

Koç University
Industrial Engineering and Operations Management
Graduate Student Resource Guide

April 9, 2011

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The Graduate Program

Profitable design and operation of modern industrial and service systems require integration of human, material, equipment and financial resources. In recent years this integration has become tighter due to the inclusion of information technology, and resulted in more complex systems. Industrial Engineering research focuses on quantitative analysis, synthesis and management of such complex systems. The affiliated faculty members come from the Industrial Engineering department of the College of Engineering, the Operations and Information Systems group of the College of Administrative Sciences and Economics, and other related fields. Our research areas are diverse, including Logistics, Supply Chain Management, Service Operations, Production Systems, Stochastic Processes, Financial Engineering, Mathematical Programming, Data Mining and Bioinformatics. The programs are built on the basic methodologies of operations research and their applications in manufacturing, distribution and service industries. Graduates of the M.S. program have been placed in respectable Ph.D. programs in North America, Europe and Turkey as well as various professional positions in industry since 2003. The first graduates of the Ph.D. program were produced in 2009 and they are pursuing their academic career either through a post-doc program or by joining respectable universities in Turkey or abroad.

While our M.S. program provides a strong foundation for academic studies in terms of Industrial Engineering knowledge as well as developing research skills, our Ph.D. program provides advanced education emphasizing the discovery of new scientific knowledge through extensive research experience. The aim is to produce competitive research results and educate the future leaders of the profession. The potential opportunities for graduates of the programs are diverse and include:

- For M.S. graduates, continuing their graduate studies with the best Ph.D. programs worldwide, and for Ph.D. students, starting their academic career in respectable universities worldwide;
- employment in private and government organizations where they can provide the necessary technical and managerial expertise and leadership;
- starting new business ventures in industry or in services.

Research Areas

- **Bioinformatics:** Ceyda Oğuz, Metin Türkay
- **Call Center Design and Management:** Zeynep Akşin, Fikri Karaesmen, Lerzan Örmeci
- **Continuous Optimization:** Emre Alper Yıldırım
- **Convex Optimization:** Emre Alper Yıldırım
- **Data Mining:** Özden Gür Ali
- **Data Traffic and Stochastic Flows:** Mine Çağlar
- **Design and Analysis of Algorithms:** Emre Alper Yıldırım
- **Facility Protection and Interdiction:** Deniz Aksen
- **Financial Engineering:** Mine Çağlar, Süleyman Özекici
- **Global Optimization:** Serpil Sayın
- **Health Care Systems:** Evrim Didem Güneş, E. Lerzan Örmeci
- **Humanitarian Operations:** Sibel Salman
- **Logistics and Transportation:** Deniz Aksen, Ceyda Oğuz, Sibel Salman, Metin Türkay
- **Manufacturing and Inventory Systems:** Yalçın Akçay, Selçuk Karabatı, Fikri Karaesmen, Onur Kaya, Süleyman Özекici, Barış Tan
- **Mathematical Programming:** Onur Kaya, Ceyda Oğuz, Sibel Salman, Serpil Sayın, Metin Türkay, Emre Alper Yıldırım
- **Metaheuristics:** Deniz Aksen, Ceyda Oğuz
- **Multiple Criteria Decision Making:** Serpil Sayın
- **Network Optimization:** Sibel Salman
- **Pharmaceutical Marketing:** Özden Gür Ali
- **Reliability and Maintenance:** Süleyman Özекici
- **Revenue Management and Pricing:** Fikri Karaesmen, Lerzan Örmeci
- **Scheduling:** Selçuk Karabatı, Onur Kaya, Ceyda Oğuz, Sibel Salman
- **Service Operations Management:** Zeynep Akşin, Evrim Güneş, Lerzan Örmeci
- **Simulation:** Yalçın Akçay, Süleyman Özекici
- **Stochastic Modeling:** Yalçın Akçay, Fikri Karaesmen, Onur Kaya, Lerzan Örmeci, Süleyman Özекici, Barış Tan
- **Supply Chain Management:** Yalçın Akçay, Deniz Aksen, Fikri Karaesmen, Onur Kaya, Sibel Salman, Barış Tan, Metin Türkay
- **Telecommunication Networks:** Sibel Salman

Research Laboratories

- Center for Computational Biology and Bioinformatics
<http://storage.ku.edu.tr/~ccbb/>
- Contact Center Research Group
<http://storage.ku.edu.tr/~call/index.htm>
- Koç-IBM Supply Chain Research Center
<http://kocibm-scm.ku.edu.tr/>
- Systems Lab
<http://systemslab.ku.edu.tr/>

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Degree Requirements

M.S. program in Industrial Engineering: This is a two-year program with thesis and the medium of instruction is English. Applicants must have a B.S. or B.A. degrees preferably in engineering or in sciences relevant to the particular degree program. Every student is supervised by an advisor. The students and the advisors are paired off during the first semester to give both the students and the advisors flexibility to match their research interests. In the program the students are engaged in coursework, projects and a thesis. The M.S. program requires the successful completion of a minimum of 21 credits beyond a Bachelor's degree. The students are required to enroll in the M.S. thesis course. At the completion of the M.S. thesis, the students have to submit a thesis and pass an oral defense to complete the degree requirements. The required courses of the "M.S. in Industrial Engineering" program are:

- INDR 501 Optimization Models and Algorithms
- INDR 503 Stochastic Models and Their Applications

In addition, each student has to register for a seminar course, INDR 590 and a thesis course INDR 595.

Ph.D. program in Industrial Engineering and Operations Management: Students with a B.S. or M.S. degree in Industrial Engineering, Business Administration, Economics and Mathematics or any related area can apply to the Ph.D. program in IEOM. All Ph.D. students have to take at least 7 courses in the program to complete at least 21 credits. The students who are accepted only with a B.S. degree have to take at least 7 additional courses to earn at least 21 additional credits. The curriculum of each student will be determined by his/her program advisor. All courses have 3 credits unless specified. The following courses are required for Ph.D. students:

- INDR 551 Advanced Optimization Methods
- INDR 553 Advanced Stochastic Methods
- MATH 531 Real Analysis (4 credits)

Depending on their background, students might be asked to take the required courses of the "M.S. in Industrial Engineering" program listed above.

Faculty

In the following pages, you can find information on the faculty of IEOM program.

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D. Aksen. *Teach Yourself GAMS*. Boğaziçi Press, 1998.

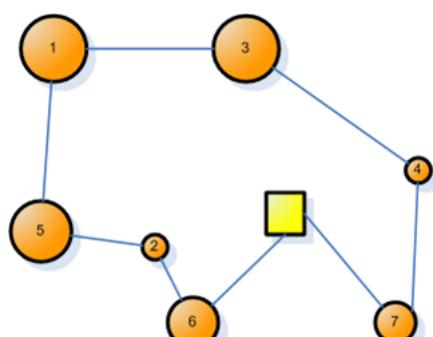
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D. Aksen and K. Altinkemer. A location-routing problem for the conversion to the click-and-mortar retailing: The static case. *European Journal of Operational Research*, 186(2):554–575, Apr 2008.

N. Aras, D. Aksen, and Ayşe Gönül Tanrıgür. Locating collection centers for incentive-dependent returns under a pick-up policy with capacitated vehicles. *European Journal of Operational Research*, 191(3):1223–1240, Dec 2008.



A simple profitable tour network showing a depot and customer nodes of unequal profits

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Courses taught by Dr. Aksen include management information systems and electronic commerce both at the undergraduate level as well as in the MBA and EMBA programs of the Graduate School of Business.

Dr. Aksen's research field is computational operations research (OR). His studies mainly focus on distribution and collection logistics and on facility location and protection planning.

Problems such as vehicle routing, location routing, team orienteering, profitable tour, facility location, r-median interdiction with protection, and government subsidization of used product collection are examples frequently found in this venue of OR.

The principal tools used by Dr. Aksen to tackle these problems are mathematical modeling and optimization. As the abstraction captured by a mathematical model gets closer to real life, its solution of desired quality becomes a bigger challenge. At this point, exact solution methods and heuristic optimization techniques often need to be merged to lead to efficient hybrid methodologies.

