OPTIMIZING THE ALLOCATION OF TRAINING PROGRAMMES TO MAXIMIZE THE ORGANIZATIONAL GOALS

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Abstract- All Human Resource managers commit for dedicated corporate trainings to ensure that their employees have a better understanding of their assigned work and be able to achieve the organizational goals. Due to resource scarcity, any company could offer a limited number of training opportunities based on the allocated training budget. The main problem that encounter in the current system is, that it unable to identify the most value adding training programmes which are aligned to the company goals. However, when a limited budget is allocated the best decision must be taken to optimize the allocation of right people to the right training programs to fill the competency gap. Decision making in HR Management tends to be more subjective, if multiple aspects are not considered while making decisions. Unless the trainings are not aligned with the organizational goals, organizations may not be able to achieve the expected company goals in short term and also competencies will be stagnated in the long run. Therefore, the main objective of this study is to optimize the most beneficial and value adding training programmes which align with each departmental goals of the organization and to assign the optimal number of employees for each training programme. In the study, Analytical Network Process (ANP) is used to prioritize the training programmes, considering employees' individual needs, departmental needs and other requirements to achieve the company goals. Then, an Integer Linear Programming model has been developed to maximize the priority values of training programmes and to find the number of programmes that should be conducted within the allocated budget. This proposed model facilitates to map the most value adding training programme with the departmental training requirements.

I. INTRODUCTION

Human Resource Management is a strategic approach in managing employment relations which emphasizes that leveraging people's capabilities is critical to achieving competitive advantage, though it has been achieved through a distinctive set of integrated employment policies, programmes and practices. (Bratton and Gold,2007).

Starting from the recruitment till the employee becomes a stable asset in the organization, HR manager needs to take decisions about the employees. As HR professionals work less with numbers they tend to make decisions mostly based on their intuition, experience and personal preferences. Therefore, there is a high subjectivity lies with the HR decisions in most of the instances. When the current system is explored, the training and development context is congested with several issues where they could block millions of dollars' income in the long run. One of the major problems faced by the Training manager is quantifying the training benefit. Before delivering a training programme the training manager is obliged to decide on the most effective set of training programmes to be implemented in the coming year. Not only that, he should decide which department to be invested more on employee training based on the value that the departments are adding to the organization. It is an

instance where the decision making comes to play. Human Resource Management consists of practices where most of the subjective decision-making processes backed by qualitative facts take place. Resource allocation is such a critical decision happen to be taken by managers. Wrong decision made to invest in the less return generating programmes will be an additional cost to the organization. Selection of most appropriate training programmes and allocation of resources on them to leverage a better return on investment.

Training always incurs a considerable cost always. Starting from the learning materials, space, trainer's fees, refreshments incur an inevitable cost. As the training manager, the always tries to maximize the training opportunities provided for the employees while minimizing the cost incurring. Even though, the cost spent is the minimum, if the training programmes do not address the required strategic skill efficiencies, they add no value to the organization. Therefore, the proposed model will incorporate benefit hierarchy of the training

programmes of each department and try to maximize the benefit given by the training programmes under the allocated budget amount.

In this study the authors have systematically reviewed the usage of multi criteria decision making in Human Resource Management and the best combination of training programmes to be implemented has been identified. Moreover, the authorshave developed a model to optimize the selection of training programmes and maximize the benefit gained from the training programmes.

II. METHODOLOGY

Initially a detailed literature review was done. Further to incorporate with the real world, and interviews with experts were conducted. During the discussions, several criteria which were considered in selecting training programmes were identified.

