ABSTRACT

Performance Management has been a topic of interest for academicians and practitioners. In today’s competitive environment, with service industries sprouting at an incredible rate, service performance management becomes an essential strategy for success and survival. The present research work aims to develop an integrated closed loop performance management model for suitable service industries.

A review of available literature has shown that service performance measurement is still a relatively new topic for research. Majority of the service organizations still uses production measures as performance dimensions. The intangible nature of service operations requires a multi-dimensional analysis and such a multi-dimensional analysis with cost, time and service quality as performance measures in the service sector is rarely found in the literature. In service quality measurement, the vagueness and uncertainty lead to insufficient and imprecise capturing of decision-makers judgements. The literature has shown that fuzzy linguistic assessment is much closer to human thinking than methods based on crisp numbers. Methods combining Fuzzy Quality Function Deployment and Fuzzy Failure Mode and Effect Analysis for improvement of the service performance are rarely found.

Based on the literature review, an attempt has been made in the present research work to develop service performance models by integrating various well known operations management tools. The objective of the present research is:
(i) To develop an integrated service performance management model using techniques viz., Fuzzy Analytical Hierarchy Process (FAHP), fuzzy logic, Extended Brown-Gibson (EBG) model, Data Envelopment Analysis (DEA), Fuzzy Failure Mode and Effect Analysis (FFMEA) and Fuzzy Quality Function Deployment (FQFD).

(ii) To use cost and time as the quantitative dimensions and service quality as the qualitative dimension in the service performance management process.

(iii) To illustrate the developed models with case studies from automobile repair shops.

To carry out the above objectives, four performance management models have been conceived and proposed. They are:

(i) AHP-EBG-QFD combined model

(ii) FAHP-EBG-FQFD combined model

(iii) Fuzzy logic-DEA-FFMEA combined model

(iv) An integrated closed loop model

Cost, time and service quality are used as performance dimensions in all the models. These models are illustrated through case studies from eight identical automobile (car) repair shops located in Southern parts of India. In AHP-EBG-QFD based model, the relative service performance has been measured by the EBG model. The service quality factors have been evaluated
using AHP. QFD has been used to redesign the existing services when performance measures fall below the satisfactory level.

In FAHP-EBG-FQFD based model, the service quality is measured by FAHP. The data pertaining to both qualitative and quantitative dimensions are combined using EBG model to measure the service performance. As an improvement process, FQFD has been employed to redesign the existing services. Fuzzy if-then rules are used in FQFD process.

In Fuzzy logic-DEA-FFMEA model, fuzzy set theory has been used for measuring perceived service quality. The weights for the service quality parameters considered are gained through AHP. Then the service performance is measured using DEA by considering both quantitative and qualitative measures. The results from DEA model provide the relative efficiency measure and efficient input/output targets for each repair shop. For further improvement of the service process, fuzzy FMEA is used to prioritize the potential failure modes. The calculated fuzzy risk priority numbers (FRPN) provide the priority value for the failure modes and the remedial actions can be launched immediately.

The above said models have their own advantages and limitations. Finally, an integrated closed loop service performance management model has been proposed by considering the advantages of all the models. Based on the nature of questionnaire, a suitable method for evaluating the service quality is chosen. If the questionnaire is based on Likert scale, then Fuzzy AHP method is used. If the questionnaire is based on linguistic terms, then fuzzy logic is used to quantify the perceived service quality. Service performance measurement is performed either through EBG model or DEA
model. If the service performance is below the satisfactory level, Fuzzy FMEA and Fuzzy QFD are integrated to redesign the services. In order to avoid building huge if-then rule base, Fuzzy linear programming approach has been used in FMEA and QFD approaches.

The major conclusions arrived out of the research work are as follows:

i. The AHP-EBG-QFD based model is found to combine both qualitative and quantitative dimensions for service performance measurement.

ii. When FAHP-EBG-FQFD model is used, fuzzy sets for subjective assessment in FAHP and FQFD processes are found to enhance the decision making process and allow precise assessments.

iii. For the performance management, Fuzzy Logic-DEA-FFMEA based model is found to prioritize the service failure modes based on FRPN values. As the risk factors and their relative importance weights are evaluated in linguistic terms rather than in crisp numbers, the assessments are found to be relatively easier.

iv. The new integrated closed loop model is found to encompass the advantages of above three models and measure the current performance of an organization. It is found to provide opportunities to integrate the relationship among cost, time and service quality dimensions.