Abstraction of reality by means of an optimization model and development of an appropriate solution algorithm are necessary, but insufficient. Model justification and experimental analysis of the proposed methodology are indispensable to the relevance of the presented research. Systematic testing with real data when such data is available or with fictitious, but highly plausible data is a matter of paramount importance to a respectable study in computational OR.

Dr. Aksen's current research projects include 'Collection of used products from the dealers of a manufacturing company'.

Reverse supply chain management consists of the collection, inspection, sorting and recovery operations related with used products. The collection operation involves locating collection centers, determining the collection policy and the incentive to be paid to product holders to induce their willingness to return their products. In this study, the design of a collection system for used products obtained from dealers is considered. Two mixed-integer linear programming (MILP) models for the collection system design problem are formulated, and a tabu search heuristic for its solution is proposed. The performance of the heuristic is compared with the CPLEX solutions of the MILP models.

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Professor Akşin's research is in service operations management. An important part of her research is motivated by problems and issues arising from the call center industry. These studies aim to understand the operational effects of various aspects of call center management like new technology, marketing initiatives for customer relationship management, outsourcing, and human resource training or incentive schemes. Modeling and analysis of service operations requires an interdisciplinary perspective that cuts across different areas like marketing, economics, and human resource management. Customer and service provider involvement typically introduce uncertainty in service processes and require a stochastic approach to modeling them. Most of Professor Akşin's work is based on stochastic modeling, queueing systems and their performance analysis, and optimization. Recent work expands these to empirical analysis based on real call center data.

Current projects include:

- Modeling the effect of delay announcements in queues.
 - Structural estimation of customers' delay sensitivity in queues.
 - Measurement and management of peakedness in arrival processes of call centers.
 - Forecasting and capacity planning for service systems.

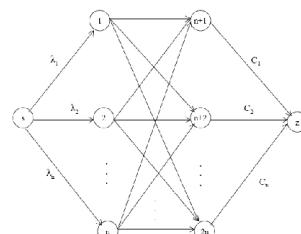
O.Z. Aksin and P.T. Harker. Modeling a phone center: Analysis of a multi-class, multi-resource, processor shared loss system. *Management Science*, 47(2):324–336, Feb 2001.

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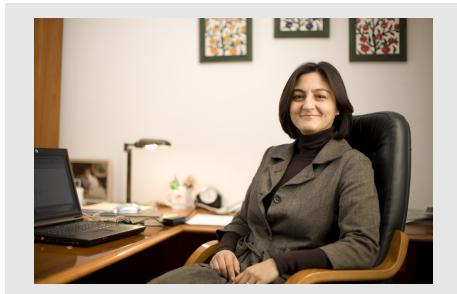
E.L. Ormeci, and O.Z. Aksin. Revenue management through dynamic cross-selling in call centers. *Production and Operations Management*, 19(6):742–756, Nov 2010.

O.Z. Aksin, E.D. Gunes, L. Ormeci, and S.H. Ozden. Modeling customer reactions to cross-selling: When cross-selling backfires. *Journal of Service Research*, 13(2):168 -183, May 2010.



An n -class service system with full flexibility

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Özden Gür Ali

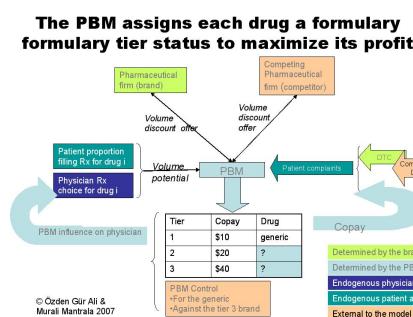
Ö. Gür Ali, S. Sayın, T. van Woensel, and J. Fransoo. SKU demand forecasting in the presence of promotions. *Expert Systems with Applications, Article in Press*, 2009.

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How Can The Employer Reduce Its Pharmacy Benefit Costs?, Gür Ali Ö, Manrala M., Çavdaroglu B. 2007

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Professor Gür Ali focuses on two areas in her research: data mining in marketing and payer and distribution channel incentives in the pharmaceutical industry.

- Data Mining in Marketing

Development of specific approaches including feature (variable) generation, selection and algorithm development using various techniques including support vector machines, decision / regression trees, and survival analysis

- SKU demand forecasting in the presence of promotions:

KÜMPEM projects with collaboration from Migros

- Customer churn prediction
Tübitak project with collaboration from YKB

- Payer Perspective and Distribution Channel Incentives in the Pharmaceutical Industry

Analytical models of the pharmacists, the pharma companies and the pharmacy benefit managers decisions, game theoretical models of competition, their deterministic simulation, and historical data analysis.

- Means of reducing the pharmaceutical expenditures for the payers

In the US system in the context of Pharmacy Benefit Managers

In the Turkish / European system the impact of changes in reimbursement status of drugs

- Use of distribution channel incentives in a pharmaceutical marketing interaction with pull marketing initiatives directed to physicians and patients.

US Pharmacy Benefit Manager incentives and marketing mix

The pharmacists optimal substitution decision in response to discounts and the discounting competition among pharma companies in the Turkish system

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Recent advances in finance and computer networking have opened fruitful research avenues for operations researchers. Several problems can be identified in these fields and formulated with stochastic processes. Dr. Çağlar's current research concentrates on a family of processes which model the statistical characteristics observed especially in finance and networking data.

The common properties ubiquitously found in financial data and network traffic are self-similarity and long-range dependence. Two stochastic processes which can be used for modeling such phenomena are fractional Brownian motion and Levy processes. Although these processes are relatively involved, they can be approximated by explicit constructions based on Poisson point processes. Along these lines, two recent research projects of Dr. Çağlar can be described as follows.

- In finance, agent based modeling is widely used for stock price processes. Each buy order from agents is assumed to increase the price whereas each sell order decreases it. The price is determined via total excess demand. The limiting behavior of this model is analyzed as the frequency of trading increases and the quantity decreases. The statistical estimation of the model parameters are to be performed by comparing various stochastic processes with real price-time data.
- The Internet can be considered as a huge service system. Peer-to-peer services such as file sharing and content distribution have occupied a great proportion in the Internet traffic recently. The performance analysis of the newly launched protocols and the generated traffic is the main focus. These are best studied through multidisciplinary collaboration. The epidemic algorithms used in peer-to-peer protocols are Markovian, which implies high performance. On the other hand, the traffic is self-similar and long-range dependent as the rest of the Internet traffic. The results are useful for devising improved protocols.

Dr. Çağlar's other contributions are in stochastic flows by means of a novel class of random velocity fields.

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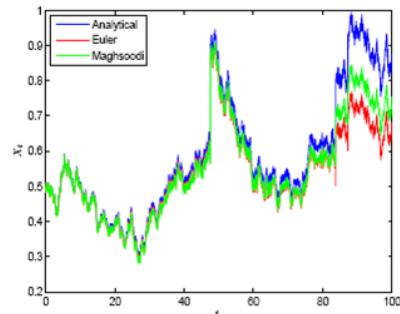
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A realization of a jump-diffusion process used in finance, analytical versus numerical solutions

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E.D. Güneş and O.Z. Aksin. Value creation in service delivery: Relating job designs, incentives and operational performance. *Manufacturing and Service Operations Management*, 6(4):338–357, 2004.

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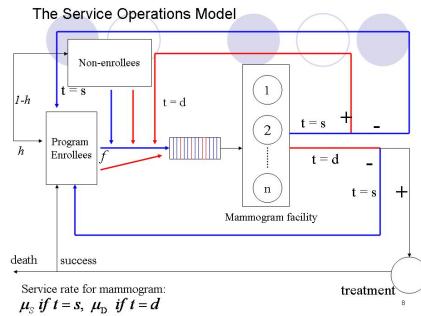
E.D. Güneş and H. Yaman. Health network mergers and hospital re-planning. *Journal of the Operational Research Society*, 2009.

E.D.Güneş. Modeling time allocation for prevention in primary care. *Central European Journal of Operational Research*, 2009.

Professor Güneş's research work concentrates on modeling and analysis of various operational problems that arise in service systems, with a specific focus on health care services and customer contact centers. Most of these problems require an understanding of the constraints of the service system and their effects on the behavior of its users, i.e. customers and servers. These possible interactions should be taken into account at the system design level to improve the system performance, and that constitutes the main motivation of this research. Stochastic modeling and simulation techniques are the main methodologies employed. Problems of recent interest are resource allocation in health care, preventive care planning, appointment scheduling, and issues related with implementing value generation programs in service systems.

