

International Journal of Engineering Sciences & Research Technology

(A Peer Reviewed Online Journal)
Impact Factor: 5.164



Chief Editor

Dr. J.B. Helonde

Executive Editor

Mr. Somil Mayur Shah

**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY****TOP-DOWN APPROACH TO PROBLEM SOLVING****Aakash Bhattacharjee**

School of Business Management, NMIMS Mumbai

DOI: 10.5281/zenodo.7079301

ABSTRACT

There are typically two primary ways to approach problem-solving - "top-down" and "bottom-up". In the structured approach to solving problems, often larger issues are broken down into smaller pieces. Those components of the problem are arranged in a hierarchical manner, with the top priority issues at the top. To these, gradually, details are added. In this research paper we shall present a case study and evaluate the goodness of the top-down approach.

1. INTRODUCTION

A top-down approach indicates that the highest-level question or subject is used as the starting point for problem solutions. One could refer to it as a controlling notion. From there, the issue is dissected, with a focus on the important or vital few impact drivers, before identifying and creating the pieces at the next level below. The emphasis only shifts to tactical details after those crucial factors have been established. It can be highly exhausting to repeat the process while adding more layers to the hierarchical structure. This strategy is the reverse of the bottom-up strategy, which starts with the minute, particular details. When using a bottom-up strategy, the work is concentrated on compiling a comprehensive list of concerns and grouping them together. These groups can be clubbed together, and we can climb up the hierarchical tree, finally reaching the topmost issue or theme.

Working at the top is regarded as strategic, while working at the bottom is tactical, which is the simplest way to explain the distinction. Instead of thinking tactically, consultants are urged to think strategically. A strong argument in favor of top-down thinking is that it is rational, structured, and identifies the most crucial questions and issues first. The presumption is that the remainder of the job will proceed in the right direction if enough intelligent, experienced, hardworking consultants and clients agree on the overarching idea.

The rest of the paper is organized as follows. Section 2 presents overview of some research papers, Section 3 presents the steps of the top down approach and the case study and Section 4 concludes the paper.

2. LITERATURE REVIEW

We first present a review of some research papers where the different problem-solving approaches have been dealt with. Indika et al in [1] explain the importance of creative solutions in Online tournaments designed with minimum effort. The findings imply that solvers deliberately distribute their efforts throughout the competition to dynamically optimise their payoffs by balancing the cost of exerting effort with the likelihood of winning. According to the results, high-skill solvers are more likely to put in a last-minute effort than are solvers with lower skill levels. This seems to be a subtle problem-solving approach underlying this type of behavior of the highly skilled people. Xicheng et al in [2] present that there are different writing techniques for task instructions, with varying degrees of informational and solver-persuasiveness. The research asserts that the reward-based approach is effective at encouraging solver involvement by examining how requirement- and reward-oriented techniques affect solver participation. Searchability in a knowledge repository, using retrieved knowledge to solve problems, and support for knowledge contribution, according to authors in [3], are features that are very



significant. Furthermore, two of these correlations are influenced by how much a knowledge worker thinks the environment is favourable for KR knowledge sourcing.

According to authors in [4], research on decision support systems (DSS) has mostly concentrated on data expansion and model improvement, but little emphasis has been given to DSS design, which unifies these DSS components. This essay considers the needs of managers who are not computer specialists while nevertheless engaging in unstructured issue solving. Since most organisations currently rely on their IT systems to run on a daily basis, cybersecurity is allegedly a severe threat to information technology (IT) systems, according to Patrick et al. in [5]. The researchers gathered data, primary observations, and a corpus of secondary materials at a large industrial company. Senior management empathy and resource mobilisation were important explanatory factors or turnaround mechanisms that moderated this oscillation. According to the research, senior management is vital in altering employees' emotional and coping skills through their intervention and support. The interaction of machine learning with optimization issues is

viewed as a crucial approach to problem-solving in [6]. Encoding techniques from machine learning and regressors were initially contrasted with the goal of making categorical scaled problems amenable to prediction, optimization, and even integration.