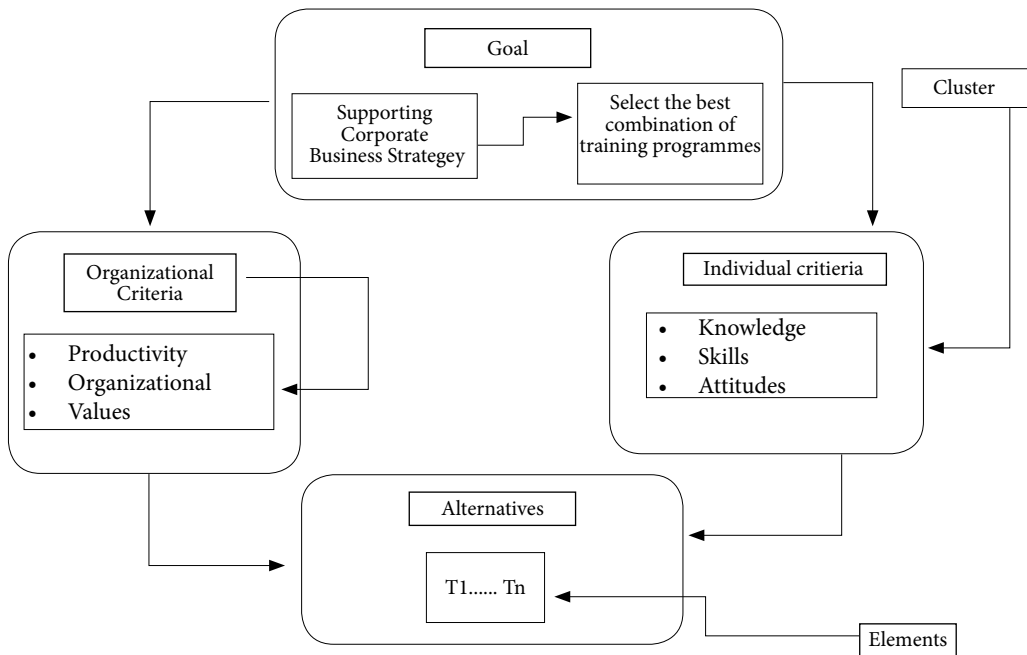**Phase 1- Prioritizing the training programmes using ANP (Analytical Network Process**

Fig 1. Network illustration of the problem

Above diagram illustrates the problem context. It consists of a number of clusters of elements. The different clusters are the goal, organizational criteria, individual criteria and the alternatives. The inner dependency within the same cluster and the outer dependency among the clusters are displayed in the network model.

After modelling the problem, SuperDecions software has been used to do the Analytical Network Process analysis and prioritize the training programes. In this example ANP analysis has been carried out three times for three departments of an organization. Ultimately, one training programme has received three different priority scores. Those values were merged in to one value by applying weighted average score. Finally, priority scores have been obtained for the training programmes.

B. **Phase 2**- Optimization using ILP (Integer Linear Programming)

After obtaining Weighted Benefit scores for each training programme, ILP model has been formulated to select the optimum number of training programmes from each category under different set of constraints. The obtained Weighted average benefit sores have been used as the coefficient values of the objective function. The optimization model developed to allocate the training programmes which align with the company goals.

1) **Objective Function:** Benefit scores of each training programmes are taken as the coefficients of the objective function

$$Max\ Z = \sum_{i=1}^{n} |a_i X_{ti}|$$

2)

$$\sum_{i=1}^{n} 1\ Bi >= |X_i| <= A \cdots (1)$$

$$\sum_{i=1}^{7} |X_{ti}| <= d \qquad \cdots (2)$$

$$\sum_{i=1}^{7} |C_i X_{ti}| <= D \qquad \cdots (3)$$

Equation 1 - Total number of training programmes from all the categories

Equation 2 – Minimum number of training initiatives from each category

Equation 3 – Total budget of the training programmes

ai : Benefit score of ith training category computed using ANP, a constant value

X_ti : Number of training programmes from category i

D : Total training budget

Ai : Minimum number of ith category training programs

Bi : Maximum number of ith category training programmes:

Ci : Cost of each training category

Di : Minimum number of training initiatives from each training category

III. RESULTS

A. **Phase 1** After applying SuperDecisions software to conduct the ANP Analysis, training benefit scores have been obtained for three departments.But a weighted average score has been applied for each department based on the value proposition added to the organization's vision and goal. Ultimately, weighted average benefit score has been obtained for each department for different training programmes. Following formula shows the way of calculating the weighted average benefit score Following formula shows the way of calculating the weighted average benefit score.

$$a_i = \sum_{i=1}^{n} K_{ij} * WS_{ij}$$

K_{ij}- benefit score calculated for each ith training programme of department j using ANP

WS_{ij}- weighted average score given for each department jth for different training programs of ith after prioritizing the needs for training

Table 1. Weighted Average Benefit score for each training category computed using ANP