Current research projects include:

- Appointment scheduling in presence of seasonal demand and walk-ins.
- Modeling the role of family doctors in a two-tier health system.
- Admission control and scheduling for preventive services.
- Modeling customer reactions to cross-selling attempts.



A Service Operations System Model for Breast Cancer Screening

Fikri Karaesmen



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Professor Karaesmen's research is motivated by modeling and understanding the effects of uncertainty and providing methods for dealing with uncertainty. His main application areas are production and inventory systems and service systems. This research mostly focuses on modeling, performance analysis and optimization of such systems. To this end tools from applied probability, queueing theory, stochastic inventory theory and stochastic optimization are employed. The results of this research yields insights on how to handle and mitigate uncertainty and better manage these systems. Recent application areas include: supply chain management, call center management, retail inventory management, dynamic pricing and revenue management and logistics auctions.

Current research projects include:

- Decentralized inventory control in production/inventory systems
- Developing general structural results for the control of queueing and inventory systems
- Dynamic pricing and auctions in production/inventory systems
- Multiple customer class call centers

E.B. Çil, E.L. Örmeci, and F. Karaesmen. Effects of system parameters on the optimal policy structure in a class of queueing control problems. *Queueing Systems*, 2009.

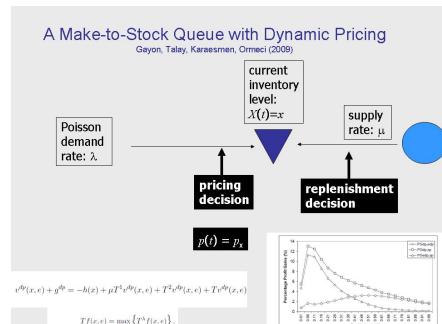
S. Ağralı, B. Tan, and F. Karaesmen. Modeling and analysis of an auction-based logistics market. *European Journal of Operational Research*, 2008.

C. Uçkun, F. Karaesmen, and S. Savaş. Investment in improved inventory accuracy in a decentralized supply chain. *International Journal of Production Economics*, 2008.

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S. Aydin, Y. Akcay, and F. Karaesmen. On the structural properties of a discrete-time single-product revenue management problem. *Operations Research Letters*, 37(4):273–279, July 2009.

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A Production/Inventory System with Dynamic Pricing

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O. Kaya. Outsourcing vs. in-house production: a comparison of supply chain contracts with effort dependent demand. *Omega*, 39(2):168–178, 2011.

O. Kaya. Incentive and production decisions for remanufacturing operations. *European Journal of Operational Research*, 201(2):442–453, 2010.

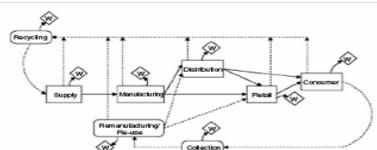
P. Kaminsky and O. Kaya. Combined make-to-order / make-to-stock supply chains. *IIE Transactions*, 41(2):103–119, 2009.

P. Kaminsky and O. Kaya. Inventory positioning, scheduling, and lead time quotation in supply chains. *International Journal of Production Economics*, 114(1), July 2008.

P. Kaminsky and O. Kaya. Scheduling and due-date quotation in a mto supply chain. *Naval Research Logistics*, 55(5):444–458, 2008.

Doctor Kaya's research is about modeling and analyzing the production and service systems under uncertainty and providing methods for the optimization of these models. For his research, tools from applied probability, stochastic inventory theory, dynamic programming, queueing theory and stochastic optimization are employed. The results of his research yields insights on the effects of uncertainty on these systems and how to manage these systems efficiently. Recent application areas include closed loop supply chain management, supply chain contracts, inventory management, dynamic pricing and revenue management, logistics and scheduling.

Doctor Kaya's current research projects include the management of collection and remanufacturing activities of used products. End-of-life products can be regained to the economy after being collected from the end users, disassembled for reusable parts and remanufactured into new products. Remanufacturing of used products has many advantages for the economy and the environment since they cost less than original raw materials, needs less effort and energy in production, decreases the need for new resources, decreases the waste that goes to the environment etc. The operations in these systems include the collection activities, remanufacturing and inventory issues in these systems, pricing and sales activities in relation with the original products. The analysis focuses on finding the best ways to collect and remanufacture the used products and how to effectively manage these systems considering the uncertainties in the collectable amounts and the qualities of the used products, the uncertainties in demand and the relationships between the original and remanufactured products.



Schematic representation of a closed loop supply chain system

Ceyda Oğuz

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Professor Oğuz conducts research in the areas of computational biology and bioinformatics, logistics, and scheduling. Her line of research for the problems arising in these areas aims to both designing algorithms for practical purposes and analyzing the computational complexity from theoretical point of view. Her research makes use of mathematical programming, metaheuristics and exact algorithms while providing solution procedures for difficult problems.

Current research projects include:

- Application of optimization techniques to container terminal management problems: This study aims to analyze different subproblems in container terminals and their interactions with each other. The subproblems will be the loading and unloading of vessels (which includes berth assignment and crane scheduling problems), and the container storage system (which includes bin-packing and vehicle routing problems). The overall aim is to achieve an efficient handling of containers, a highly utilized port, and smooth operation procedures in the container yard.
- Development of metaheuristics for efficient solution of difficult optimization problems: The research focuses on developing metaheuristic algorithms for the problems arising in production scheduling, resource allocation, and transportation by incorporating novel elements based on the characteristics of the problems into the standard metaheuristics.
- Complex scheduling models: This project will include scheduling problems with some additional features, such as timelags, release dates, multiprocessor tasks, etc. The results to be obtained from such models will be used to analyze more complex environments. The main objective of this project is to design algorithms, which are essential for advanced planning and scheduling systems and can be linked to the existing softwares. Such an output will support the process of developing better schedules for the companies.
- Solving protein folding problem (PFP) via metaheuristics: This research aims to provide efficient and effective solution procedures for PFP. In particular, the project involves analysis of the protein structures, and reflecting these into the algorithms to be developed, such as defining appropriate neighborhoods of the solutions, moves to be performed in these neighborhoods, and search strategies.

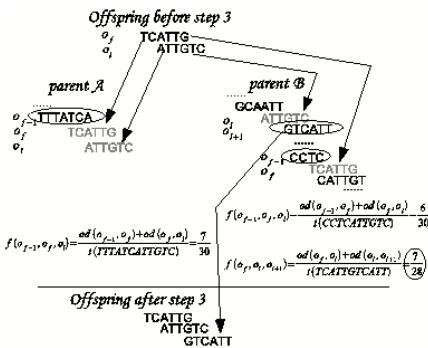
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An example for the crossover operator in genetic algorithm. (From: Błażewicz et al., “DNA Sequencing by Hybridization via Genetic Search”, Operations Research, Vol.54, pp:1185–1192, 2006.)

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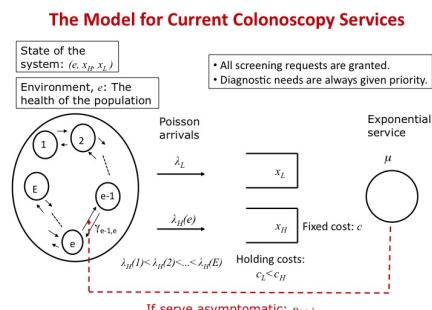
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The model for current colonoscopy services.

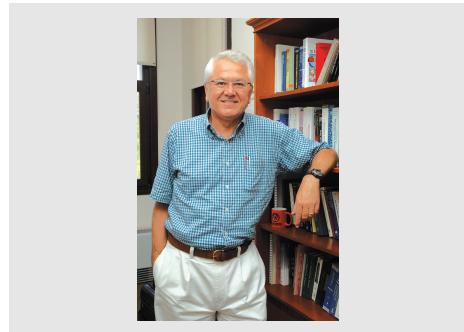
Professor Örmecis research concentrates on stochastic models and their optimization and analysis. Her application areas are production and inventory systems as well as service systems such as call centers, marketing and health care systems. The main goal of her research is to understand how these systems are affected by uncertainty and to generate insights on how to manage these systems in a better way. For this purpose, she develops the mathematical models of these systems, and characterizes the corresponding optimal control policies. The main tools of her research come from stochastic optimization, dynamic programming, and queueing theory. Professor Örmeci currently works on a number of projects in health care management:

- Investigating the effectiveness of screening policies subject to capacity constraints in the context of colorectal cancer.
- Optimizing the mix of surgical procedures when the patient length of stay is random and the bed capacity is limited.
- Stochastic modeling of patient arrivals to hospitals due to an epidemic.
- Logistics of clinical testing.