3. CASE STUDY TO ILLUSTRATE THE STEPS OF TOP-DOWN APPROACH

Case Study – A Higher education organization BIG University, is gradually falling in the national rankings and wants to improve. The AANI Consultancy agency is employed to solve this problem.

Solution by AANI –

1. *The rank calculation scores to be examined by the CEO.*
2. *The important factors to be identified.*
3. *The key personnel responsible for these factors to analyse and find subcomponents.*
4. *Focus group discussions with next group of people to analyse each subcomponent and propose solutions.*
5. *Report back to the CEO for implementation of solutions.*
6. *Prepare for the next iteration.*

These steps are illustrated by the Figure 1

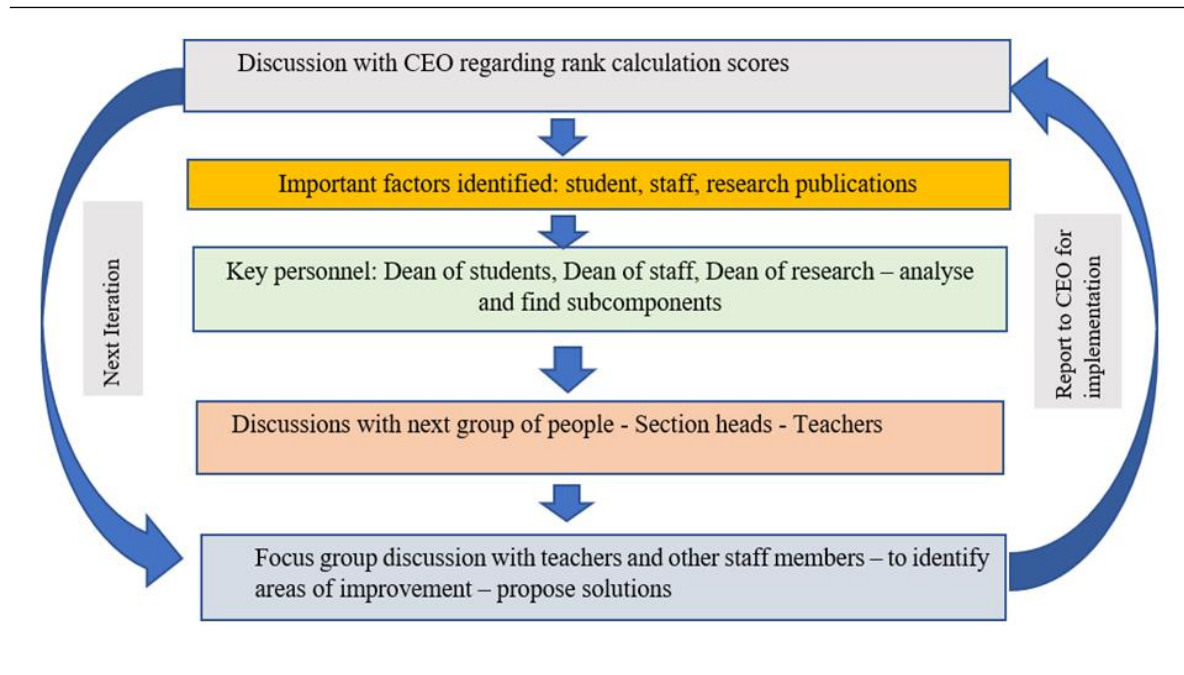


Figure 1. The steps of Top-Down problem solving

As an example, in our Big University case study, the AANI personnel, Ms. Nidhi identifies, upon discussion with the Dean students, that admissions in Post graduate studies is a major concern. In Figure 2, the steps of expanding this subcomponent bubble for the Postgraduate students are illustrated. The identified issue and the proposed solution are presented.

