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## Constrained Moments Simulation of Healthcare Capital Acquisitions

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## Constrained Moments Simulation of Healthcare Capital Acquisitions

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Two analytical techniques which evaluate capital acquisitions in healthcare are the method of generating system moments and Monte Carlo simulation. Generating system moments enables the user to determine an estimate of the expected cost from a user-supplied function. Furthermore, the user can determine, from a variance component analysis, the sensitivity of the user-supplied function to marginal changes in the random variables by expanding the function about its mean using the Taylor Series expansion to the second order. Calculating the magnitude of partial derivatives of each random variable with respect to the user-supplied function indicates the relative importance of each random variable to the function. VARSIM is an interactive program which is used to calculate the system moments. An add-in program to an Excel spreadsheet is used to invoke a Monte Carlo simulation, whose results are useful for assessing potential risks associated with a capital investment. The results from VARSIM indicate that the expected cost per MRI exam is \$350 with a standard deviation of \$11.81. Operating hours are increased from 50 to 126 hours per week. The simulation results indicate that there is a 55.2 percent probability that this cost level will be achieved and ultimately its annual target number of exams. Thus, the systematic approach presented in this paper provides a solid basis which hospitals can use to perform a thorough assessment of their capital equipment needs, and thereby, present their findings in a more objective manner to decision-makers.

## Technology Decisions For A Flexible Health Care Organization

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Flexible manufacturing is regarded as one of the most powerful production systems for manufacturing companies for improving their competitive standing in a global setting where customer demand becomes more customized and lead times get shorter. The fastest growing service sector, health care, is also facing the same challenges as their manufacturing counterparts. In this case, however, there are more constraints since health care is partially regulated by the government and reimbursing organizations. These constraints and intensive competition forced health care organizations to revise their strategic objectives. Similarities of the new competitive challenges encouraged health care organizations to look at new technologies used in dealing with these challenges in the manufacturing sector. Health care organizations have a number of strategic choices in meeting their customer requirements. These choices can be summarized in a strategy continuum defined by two extreme strategies: broad range competition and specialist competition. Broad based health care organizations, which offer a wide range of services, can respond to changes in the competitive environment easily by using their slack resources and taking advantage of "economies of scope". On the other end, specialist health care organizations, which offer only a narrow range of services, can adopt to technological changes in their specialized areas faster and more cost effective. In a broad range organization, flexibility increases together with cost of providing these services. Specialist organizations offer their limited range services at lower costs. In order to compete in an environment which is defined by new consumer driven focus in which new products and services must be developed quickly and marketed continuously with reasonable cost, health care organizations, just like their manufacturing counterparts have been doing it, must adopt flexible organization systems. This is a strategic move by both types of organizations: generalists offering a few highly specialized and high technology products and services, and broad-based organizations which provide complete health care. There are significant organizational requirements to be met in this transition. Role of technology, organization's strategic emphasis, their current resource-mix and capacity availability, market pressures, government regulations, and ever complex reimbursement mechanism will add additional constraints in this transformation. During the next decade, flexible organizations for health care will be a requirement for survival.