Other current research projects include:

- Revenue management on a Chinese-postman problem: The parking ticket case.
- Investigating the effects of outbound dispatch policies in supply chain models.
- The structure of optimal policies in robust optimization models of revenue management problems.

Süleyman Özekici



Professor
Department of Industrial Engineering
Ph.D. Northwestern University
<http://home.ku.edu.tr/~sozekici>
sozekici@ku.edu.tr

Professor Özekici conducts research, in general, on the applications of stochastic processes in operations research, management sciences and industrial engineering. Currently, he is interested in stochastic modelling and decision making problems related to reliability, inventory, and financial systems operating in random environments. He has published numerous articles in the field and served in the editorial boards of various journals. He is a member of the Institute for Operations Research and Management Sciences (INFORMS), the Operations Research Society of Turkey, the International Statistical Institute (ISI), and the Turkish Statistics Society. Current research topics are:

- Portfolio management in stochastic markets: An important problem in financial engineering is to determine optimal portfolio management policies. This research addresses this problem when there is a stochastic market that explains, in some random fashion, how financial, economic, and other factors change and affect returns of risky assets. Investors with deterministic as well as random utility functions are considered to characterize how they choose optimal portfolios.
 - Reliability and maintenance of mission-based systems: Complex devices consist of many components which are designed to perform missions consisting of phases with possibly random durations. The failure rates of the components change as the phases of the mission changes. The analysis focuses on the computation of various performance measures like mission reliability, mean time to failure and availability. The determination of optimal maintenance policies for such systems is also considered.
 - Inventory management with random supply in random environments: In inventory management, the main source of randomness is the demand, but the supply may also be random in many cases. This happens when the quantity ordered by the inventory manager is not received in full due to problems related to production and logistics. Moreover, both demand and supply depend on the prevailing economic conditions. The challenge is to determine optimal inventory management policies that minimize the expected costs.

B. Çekyay, and S. Özekici. Mean time to failure and availability of semi-Markov missions with maximal repair. *European Journal of Operational Research*, 207:1442–1454, 2010.

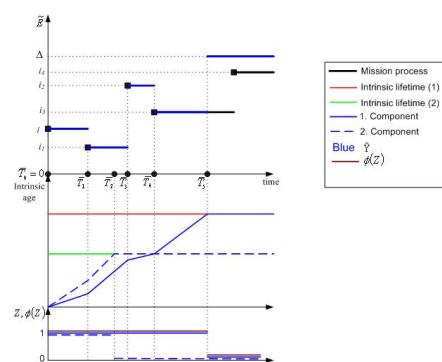
K. Arifoğlu, and S. Özekici. Policies for inventory systems with finite capacity and partially observed Markov-modulated demand and supply processes. *European Journal of Operational Research*, 204:421–438, 2010.

E. Çanakoğlu and S. Özekici. Portfolio selection in stochastic markets with exponential utility functions. *Annals of Operations Research*, 166:281–297, 2009.

O. Feyzioğlu, İ.K. Altinel, and S. Özekici. Optimum component test plans for phased-mission systems. *European Journal of Operational Research*, 185:255–265, 2008.

H. Sak, S. Özekici, and I. Boduroğlu. Parallel computing in asian option pricing. *Parallel Computing*, 33:92–108, 2007.

S. Özekici and R. Soyer. Semi-markov modulated poisson process: Probabilistic and statistical analysis. *Mathematical Methods of Operations Research*, 64:125–144, 2006.



A realization for mission-based reliability of a series system with two components.



Serpil Sayın

Ö.G. Ali, S. Sayın, T.V. Woensel, and J. Fransoo. SKU demand forecasting in the presence of promotions. *Expert Systems with Applications*, 36:12340–12348, 2009.

C. Yıldız, S. Karabati, and S. Sayın. Pricing and lot-sizing decisions in a two-echelon system with transportation costs. *OR Spectrum*, 31(3):629–650, 2009.

H. Aytug, and S. Sayın. Using support vector machines to learn the efficient set in multiple objective discrete optimization. *European Journal of Operational Research*, 193(2):510–519, 2009.

B. Saglam, F.S. Salman, S. Sayın, and M. Türkay. A mixed-integer programming approach to the clustering problem with an application in customer segmentation. *European Journal of Operational Research* 173(3):866–879, 2006.

S. Sayın, and P. Kouvelis. The multiobjective discrete optimization problem: A weighted min-max two stage optimization approach and a bicriteria algorithm. *Management Science*, 51(10):1572–1581, 2005.

Professor

College of Administrative Sciences and Economics

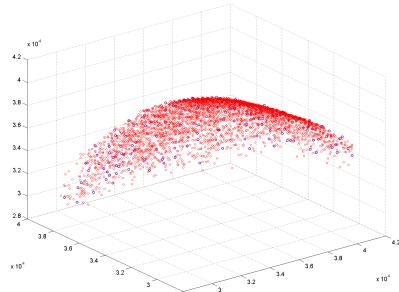
Ph.D. University of Florida

<http://home.ku.edu.tr/~ssayin>

ssayin@ku.edu.tr

Serpil Sayın's main research stream historically has been within the area of multiple objective optimization. When multiple objectives are introduced into a mathematical programming problem, the notion of optimality is replaced by that of efficiency. Efficient solutions of a problem fully characterize the trade-off information involved in the decision making setting. However, there are many efficient solutions of a multiple objective optimization problem, which might be computationally difficult to obtain, and once obtained challenging to evaluate for identifying a most-preferred decision alternative. One way to approach the problem then is finding samples of efficient solutions that are good enough to characterize the entire set of efficient solutions. Her research has investigated several aspects of this general approach in continuous and discrete optimization problems.

Serpil Sayın is also interested in the field of data mining. She has been involved in projects involving empirical work and algorithm development. She is particularly interested in using optimization based methodologies to solve specific data mining problems such as support vector machines.



Supported and unsupported efficient solutions of a three criteria knapsack problem.

Barış Tan



Dean of College of Administrative Sciences and Economics, Professor of Operations Management
Department of College of Administrative Sciences and Economics

Ph.D. Operations Research, University of Florida
<http://home.ku.edu.tr/~btan>
btan@ku.edu.tr

Prof. Tan's research interests are in four areas: design, analysis, and improvement of production systems; supply chain management and production/inventory planning; stochastic modeling and analytical and numerical modeling techniques, and competitiveness in textile-apparel-retail supply chain. He worked extensively on performance analysis of production systems that are subject to demand and supply uncertainty. His supply chain research is focused on studying subcontracting, outsourcing, and cooperation. He developed data-driven inventory planning methods in retailing. He is studying the competitiveness of Turkish textile and apparel industry based on his research on subcontracting and cooperation strategies in supply chains.

His main expertise is in stochastic modeling and its applications. In his research, he uses stochastic modeling techniques to address issues that arise in various applications that also included performance analysis of logistics auction markets, risk analysis of tanker traffic through Bosphorus, Markov Chain tests for testing market efficiency in financial markets and to analyze business cycles, agricultural planning with harvest, demand, and yield uncertainty.

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B. Tan, and S.B. Gershwin. Modeling and analysis of Markovian continuous flow production systems with a finite buffer. *Annals of Operations Research, Special Issue on Advances in the Analysis of Manufacturing Systems*, 182:5–30, 2011.

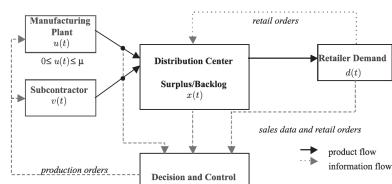
B. Tan, and S.B. Gershwin. Analysis of a general Markovian two-stage continuous-flow production system with a finite buffer. *International Journal of Production Economics*, 120(2):327–339, 2009.