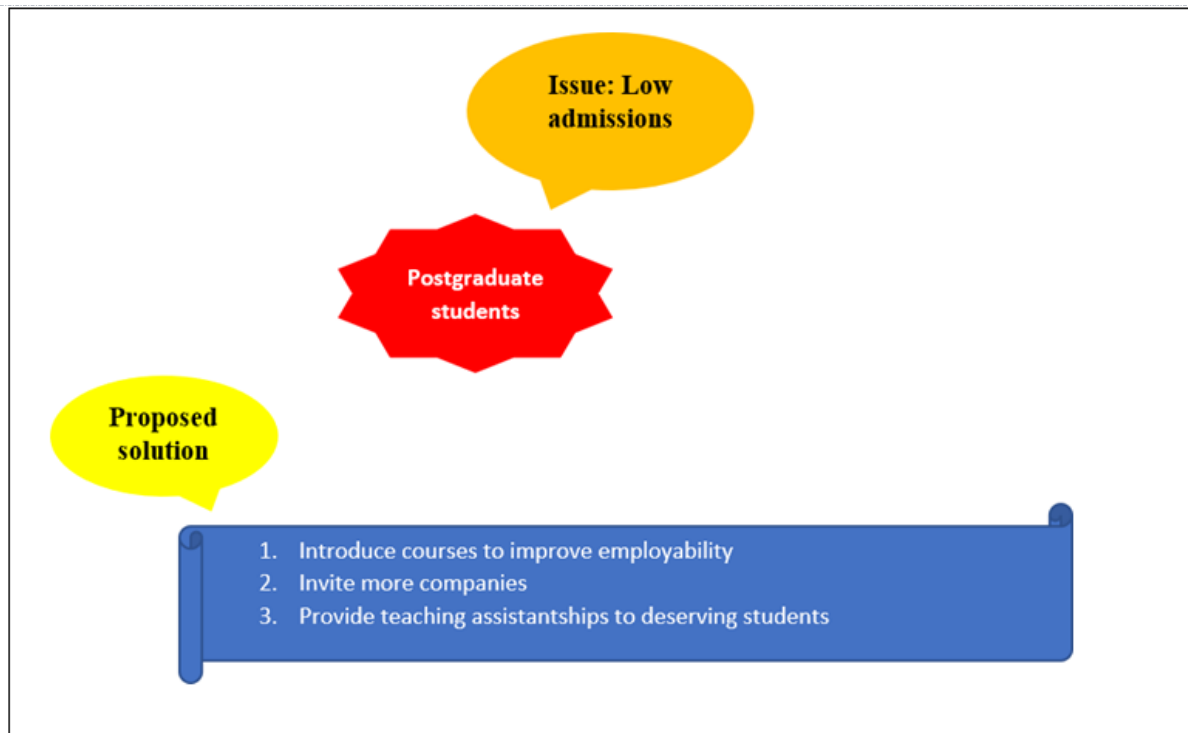


Figure 2. The steps to solve the subcomponent (student) – of post graduate admission in Big University

Figures 3 and 4 illustrate the steps of expanding the subcomponent bubble for the Staff members and Research publications respectively. The identified issue and the proposed solution are presented in both the cases.

