A renowned application show-cased in “Practical Management Science” of Kelley School of Business

Lockheed Martin Space Systems Optimizes Infrastructure
Project-Portfolio Selection
Cigdem Z. Gurgur and Charles T. Morley

Lockheed Martin Space Systems Company spends millions of dollars on the maintenance and modernization of its infrastructure each year. Projects often involve investments that cannot be justified purely in terms of net present value or other classical investment-evaluation methods. The options are also restricted because funds that are not spent within a given time frame must be relinquished. Furthermore, some projects may be delayed and the unplanned carryover of their costs moved into the next fiscal year; this causes the postponement or cancellation of other unrelated projects because of in-budget transfers.

Method: We used multi-attribute utility theory and chance-constrained programming to optimize the selection of infrastructure projects.

Solution ensured the selection of high-value projects to maximize the company’s performance. These selections were subject to the constraints that a portfolio did not exceed the available budget and that the carryover of the unspent funds to the next fiscal year did not exceed predetermined limits. We built a Decision Support System with broad accessibility, transparency, improved data collection and asset management, and ease-of-use by managers.

“Adding the prescriptive model to our investment strategy has undoubtedly benefited the department over the long term and in some immediate ways as well. Organization of past financial performance data to predict and control future financial performance has long been needed and the model has addressed this issue. Watching the correction and evolution of the model to match our needs has been extraordinarily constructive for the entire department.”

“Simply put, the optimization model has been a huge success and directly affects our productivity and ability to deliver positive results. It has already been recognized as a best practice.”

Company Executive Testimony
Dennis Garegnani,
Lockheed Martin Space Systems

“The optimization model developed for our team has made substantial contributions to the long term effectiveness of our organization.”

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 REGARDLESS OF INDUSTRY, UNDERSTANDING PAST BUSINESS PERFORMANCE IS CRUCIAL TO GAINING INSIGHTS THAT DRIVE FUTURE PLANNING.

THE CENTER PROVIDES BUSINESSES WITH THE ABILITY TO ASK BETTER QUESTIONS AND ACHIEVE BETTER BUSINESS SOLUTIONS WITH ENHANCED DATA ANALYTICS.

**MISsion**

- Financial/Banking Analytics
  - Published in *International Journal Of Applied Decision Sciences*
  - CONDITIONAL VALUE AT RISK CONSTRUANTED OPTIMIZATION OF A POWER PORTFOLIO

- Consumer/Retail Analytics
  - Published in *The Engineering Economist*
  - DYNAMIC CASH MANAGEMENT OF WARRANTY RESERVES

**Advances of Risk Analytics with Big Data**

With cloud computing, internet-of-things, wireless sensors, and social media, organizations and enterprises amass data that challenges existing computing resources. Current risk analysis methodology and applications are awaiting related advances and breakthroughs.

- Big data-driven system optimization
- Financial engineering and portfolio analytics
- Healthcare operations with big data
- Healthcare logistics: Multi-criteria methods in healthcare resource planning
- Financial incentives and contracting in healthcare delivery

**Health Care Analytics**

**Health Care Product Procurement In Dual-Supplied Systems - Presentation at ICOVACS Conference, Leuven, Belgium**

Recent years have witnessed a profound interest in healthcare waste given its impact on costs and the environment. We consider supplier selection and quantity allocation decisions for a health care organization that may purchase a number of unbundled and bundled products.

**Health Care Operations Management Presentation at POMS Conference, Denver**

To study the tradeoffs in patient satisfaction and system efficiency, a patient flow simulation model is developed for an Emergency Department of a major hospital with the incorporation of patient classification, blocking effects, and time dependent arrival patterns. The simulation model helps in capacity management decisions.

**Analytics’ Role in the Examination of Large Insurance Claim Data Sets**

**Collaborative work with Humana**

**Center Goals**

**Education**

- Through education events, seminars, non-credit short courses, the center expands awareness, explores possibilities, and deepens regional expertise in the use of analytical methods across a broad spectrum of business problems.

**Investigation**

- As organizations are able to collect massive amounts of data more readily than ever before, the center engages faculty and students to develop new methods and apply existing analytical techniques to apply this data in the solution of current and emerging organizational problems.

**Integration**

- The center serves as an integration hub for applied analytics efforts, bringing together the expertise and experience of Business and other colleges to bear on important, challenging industry problems.

**Promotion**

- The center inherently strengthens the analytics labor pool to meet industry needs for a diverse workforce, providing hands-on experiences that represent the foundations for analytics applications and research.