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Quantitative Methods in Workforce Management in Service

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It is widely accepted that workforce management is critical to the profitability, growth and client satisfaction of companies in the service industry. Considerable amount of resources have been devoted in improving workforce management in industry practices. New methodologies emerge at a very fast pace in various areas. Meanwhile, at the theory front, just like the development of supply chain management theory for the manufacturing industry, exciting new research topics on workforce management are being investigated from multiple angles by researchers from different fields.

The goal of this issue is to facilitate the development of new theories, as well as their permeation to the practice fields. To this end, we provide a platform for both researchers and practitioners to communicate their new ideas, so that important problems in workforce management can be addressed from a more comprehensive point of view. Of course, each problem solved naturally generates many more new challenges. We also expect the interactions between academia and industry to stimulate new ideas, models and analytical methods. We have an excellent collection of papers that represent the frontier of workforce management research.

It is always critical for anyone who wants to manage a workforce to know its status and capability before any actions can be applied. More specifically, it is crucial to identify and quantify the characterizations of a workforce that are the most valuable to an institution. Palshikar *et al.* investigate this problem from three aspects: expertise, specialization and experience. Their paper contains a novel formalization of these concepts, with which they are able to quantitatively categorize a workforce in terms of its productivity and business impact. Although the paper focuses on the industry of IT service, its methodology can be adapted and applied widely.

Just as a material product, a service offering also has its life cycle, and workforce planning and management have to be adjusted according to different pattern of life cycles. In addition, the learning curve of the workforce adds another layer of difficulty to this problem in workforce management. In her paper, Qin proposes a general dynamic programming model and solution techniques for addressing many of the critical concerns of around the issue of life cycles. Many of the problems, such as training of the workforce under life cycle conditions and stochastic workforce planning and management, are studied in details, and should be significant additions to the literature.

An important service delivery environment is a call (service) center. Performance analysis and capacity planning for all centers are also among the most active research areas in service science. Extensive research literature on different aspects of the problem has been flourished during the last decade. Two of papers in this issue on this subject provide new insights from both the modeling and the analysis aspects, especially on human resource actions. Robbins and Harris conduct extensive empirical studies on new project staffing, demonstrate the relationship between turnover rate and experiences of the staff. The paper by Cordone *et al.* considers features such as contracting, and provides a detailed formulation for balancing service level and capacity provision through hiring contracts.

Sale force is an important element of the workforce to almost all service organizations. Its performance is usually in the front and center of the overall performance picture of an organization. However, what factors are most crucial to the performance of a sales force? More importantly, how can one quantify these factors so that an organization can improve its sales force performance at a restricted budget level? These questions are critical, albeit difficult. The paper by Singh *et al.* sheds new light on these questions. More specifically, they present a framework of performance evaluation for sales force that is based on advanced statistical analysis, and their experiences with real

data from a large sales force is valuable for any further development in the area.

Cloud computing emerges as a powerful player in the realm of service computing. Its practice has generated many new challenges in many area of service science research. Gera and Xia's paper focuses on the combined pricing and capacity planning for cloud computing. An innovative approach in this paper is the adaption of the learning curve model in quantitative characterization of the relation between the providers' cost reduction and economy of scale.