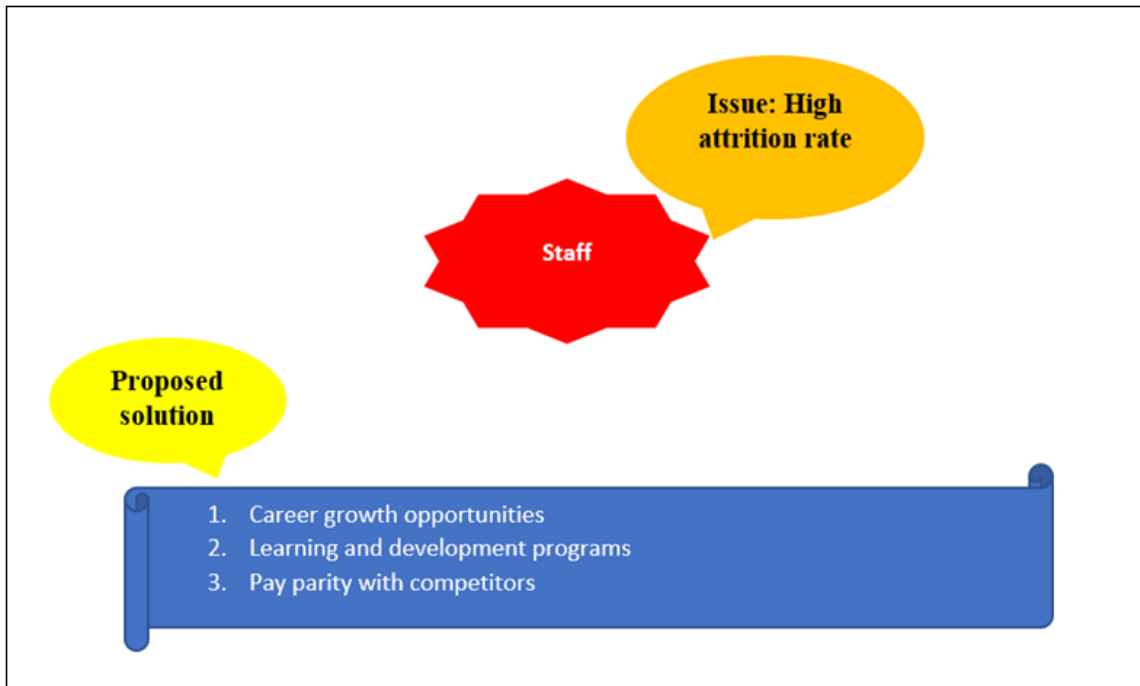


Figure 3. The steps to solve the subcomponent (staff)– of post graduate admission in Big University

From Figure 3 it can be seen that quite feasible solutions have been proposed by the concerned section heads or other members.