S.B. Gershwin, B. Tan, M.H. Veatch. Production control with backlog-dependent demand *IIE Transactions*, 41(6), 511–523, 2009.

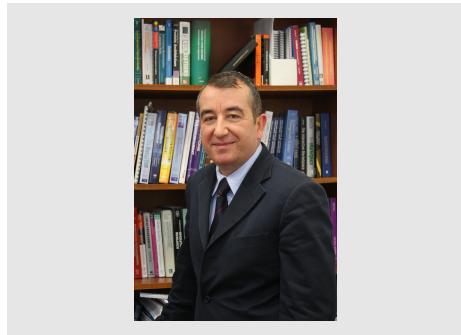
S. Karabat, B. Tan, and O.C. Ozturk. A method for estimating stock-out based substitution rates by using point-of-sale data. *IIE Transactions*, 41:408–420, 2009.

A. Ozler, B. Tan, and F. Karaesmen. Multi-product newsvendor problem with value-at-risk constraints. *International Journal of Production Economics*, 117(2):244–255, 2009.

Y. Akcay, and B. Tan. On the benefits of assortment-based cooperation among independent producers. *Production and Operations Management*, 17(6):626–640, 2008.



Retailer, manufacturer and subcontractor product and information flows.



O. Dagliyan, F. Uney Yuksektepe, I.H. Kavakli and M. Türkay. Optimization based tumor classification from microarray gene expression data *PLoS ONE*, In press, 2011.

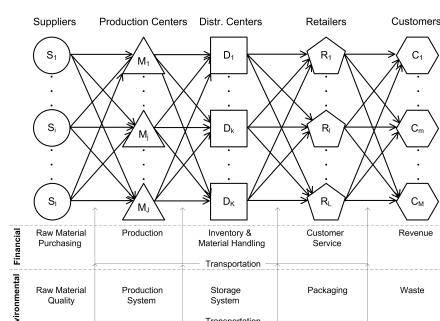
S. Atalay, M. Cancı, G. Kaya, C. Oguz and M. Türkay. Intermodal transportation in Istanbul via Marmaray project. *IBM J. Res. & Dev.*, 54(6):1–9, Nov 2010.

U. Kaplan, M. Türkay, B. Karasozen and L.T. Biegler. Optimization of supply chain systems with price elasticity of demand. *Informs Journal on Computing*, In press, 2010.

M. Türkay. Environmentally conscious supply chain management. *Process Systems Engineering, vol 3: Supply Chain Optimization*, Chapter 3:45–86, 2008.

F. Uney, and M. Türkay. A mixed-integer programming approach to multi-class data classification problem. *European Journal of Operational Research*, 173(3), 910–920, 2006.

A. Soylu, C. Oruc, M. Türkay, K. Fujita, and T. Asakura. Synergy analysis of collaborative supply chain management in energy systems using multi-period MILP *European Journal of Operational Research*, 174(1):387–403, 2006.



Environmental conscious supply chain management.

Metin Türkay

Associate Professor

Department of Industrial Engineering

Ph.D. Carnegie Mellon University

<http://home.ku.edu.tr/~mturkay>

mturkay@ku.edu.tr

Professor Türkay's research aims to develop systematic approaches to address complex problems in science, engineering, and scientific management. His research has three primary components: modeling, solution algorithms, and applications in real life problems. He has worked on the development of a novel mathematical modeling approach that integrates propositional logic to describe discrete nature of the problems under study with the continuous part. He also developed logic-based optimization algorithms for solving discrete-continuous problems that are applied successfully to network design and supply chain management problems. Current research topics are:

- Modeling and optimization of discrete-continuous systems: Development of models that captures the complex nature of discrete-continuous optimization problems is essential for understanding the behavior of these systems. In addition, solution of these models requires taking advantage of models that are well-represented for algorithmic efficiency. We aim to efficient approaches that combine modeling and solution stages taking advantage of systematic structure of the systems under study.
- Sustainable supply chain and logistics: Sustainability of one of the primary concerns in the design and operation of supply chain and logistics systems. Sustainability incorporates environmental and social factors in addition to economic factors. We develop models to analyze sustainability of supply chain management and logistics systems on well-known problems such as inventory management, network design, production planning and scheduling and transportation.
- Data classification: Data classification is a supervised learning strategy that analyzes the organization and categorization of data in distinct classes. It has numerous applications in problems of science, engineering and management. We developed a novel mixed-integer programming based approach for data classification that outperforms existing approaches on standard benchmark data sets. We aim to improve the computational efficiency of this approach and apply to diverse set of problems. Computational biology and bioinformatics: Computational biology and bioinformatics had become one of the major application areas for operations research methods in recent years. We tailor operations research methods for applications in the design and optimization of metabolic networks, data mining and the application of structure based drug design.

Emre Alper Yıldırım

Associate Professor
Department of Industrial Engineering
Ph.D. Cornell University
<http://home.ku.edu.tr/~alperyildirim>
alperyildirim@ku.edu.tr

Dr. Yıldırım's research interests lie in the theory, applications, and algorithms in mathematical optimization. His research focuses on the investigation of the underlying theoretical properties of a class of optimization problems in an attempt to develop efficient solution methodologies for such problems by properly exploiting such properties. His current research projects include the investigation of efficient first-order algorithms for large-scale structured convex optimization problems, mixed integer nonlinear programming problems, and particular applications such as wireless mesh networks, multicommodity distribution problems, and the assignment of proposals to reviewers in funding agencies.



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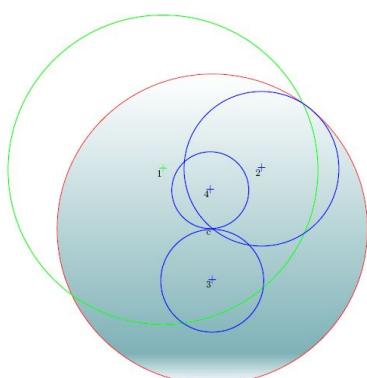
E.A. Yıldırım. On the accuracy of uniform polyhedral approximations of the copositive cone. *Optimization Methods and Software*, In press, 2011.

P. Kumar, and E.A.Yıldırım. A linearly convergent linear-time first-order algorithm for support vector classification with a core set result. *INFORMS Journal on Computing*, In press, Sep 2010.

E.A. Yıldırım A simpler characterization of a spectral lower bound on the clique number *Mathematical Methods of Operations Research*, 71(2):267–281, 2010.

P. Kumar, and E.A. Yıldırım. An algorithm and a core set result for the weighted Euclidean one-center problem. *INFORMS Journal on Computing*, 21(4):614–629, 2009.

S.D. Ahipasaoglu, and E.A. Yıldırım. Identification and elimination of interior points for the minimum enclosing ball problem. *SIAM Journal on Optimization*, 19(3):1392–1396, 2008.



Weighted Euclidean one-center algorithm

Recent Graduates

In the following pages, you can find information on the recent graduates of IEOM program.

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Aysun Aker (Özler)

Ph.D. student at University of Washington
M.S. Koç University, 2005
Advisor: Fikri Karaesmen and Barış Tan



Aysun Aker (Özler). Stochastic inventory models with downside risk consideration. Master's thesis, Koç University, 2005. *"In this thesis, we study the single period stochastic inventory (newsvendor) problem with downside risk constraints. We utilize Value at Risk (VaR) and Conditional Value at Risk (CVaR) as the risk measures to incorporate the risk of earning less than the desired target profit or losing more than an acceptable level due to the randomness of demand into the newsvendor framework".*

Karaesmen F., Ozler A., Tan B. Multi-product newsvendor problem with value-at-risk considerations. *International Journal of Production Economics*, 2009.

21

Semra Ağralı

Ph.d. student at University of Florida
M.S. Koç University, 2005
Advisor: Fikri Karaesmen and Barış Tan



Semra Ağralı. Modeling and analysis of an auction-based logistics market. Master's thesis, Koç University, 2005. *"In this thesis, a logistics market that uses a reverse auction to match orders given by shippers that aim to transport their goods to various destinations with carriers is analyzed. The objective of this thesis is to analyze the effects of various system parameters, such as arrival and abandonment rates of orders and carriers, and the capacity of the system for carriers and orders, on the performance of the system in a stochastic environment. The main contribution of this thesis is to propose an analytical model that evaluates the performance of an auction-based logistics market in a dynamic setting".*

Ağralı S., Tan B., and Karaesmen F. Modeling and analysis of an auction-based logistics market. *European Journal of Operational Research*, 2008.



