follows the following steps:

- Identify the factors to be compared and arrange them in desired order,

- Select standards for comparison or categories into which you want to group the data,

- Collect data and total the occurrences in each data category,

- List categories from left to right on the horizontal axis in descending order – from largest to smallest,

- Draw bars representing the frequency of the items,

- Calculate the cumulative frequencies and percentages,

- Construct a cumulative line graph.

The factors reported by the selected articles were extracted and presented in a Table 1. The factors that were recommended by the authors for effective evaluation were included in the Pareto analysis. The Pareto analysis of factors compiled from selected articles is presented in Tables 2 and Fig.2. Top Management has come at the top with 64% literature support while other factors occurs at only 36%.

Table 2
Pareto Analysis Data

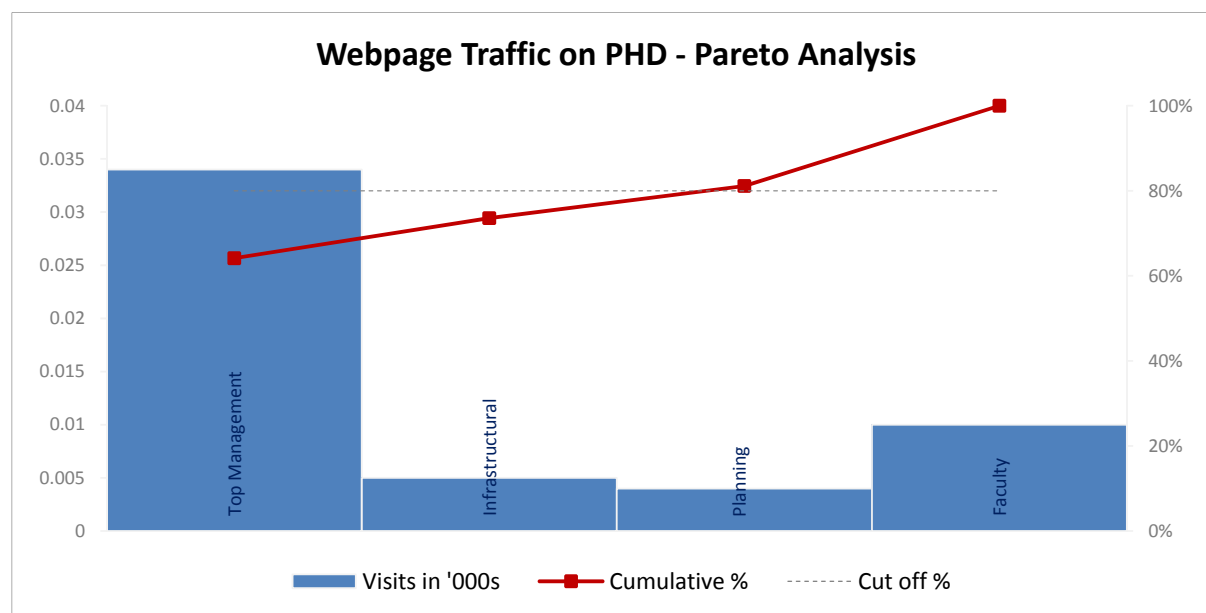| Critical Factors	No. of Articles	Cumulative %	Cut off %
Top Management	34	64%	0.8
Infrastructural	5	74%	0.8
Planning	4	81%	0.8
Faculty	10	100%	0.8

Fig. 2. Pareto Analysis

4. Conclusion

Technical institution evaluation is important for stakeholders, management as well as for strong economy of India. Critical factors have been identified from literature survey and pareto analysis has been carried out to now the intensity of these factors in evaluation. The pareto analysis shows that top management is the most target factor in literature. This seems to be right because if the vision and policies of the top management are correct and in the best interest of stakeholders and institution then definitely everyone will be beneficial. The second important factors come out to be faculty which is the pillar of any good technical institution The third important factors comes out to be planning, which is another most critical factor because all depends upon building right planning in the starting and in the last infrastructural factor comes. A good infrastructure will definitely produce more opportunities to provide the class education.

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