Training category	Department of Manufacturing	Department of Finance	Department of Engineering services	Weighted Average benefit score = ai
Quality related training	0.203239 WS=0.50	0.142129 WS=0.25	0.131241 WS=0.25	0.1699
Technical training	0.156511 WS=0.30	0.135480 WS=0.20	0.119801 WS=0.50	0.1339
Engineering related training	0.191853 WS=0.25	0.126456 WS=0.15	0.151569 WS=0.60	0.1578
Soft skills training	0.137334 WS=0.25	0.147926 WS=0.50	0.148544 WS=0.25	0.1974
Computer Literacy training	0.123754 WS=0.60	0.160253 WS=0.20	0.146773 WS=0.20	0.1356
Lean six sigma training	0.078101 WS=0.33	0.155144 WS=0.33	0.163686 WS=0.33	0.1052
Safety training	0.109207 WS=0.50	0.132613 WS=0.20	0.138387 WS=0.30	0.1226

The results depict that the Soft skills trainings have the highest value addition to the organization while the Lean six sigma trainings have the least value addition to the organization.

B. Phase 2: In the Integer Linear Programming model, when A=50, B=20, D=50000

After running the ILP model on Excel Solver following final results have been generated

Training Category	# training programmes	Benefit score
Quality related training	4	0.1699
Technical training	3	0.1339
Engineering related training	6	0.1578
Soft skills training	3	0.1974
Computer Literacy training	3	0.1356
Lean six sigma training	4	0.1052
Safety training	7	0.1226

Based on the above optimized solution derived, it can be concluded that though the Soft skills trainings carry the highest benefit score, the organization cannot allocate the major portion of their training budget on it. The other constraints have influenced on deciding the number of training programmes to be conducted.

IV. CONCLUSION

Decision making always plays a vital role in Human Resource Management. As its decisions are mostly made by people on people, there is a high probability that decision may influenced by subjectivity and biasness. Therefore, the HR experts in the industry have emphasized the importance of Multi criteria decision making. The literature witnesses a less contribution of research on applicability of multi criteria decision making in Human Resource Management. The research work done mostly were on practices like Recruitment and Performance Management. One research article was found on application of Multi criteria decision making on Training and Development where it was a case study related to an expansion of a company. Therefore, the flexibility of the model they have developed was less. This study will contribute to the literature of the Human Resource Management related research, by quantifying the intangible criteria which will support heavily in making decisions regarding real world problem. Moreover, the model can be customized according to any organization and in any industry in order to optimize the most beneficial training categories which will achieve the desire organizational goals and objectives.

The main objective of this study is to identify the most beneficial number of training programmes to be conducted while prioritizing the need of the organization. Moreover, the selected training programmes should be within the limited budget and aligned with the organizational goals and objectives. Also, the model will maximize the benefits gained from the training programmes while striking a balance between organizational benefits and individual benefits.

The criteria needed for the model were defined in order to select the most beneficial training programmes in terms of the value they are adding to the organizational corporate business strategy or the organizational

goals and objectives. Criteria were identified with the knowledge and the experience of the industry HR experts. The identified criteria were divided in to two main sectors as organizational criteria and individual criteria. Organizational criteria consist of Productivity, Culture and Organizational value. Individual criteria consist of Knowledge, Skills and Attitudes. Using these identified criteria, a multi criteria decision making model was developed to evaluate the training categories in terms of the strategic value added by them to the organization. The first phase of the model has been successfully developed by using ANP method and the most beneficial training categories were identified. The accomplishment covers the first objective of the research. Moreover, the results show the ability of the model to assist the decision makers to examine the benefits of the training programmes by comparing them against several criteria.

As the second phase, an ILP model has been developed in order to maximize the benefit gained from the training programmes. The model has been validated qualitatively using the real-world data from a well-recognized Global protection ware manufacturing company. Past year data related to their business strategy, departments maintained by them, training categories used were obtained to run the model. After running the model, a set of training categories were prioritized with the number of training programmes to be conducted from each category. The result was compared with their last year training calendar. Feedback was obtained from a few department heads regarding the result generated from the model compared with the last year training opportunities received from them. They were much satisfied with the result of my model compared to the last year training calendar.

Therefore, the developed model will be appropriate for any organization for any level of employment who are always trying to align their Training and development strategy with the organizational business strategy. Moreover, the model allows HR department to consider the requirements of every department when preparing the training calendar. Moreover, it will strike a balance between the addressing organizational requirements and the individual requirements by organizing the training programmes. Additionally, the model will support the HR department of an organization to take an extra leap by acting the role of a strategic partner in the long run of company existence by developing the competencies of their employees.

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