Alper Altan

Industry

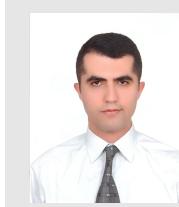
M.S. Koç University, 2005

Advisor: Selçuk Karabatı and Fikri Karaesmen

Alper Altan. A two stage supply chain model in a price-dependent demand environment. Master's thesis, Koç University, 2005.

Karabati S., Karaesmen F., and Altan A. A two-stage decentralized supply chain with limited capacity and limited information sharing. *Proceedings of the Analysis of Manufacturing Systems Conference*, 2007.

22



Kenan Arifoğlu

Ph.D. candidate, Northwestern University

M.S., Ko University, 2007

Advisor: Sleyman zekici

22

"Inventory Models with Imperfect Information and Random Supply, M.S. Thesis, Koç University, Istanbul, 2007. The aim of this thesis is to analyze single-item inventory models with random supply and imperfect information in a random environment. We assume that the randomness in supply is attributed to the random capacity of the producer and/or random availability of the transporter. Moreover, the random environment which modulates demand, supply and all cost parameters is modeled as a Markov chain. In the first part of the thesis, we assume that the random environment is fully observed. The optimal policy for single, multiple and infinite planning periods is shown to be an environment-dependent base-stock policy. In the second part of the thesis, we assume that the random environment is only partially observed. Therefore, we model the random environment by two processes: an unobserved process which is a Markov chain and observed process which is not necessarily a Markov chain. We show that the base-stock policy is optimal in single and multiple period settings if the capacity process and costs are observable. We also analyze inventory problems with unreliable suppliers and fixed ordering cost by using sufficient statistics. We show that a state-dependent (s,S) policy is optimal for this type of inventory problems if the availability process of supplier is observable. Finally, we also analyze inventory problems with finite capacity and random yield in a partially-observed random environment and show that state-dependent modified inflated base-stock policy is optimal in single, multiple and infinite planning periods".

K. Arifoğlu, and S. Özekici. Policies for inventory systems with finite capacity and partially observed Markov-modulated demand and supply processes. *European Journal of Operational Research*, 204:421–438, 2010.



Seray Aydın

Industry
M.S. Koç University, 2008
Advisor: Yalçın Akçay, Fikri Karaesmen

Seray Aydın. Revenue management applications through dynamic pricing. Master's thesis, Koç University, 2008.

Aydın S., Akçay Y., and Karaesmen F. On the structural properties of a discrete-time single-product revenue management problem. *Operations Research Letters*, 2009.

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Zehra Yalçın

Bilgintürk

University of Texas at Austin, Ph.D. candidate
M.S. Koç University, 2007
Advisor: Ceyda Oğuz, Sibel Salman

Zehra Bilgintürk Yalçın. Order acceptance and scheduling decisions in make-to-order systems. Master's thesis, Koç University, 2007. "In this thesis, simultaneous order acceptance and scheduling decisions in a make-to-order system are examined. The problem is first modeled as a MILP. Since the problem is NP-hard, a heuristic algorithm is then developed to handle data instances up to 100 orders. Computational experiments indicate that the algorithm provides high quality feasible solutions with modest computational effort".

Z. Bilgintürk Yalçın, C. Oğuz, and S. Salman. Order acceptance and scheduling decisions in make-to-order systems. *Proceedings of the 3rd Multidisciplinary International Conference on Scheduling: Theory and Application*, pages 80–87, 2007.

Z. Bilgintürk Yalçın, C. Oğuz, and S. Salman. Order acceptance and scheduling decisions in make-to-order systems. *under revision*, 2009.



Ethem Çanakoğlu

Universiy of Warwick
Ph.D. Koç University, 2009
Advisor: Süleyman Özekici

Ethem Çanakoğlu. *Portfolio Optimization in Stochastic Markets: Utility-Based Approach*. PhD thesis, Koç University, 2009. "The thesis considers the optimal portfolio selection problem in a multiple period setting where the investor maximizes the expected utility of the terminal wealth in a stochastic market. The utility function belongs to the HARA family and the market states change according to a Markov process. Via dynamic programming approach an explicit characterization of the optimal policy and the value function is obtained. In particular, it is shown that the optimal portfolio satisfies the separation property and the composition of the risky portfolio does not depend on the wealth of the investor".

E. Çanakoğlu and S. Özekici. Portfolio management with imperfect information: A hidden Markov model. *Applied Stochastic Models in Business and Industry (to appear)*, 2011.

E. Çanakoğlu and S. Özekici. Portfolio selection in stochastic markets with HARA utility functions. *European Journal of Operational Research*, 201:520–536, 2010.

Burak Çavdaroğlu

Ph.D. Student at Rensselaer Polytechnic Institute
M.S. Koç University, 2007
Advisor: Özden Gür Ali



Burak Çavdaroğlu. Pharmacy discounts and profit maximizing pharmacy and manufacturer decisions in turkey. Master's thesis, Koç University, 2007. "This thesis studies the discounts given by the pharmaceutical companies to pharmacists who are allowed to substitute the prescribed drugs with cheaper bioequivalent alternatives. The analysis of the mathematic model for the profit maximizing pharmacists suggests that the drug substitution decision of the pharmacy is directly influenced by the pharmacy discounts of the pharmaceutical firms relative to each other, suggesting a discount war, as well as physician detailing and compulsory government discounts. The analytical results derived in this study can be utilized by pharmacist and pharmaceutical companies to maximize their profits, and at the highest level by regulators to maximize social welfare of the society".

B. Çavdaroğlu and Ö Gür Ali. Profit maximizing pharmacy decision and pharmacy discounts in turkey. *Proceedings of the 14th International Annual EurOMA Conference*, June 2007.

Özden Gür Ali and Burak Çavdaroğlu. The pharmaceutical distribution channel and the use of pharmacy discounts as a marketing tool. *under review*, 2008.

25

Nesrin Çakan

Industry
M.S. Koç University, 2006
Advisor: Zeynep Akşin



Nesrin Çakan. Joint flexibility and capacity design in service and manufacturing systems. Master's thesis, Koç University, 2006. "In this thesis, an integrated model is provided for facility location and layout problems together with scheduling problems arising in Ro-La transportation. Train scheduling problem was modeled as an integer programming model to find minimum number of platforms in a station, number of trains and departures with carried trucks/trailers, while scheduling all of the several train operations. Using the output of the train scheduling model, station layouts were developed and improved with an algorithm to find the best sub-optimal station layout. Consequently, train scheduling model and facility layout model constitute the integrated model. This model was applied to the Marmaray Project in İstanbul and different Ro-La transportation systems were analyzed. based on the results, we suggested how to locate the system, how to plan the facility layout and how to schedule the intermodal freight transportation in that system".

N. Çakan, O.Z. Akşin, F. Karaesmen, and L. Örmeci. Flexibility structure and capacity design with human resource considerations. *under review*.

26



Bora Çekyay

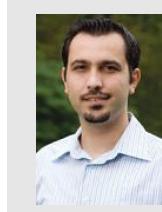
McGill University, Postdoctoral
Ph.D., Koç University, 2009
Advisor: Süleyman Özекici

"Reliability and Maintenance of Semi-Markov Missions, Ph.D. Thesis, Ko University, stanbul, 2009. In this thesis, we analyze the reliability and maintenance of a mission-based system where the mission process is the minimal semi-Markov process corresponding to a Markov renewal process. The system is a complex one with multiple components that have arbitrary lifetime distributions. The mission has different stages or phases with random sequence and durations. We assume that the failure parameters of the components and the configuration of the system change according to the phases of the mission. In other words, an external mission process modulates the deterioration or age process of the system. We analyze several performance measures under two repair policies: namely, maximal repair and no repair. We also discuss optimal maintenance policies minimizing the expected total discounted cost. We consider simpler models with Markovian mission and deterioration to obtain more explicit and computationally tractable results".

I.K. Altinel, B. Çekyay, O. Feyzioglu, M.E. Keskin, and S. Özékici. Mission based component testing for series systems. *Annals of Operations Research (to appear)*, 2010.