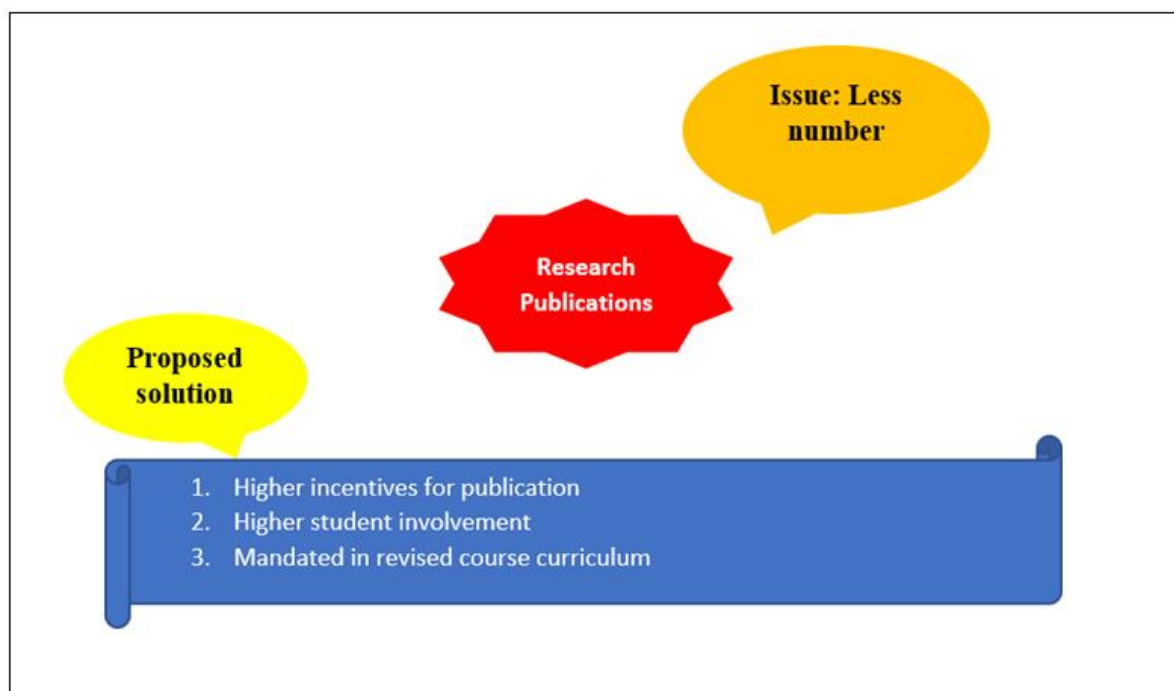


Figure 4. The steps to solve the subcomponent (publications)– of post graduate admission in Big University

From Figure 4 it is again illustrated that innovative ideas can come up as proposed solutions. Thus, Ms. Nidhi, in discussion with the concerned staff members reports back to the CEO for implementing the proposed solution. Now it is up to the CEO and the others in the hierarchy to work out the implementation methods. Parallely, other subcomponents may be handled in a similar manner, or in a sequential way. It can be hoped that in a fixed number of iterations, the AANI consultancy, would show the improvement of ranking.

4. DISCUSSION

The following steps may be identified as the key points of the top-down problem-solving approach:

- Make a clear problem specification at the highest level
- Subdivide the main issue into more manageable issues.
- Keep going until all minor issues are easily resolved.

Top-down approach is immensely important for a complex system, mostly the kind for which a consultant would be employed. It focusses on the macroscopic view and starts with a higher-level view of the problem. Gradually, this is elaborated upon and refined towards a solution.

REFERENCES

- [1]. Indika Dissanayake, Jie Zhang, Mahmut Yasar, Sridhar P. Nerur, Strategic effort allocation in online innovation tournaments, *Information & Management*, Volume 55, Issue 3, 2018, Pages 396- 406, ISSN 0378-7206, <https://doi.org/10.1016/j.im.2017.09.006>.
- [2]. Xicheng Yin, Kevin Zhu, Hongwei Wang, Jiaping Zhang, Wei Wang, Heng Zhang, Motivating participation in crowdsourcing contests: The role of instruction-writing strategy, *Information & Management*, Volume 59, Issue 3, 2022, 103616, ISSN 0378-7206, <https://doi.org/10.1016/j.im.2022.103616>.
- [3]. Alexandra Durcikova, Kelly J. Fadel, Knowledge sourcing from repositories: The role of system characteristics and psychological climate, *Information & Management*, Volume 53, Issue 1, 2016, Pages 64-78, ISSN 0378-7206, <https://doi.org/10.1016/j.im.2015.08.005>.
- [4]. Takeshi Kosaka, Tetsuo Hirouchi, An effective architecture for Decision Support Systems, *Information & Management*, Volume 5, Issue 1, 1982, Pages 7-17, ISSN 0378-7206, [https://doi.org/10.1016/0378-7206\(82\)90014-3](https://doi.org/10.1016/0378-7206(82)90014-3).
- [5]. Patrick Stacey, Rebecca Taylor, Omotolani Olowosule, Konstantina Spanaki, Emotional reactions and coping responses of employees to a cyber-attack: A case study, *International Journal of Information Management*, Volume 58, 2021, 102298, ISSN 0268-4012, <https://doi.org/10.1016/j.ijinfomgt.2020.102298>.
- [6]. Achamu, G., Berhan, E. & Geremaw, S. Demonstrating the interplay of machine learning and optimization methods for operational planning decision. *Journal of Data, Information and Management*. Vol. 3, 297–324 (2021). <https://doi.org/10.1007/s42488-021-00060-4>