

Chapter 89

Operations Research in Healthcare Supply Chain Management Under Fuzzy– Stochastic Environment: Operations Research in Healthcare

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ABSTRACT

Operations research is for mankind in almost all aspects of our life. Applying the scientific method to the management of organizations, industry, government and other enterprises play a vital role in OR. It is used to increase productivity, to improve customer service, to improve quality and to reduce costs. Healthcare has attracted a great attention of governments in order to provide sufficient health services to the people. The provision of healthcare is very complicated and very responsible, that the right drug to the right people at the right time and in good condition to fight the disease. Today, the importance and significance of planning in healthcare can hardly be over emphasized when providing proper and adequate service continues to be a key concern of most countries. Operations research provides a wide range of methodologies that can help health care systems to significantly improve their operations. It helps to solve approximately all the problems involved in healthcare with its useful modeling techniques.

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INTRODUCTION

Operations research (OR) is a term that can be used with mathematical and statistical methods and computer systems, which interdisciplinary philosophy, which aims to quantify the relevant aspects of the situation in the modeling and manipulation of the model approach to develop decisions, plans, and policies. Using set of scientific principles, strategies and methods, including mathematical modeling, statistics and data analysis algorithms organization's ability to make rational decisions and sound management of optimal solutions to meet complex decision problems or improve nearly optimal fixed.

Naturally, the techniques of management science is not limited to business applications, but can be applied to government, military, medical groups nonprofit, political groups or social groups. Management science is committed to the development and application of models and concepts that help to management problems and also the design and development of new and better models of organizational excellence. The literature in this field has many applications in operations research, evidence of the growing importance of the availability and use of computers in today's world can be attributed. Some of the areas that coincide with significant operations research and management science are, among others: (i) Business Analytics, (ii) Decision and policy analysis, (iii) Industrial engineering, (iv) Game theory, (v) Mathematical modeling and optimization, (vi) Probability and statistics, (vii) Simulation, (viii) Transportation forecasting models, (ix) Stochastic processes, and (x) Supply chain management.

The systematic methodology of OR focuses on the problems developed conflicting objectives, strategies and alternatives. Operations research is, ultimately, the scientific method, which is applied to large organizations or complex tasks to assess the overall impact of different policy options to consider actions, providing a better basis for making business decisions. The OR approach to solve the problem comprises the following seven sequential steps: (i) Formulate the problem, (ii) Construct a mathematical model, (iii) Derive the solution from the model, (iv) Establish control over the solution, and (v) Implement the final results; Figure 1 shows this schematically.

Health care is the number one domestic industry in the United States and one of the largest industries in the developed countries as well as it is a service-oriented industry. It is a particularly significant service industry given not only the criticality of quality and safety in delivering patient care, but also the associated cost involved as it is expected to account for 20% of gross domestic product (GDP) in the USA (Dobrzykowski (2012)). Figure 2 and Figure 4 compare the total expenditure on health care among several countries, as a percentage of the GDP. These concerns extend beyond the USA, leading to increasing research interest in global healthcare operations and supply chain management issues (Sinha & Kohnke (2009)).

Nowadays, the high quality of research in this area is ongoing, but this work is in its infancy and requires a better understanding of operations management and supply chain management phenomena in the health sector in order to improve performance. OR provides a wide range of methodologies that can help health care systems to significantly improve their operations. Technologies, tools and theories of decision-making operations research is many different topics and issues in health care. OR is increasingly recognized as essential to strengthen health programs. For example, expanded stop tuberculosis (TB) strategy research clearly acting as a key element of successful programs of TB. The International Union Against TB and Lung Disease and many of its research partners define OR as research into strategies, interventions, tools or knowledge that can enhance the quality, coverage, effectiveness or performance of the health system or programme in which the research is being conducted. Mistry et al. (2012) proposed a local agenda for OR: modeling the effects of newer technologies, active case detection, and changes in

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