E. Yamangil, I.K. Altinel, B. Çekyay, O. Feyzioglu, and S. Özékici. Design of optimal component test plans in the demonstration of diverse system performance measures. *IIE Transactions (to appear)*, 2010.

B. Çekyay, and S. Özékici. Mean time to failure and availability of semi-Markov missions with maximal repair. *European Journal of Operational Research*, 207:1442–1454, 2010.



Eren Başar Çıl

Ph.D. student at Northwestern University
M.S. Koç University, 2006
Advisor: Fikri Karaesmen, Lerzan Örmeci

Eren Başar Çıl. General framework to perform sensitivity analysis on markovian queueing and inventory systems. Master's thesis, Koç University, 2006.

Çıl E.B., Örmeci E.L., and Karaesmen F. Structural results on a batch acceptance problem. *Mathematical Methods in Operations Research*, 2007.

Çıl E.B., Örmeci E.L., and Karaesmen F. Effects of system parameters on the optimal policy structure in a class of queueing control problems. *Queueing Systems*, 2009.

Ayşe Başak Çizmeci

Ph.D. Student at Sabancı Management
M.S. Koç University, 2009
Advisor: Özden Gür Ali



Ayşe Başak Çizmeci. The pharmacists substitution strategy in the presence of manufacturer quantity discounts and an empirical study on the cost effects of rx-to-otc switch in turkey. Master's thesis, Koç University, 2009. “*This thesis consists of an empirical and a theoretical study focused on pharmaceutical industry. In the analytical part, a mathematical model of the pharmacists substitution and order strategy in response to the quantity discounts of by the manufacturers of the substitutable drugs is developed. The results of the study suggest that full substitution is optimal only when substitution is profitable for the pharmacist and the gain from quantity discount and substitution exceeds the holding cost. The pharmacist engages in partial substitution by substituting all demand up to a point in the order cycle, beyond which holding costs make it unprofitable to substitute. The empirical part analyzes how the removal of certain drugs from the government reimbursement list in July and September 2006 in Turkey changed the consumption of the affected drugs as well as their alternatives that are still reimbursed by the government, and the results suggest that the removal of these drugs from reimbursement may not produce the expected decrease in spending, as the consumption of the alternatives increase*”.

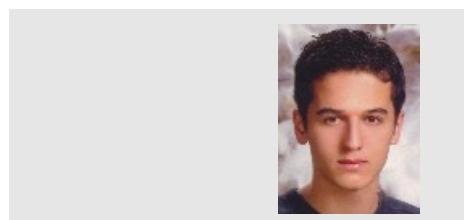
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Ayşe Başak Çizmeci and Özden Gür Ali. Firm-driven substitution in the presence of quantity discounts. *Proceedings of the 15th International Annual EurOMA Conference*, June 2008.

Özden Gür Ali and A. Başak Çizmeci. How removing prescription drugs from reimbursed status can increase the pharmaceutical expenditures. *under review*, 2008.

Taha Doğru

Industry
M.S. Koç University, 2007
Advisor: Zeynep Akşin, Evrim Güneş



Taha Doğru. Essays in service operations with moral hazard. Master's thesis, Koç University, 2007.

Doğru T., Güneş E., and Akşin O.Z. Salesforce compensation design with post-purchase satisfaction. *Proceedings of EUROMA*, June 2007.

Akşin O.Z., Doğru T., and Güneş E.D. Sales force compensation in settings with servitization. *Proceedings of MSOM*, June 2008.



Figen Helvacıoğlu

Industry

M.S. Koç University, 2009

Advisor: Barış Tan, Selçuk Karabatı

Figen Helvacıoğlu. Multi-product inventory control under stock-out based substitution. Master's thesis, Koç University, 2009. "In the retail industry, substitution is a commonly observed customer response to stockouts. The sales data of a particular product observed by a retailer is affected by substitutions from other products. In practice, retailers make their inventory decisions without the knowledge of the substitution effects on demand. These decisions can be improved if the substitution rates are known. In this thesis, an inventory management problem is considered in the retail industry with multiple items, stock-out based substitution and lost sales".



Güray Kaya

Texas A.M. University, Ph.D. candidate

M.S. Koç University, 2008

Advisor: Ceyda Oğuz, Metin Türkay

Güray Kaya. Integration of facility location and layout of intermodal transportation system with scheduling. Master's thesis, Koç University, 2008. "In this thesis, an integrated model is provided for facility location and layout problems together with scheduling problems arising in Ro-La transportation. Train scheduling problem was modeled as an integer programming model to find minimum number of platforms in a station, number of trains and departures with carried trucks/trailers, while scheduling all of the several train operations. Using the output of the train scheduling model, station layouts were developed and improved with an algorithm to find the best sub-optimal station layout. Consequently, train scheduling model and facility layout model constitute the integrated model. This model was applied to the Marmaray Project in İstanbul and different Ro-La transportation systems were analyzed. based on the results, we suggested how to locate the system, how to plan the facility layout and how to schedule the intermodal freight transportation in that system".

G. Kaya, C. Oğuz, and M. Türkay. Integration of facility location and layout of intermodal transportation systems with scheduling. revised for *Computers and Operations Research*, 2009.

Hazal Özden

Industry
M.S. Koç University, 2006
Advisor: Lerzan Örmeci, Evrim Güneş



Hazal Özden. Accounting for customer reactions to customer relationship management initiatives. Master's thesis, Koç University, 2006.

O.Z. Akşin, E.D. Güneş, E.L. Örmeci, and S.H. Özden. When cross-selling backfires: Modeling customer reactions to sales attempts. *Proceedings of MSOM*, June 2008.

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Ömer Cem Öztürk

Ph.D. Student at Emory University
M.S. Koç University, 2006
Advisor: Barış Tan, Selçuk Karabati



Ömer Cem Öztürk. A method for estimating stock-out based substitution rates by using point-of-sale data. Master's thesis, Koç University, 2006. "Empirical studies in retailing suggest that stock-out rates are considerably large for many product categories. Stock-outs result in demand spill-over, or substitution, among items within a product category. Product assortment and inventory management decisions can be improved when the substitution rates are known. In this thesis, we study the problem of estimating product substitution rates using Point-of-Sale (POS) data only".

S. Karabati, B. Tan, and Ö.C. Öztürk. A method for estimating stock-out based substitution rates by using point-of-sale data. *IIE Transactions*, 41:408–420, 2009.

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Zeynep Özyurt

Borusan Logistics
M.S. Koç University, 2007
Advisor: Deniz Aksen

Zeynep Özyurt. Solving multi-depot location routing problem using Lagrangian relaxation. Master's thesis, Koç University, 2007. "The design of a distribution logistics system requires quite a number of decisions of different planning levels. The most important strategic decision is the locations of distribution centers, which are also referred to as depots. The allocation of customers to the depots is a decision of tactical level, while determining vehicle routes to visit those customers belongs to the operational level. Multi-depot Location-Routing Problem (MDLRP) involves the decisions of different levels simultaneously. In the problem, the optimal number and locations of depots are decided while allocating customers to depots and determining vehicle routes to visit all customers. In this thesis, we propose a nested Lagrangian relaxation-based method named [LRTS] for the 2-layer discrete uncapacitated MDLRP".

D. Aksen, Z. Özyurt, and N. Aras. The open vehicle routing problem with driver nodes and time deadlines. *Journal of the Operational Research Society*, 58(9):1223–1234, Sep 2007.

Z. Özyurt and D. Aksen. Solving the multi-depot location-routing problem with Lagrangian relaxation. In EK Baker, A. Joseph, A. Mehrotra, and MA Trick, editors, *Extending The Horizons: Advances in Computing*, volume 37 of *Advances in Computing, Optimization and Decision Technologies*, pages 125–144. Springer Verlag, 2007. ICS 2007 Conference Volume.



Müge Sandıkçıoğlu

Industry
M.S. Koç University, 2008
Advisor: Özden Gür Ali, Serpil Sayın

Müge Sandıkçıoğlu. Grocery retail store revenue prediction for store location evaluation using spatial interaction models. Master's thesis, Koç University, 2008. "The goal of this thesis study is to support the store location decision using spatial interaction models by predicting the revenue of a potential grocery store. Using insights obtained in the exploratory analysis examining factors such as distance, competition, store format through macro and customer level analysis a new spatial interaction model is developed. The new model, called the Variable Distance Decay Model, combined with the developed estimation procedure provides superior accuracy in terms of customer share prediction compared to the well established Huff , MCI and Competing Destinations models on real customer data that is provided by the leading grocery store chain in Turkey. A method is proposed to predict store sales using spatial interaction models and customer loyalty card data".

Müge Sandıkçıoğlu, Özden Gür Ali, and Serpil Sayın. A new gravity model with variable distance decay. *Proceedings of Eur-Opt 2008, Continuous Optimization and Knowledge Based Technologies*, May 2008.

Sibel Bilge Sonuç

University of Florida, Ph.D. candidate
M.S. Koç University, 2007
Advisor: Ceyda Oğuz



Sibel Bilge Sonuç. A scatter search approach for protein folding problem in 2d hp-model. Master's thesis, Koç University, 2007. "In this thesis, a metaheuristic algorithm based on scatter search and path relinking was developed for the 2D protein folding problem based on the HP-model. The study introduces new moves and operators for the scatter search. The proposed metaheuristic was tested on some known test instances and promising results were obtained".

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İşilay Talay Değirmenci

Ph.D. student at Duke University
M.S. Koç University, 2004
Advisor: Fikri Karaesmen, Lerzan Örmeci



İşilay Talay Değirmenci. Inventory pricing and replenishment for a make to stock production system with fluctuating demand and lost sales. Master's thesis, Koç University, 2004.

Gayon J.-P., Talay-Değirmenci I., Karaesmen F., and Örmeci E.L. Dynamic pricing and replenishment in a production/inventory system with markov-modulated demands. *Probability in the Engineering and Informational Sciences*, 2009.



Seda Tepe

Ph.D. student at University of Minnesota
M.S. Koç University, 2007
Advisor: Fikri Karaesmen

Seda Tepe. Impacts of advance demand information and admission control in production/inventory systems. Master's thesis, Koç University, 2007.

Tepe S. and Karaesmen F. Impact of advance demand information in multi-class production-inventory systems. *Proceedings of EUROMA 2007*, 2007.

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Ayşe Gül Tunçelli

Industry
M.S. Koç University, 2007
Advisor: Özden Gür Ali, Serpil Sayın

Ayşe Gül Tunçelli. Forecasting simulated retail demand using statistical and data mining techniques. Master's thesis, Koç University, 2007. "Statistical and machine learning techniques are evaluated for forecasting stock keeping unit (SKU) demand in the presence of promotions. The demand data is artificially generated using a consumer choice model from marketing literature. A retail environment with multiple products in a single category and multiple customer segments is created where products are promoted with price discounts, advertisement and feature displays. Several techniques, including exponential smoothing and regression and machine learning techniques, such as support vector machine regression and regression tree are compared according to accuracy of the SKU demand forecasts, simplicity and forecasting performance in new SKU situations, and preferred methods for different data conditions are explored".

Canan Uçkun

Ph.D. student at University of Chicago
M.S. Koç University, 2006
Advisor: Fikri Karaesmen, Selçuk Savaş



Canan Uçkun. Modeling and analysis of radio frequency identification (RFID) technology within the supply chain. Master's thesis, Koç University, 2006.

Uçkun C., Karaesmen F., and Savaş S. Investment in improved inventory accuracy in a decentralized supply chain. *International Journal of Production Economics*, 2008.

33

Tuğba Yaman

Industry
M.S. Koç University, 2008
Advisor: Selçuk Karabati, Fikri Karaesmen



Tuğba Yaman. RFID applications in retail management. Master's thesis, Koç University, 2008.

Yaman T, Karabati S, and Karaesmen F. Clustering grocery shopping paths of customers by using optimization-based models. *Proceedings of EurOPT 2008*, 2008.

34



İşıl Yıldırım

Industry

M.S. Koç University, 2004

Advisor: Fikri Karaesmen, Barış Tan

İşıl Yıldırım. Stochastic production planning and sourcing problems with service level constraints. Master's thesis, Koç University, 2004. "We study stochastic multi-period production planning problems of a manufacturer with single/multiple plant(s) and/or subcontractors, where each source has a different production cost, capacity, and lead time. The manufacturer has to meet the random demand for single/multiple product(s) according to the service level requirements set by a retailer. We present a methodology based on a mathematical programming approach that a manufacturer can utilize to make its production and sourcing decisions, i.e., to decide how much to produce, when to produce, where to produce, how much inventory to carry, etc".

Yıldırım I., Tan B., and Karaesmen F. A multi-period stochastic production and sourcing problem with service level constraints. *OR Spectrum*, 2005.



Eda Yücel

Industry

M.S. Koç University, 2006

Advisor: Fikri Karaesmen, Sibel Salman, Metin Türkay

Eda Yücel. Vendor selection under product assortment and inventory consideration. Master's thesis, Koç University, 2006.

Yücel E., Karaesmen F., Salman F.S., and Türkay M. Optimizing product assortment under customer-driven demand substitution. *European Journal of Operational Research*, 2009.

Admission

Students should apply with the completed application form which includes;

1. Personal and Educational Background Information
2. Recommendation Letters (2 for M.S., 3 for Ph.D.)
3. TOEFL Requirement (for those whose native language is not English)
 - New Internet Based: Minimum Score 80
 - Computer Based: Minimum Score 213
 - Paper Based: Minimum Score 550
4. ALES scores (required for all Turkish nationals)
5. GRE scores (required from Foreign students; optional for Turkish students)
6. Official transcripts from all the universities attended
7. Statement of Purpose
8. Application fee of 35 TL (or 20 USD or 15 Euro)

Promising candidates will be called for an interview before a final decision is reached on their application.

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Financial Aid

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For M.S. Students:

Students admitted with a B.S./B.A. degree choose between the following two offers:

1. Tuition waiver (29,000 TL/year) plus 1,425 TL monthly stipend
2. Tuition waiver (29,000 TL/year) plus 900 TL monthly stipend and housing

For Ph.D. Students:

Students admitted with a B.S./BA degree choose between the following two offers:

1. Tuition waiver (29,000 TL/year) plus 1,425 TL monthly stipend. The monthly stipend increases to 1,825 TL after the student passes the Ph.D. qualifier.
2. Tuition waiver (29,000 TL/year) plus 900 TL monthly stipend and housing. The monthly stipend increases to 1,300 TL after the student passes the Ph.D. qualifier.

Students admitted with a M.S./M.A. degree choose between the following two offers:

1. Tuition waiver (29,000 TL/year) plus 1,625 TL monthly stipend. The monthly stipend increases to 1,825 TL after the student passes the Ph.D. qualifier.
2. Tuition waiver (29,000 TL/year) plus 1,100 TL monthly stipend and housing. The monthly stipend increases to 1,300 TL after the student passes the Ph.D. qualifier.

Additional Benefits:

1. All students receive a laptop computer and private health insurance.
2. Students with successful standing receive travel funds to attend scientific conferences and meetings.
3. Ph.D. students may be offered monthly stipend up to 3,000 TL through externally funded research grants and projects.
4. Students who receive their stipend from other sources (like TBTAK scholarships or externally funded research grants and projects) are eligible for the following benefits provided by the university:
 - Research Award: 1,300 TL
 - Free Housing: This includes all costs except telephone expenses.
 - Research Award for Ph.D. students: 2,000 TL/year after they pass the qualifier.
 - Housing Allowance: 500 TL/month for students who do not use the free housing benefit.

Partial Scholarships:

Students may also be offered partial scholarships where they pay 13,750 TL/year tuition and receive no monthly stipend or benefits.

For More Information

Application Materials:

Graduate School of Sciences and Engineering
Koç University
Rumelifeneri, Sarıyer
İstanbul, TURKEY 34450
<http://gsse.ku.edu.tr>

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Graduate Programs Office:

Gülçin Sincan
Emine Büyükdurmuş

GSSE Admissions
KOÇ University
Rumelifeneri, Sarıyer
İstanbul, TURKEY 34450
Phone: 212 338 1775
Fax: 212 338 1548
Email: gsse@ku.edu.tr

Graduate Student Resource Guide:

To request a hardcopy of this booklet, please email gsse@ku.edu.tr. An up to date version of this booklet can be downloaded from:

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