



ATHENS UNIVERSITY OF ECONOMICS & BUSINESS
Department of Management Science & Technology

MSL

Management Science Laboratory



Summary of Activities
2000 - 2005



Message from the Director

The Management Science Laboratory (MSL) was established in the year 2000 by the Senate of the Athens University of Economics and Business (AUEB) in order to promote research activities in the general area of Management Science. The Laboratory's mission is to conduct top-quality research that addresses the challenges and the key issues that organizations face in today's fast changing, global and technologically driven business environment. The core team of MSL consists of about 40 researchers (20 faculty or research staff and 20 doctoral students), working on basic or applied research projects funded by the European Union, National Funding Agencies, or private and public organizations. The Laboratory is equipped with state-of-the-art facilities including computer equipment and networks, decision technology software, ERP tools and risk management systems.

MSL is composed of three research units:

- The Innovation and Knowledge Management Unit (InnKnow): InnKnow engages in research activities in the areas of Innovation Management, Knowledge Management, Management of Organizational Change, Entrepreneurship, Strategic Performance Management, Human Resources Management & Development, and Research & Technology Management. (Head: Assistant Professor Klas Eric Söderquist).
- The Operations Management and ERP Systems Unit (OpeR): OpeR explores operational problems faced by supply chains in today's global businesses, using Operations Research methods, together with IT tools and systems. (Head: Associate Professor George Ioannou).
- The Financial Engineering Research Unit (FRC): FRC explores Financial Engineering and Risk Management problems and provides access to a synergistic mix of specialized knowledge in finance, higher mathematics, statistics and econometrics, required for the design, estimation and management of the risks involved with modern financial tools and products. (Head: Professor Apostolos Refenes).

In its six years of operation, MSL has achieved important accomplishments. It has developed a number of methodologies, models and tools that have been published internationally and have been successfully used for the solution of complex problems in organizations. It has completed over 50 research or consultancy projects and has produced more than 150 research working papers, the majority of which have already been published in international journals or presented in conferences. It has initiated the publication of an international research magazine that addresses a major need of both academics and practitioners, already in its 8th issue. It has organized two international conferences and many research or educational seminars and workshops. It has developed a portal for the management science research community. It has supported the school's graduate program by contributing to more than 50 MBA Field Study Projects and about 20 Doctoral dissertations, etc.

In addition, it has achieved to attract significant funding by winning a large number of research grants from the European Union (DG Research, DG Enterprises), and a number of Greek public organizations and bodies such as : the Ministry of Education, the Ministry of Development, the General Secretariat of Research & Technology, and others. Recently, it has won an additional grant from the Ministry of Development of Greece to enhance even further its infrastructure, and obtain an ISO 9001:2000 certification.

Finally, and maybe more importantly, MSL has managed to bring and "tie together" an excellent research team, composed of AUEB faculty, post-doctoral researchers, doctoral students and international fellows, who collaborate closely and effectively to deliver quality research, publications in the top academic journals, solution of managerial problems in practice, organization of conferences or seminars, always in line with AUEB's research orientation and thought leadership position.

I believe that through these activities, AUEB's Management Science Laboratory has achieved recognition from both the Greek and international academic community, as an effective and results-oriented research center. I would like to thank our sponsors for their continuous support and trust, as well as the heads of our research units and all our researchers for their commitment and valuable contributions.

Prof. Gregory Prastacos
May 2006

Innovation & Knowledge Management Unit (InnKnow)



The InnKnow research unit of MSL, headed by Assistant Professor Klas Eric Söderquist, pursues applied and basic research in a number of scientific areas, which include:

- Innovation and R&D Management
- Knowledge Management and Competency-Based Management
- Entrepreneurship and New Business Development
- Strategic Performance Management – Balanced Scorecard
- Management of Organizational Change and Development

Some of the projects undertaken by MSL/InnKnow in these areas are the following:

Analyzing and Evaluating the Impact on Innovation of Publicly-Funded Research Programs

Even though every EC Research Support Framework Program has funded a large number of major projects in Europe, it seems that the relationship between R&D on one hand and firm competitiveness and innovation on the other is rather loose. This project analyzes this situation, aiming to identify critical success factors and come up with guidelines and policy recommendation for the management of publicly funded R&D work. The project includes development of a methodology, analysis of projects, evaluation of the impact of research, comparison with other countries (eg. USA, Japan, Israel, Norway, Australia), development of case studies at the firm level, and policy recommendations. The project is funded by the EC – General Direction on Enterprises.

Evaluating the Impact of Innovation on Technological Development, FORESIGHT

This project, part of the Pan-European FORESIGHT research initiative, developed

and evaluated the importance and impact of innovation to 11 economic sectors under alternative development scenarios in Greece. The project was funded by the General Secretariat of Research and Technology (GSRT) of Greece.

Developing and Managing Effective Knowledge Sharing Networks

This research project investigates the impact, interplay and relative importance of a number of technological, organizational and cultural factors that affect the efficiency of knowledge sharing networks (KSNs), both of inter- and intra-organizational nature. A cross-sectoral survey of knowledge sharing practices in the marketing function of large companies is conducted, and a methodology is developed for the efficient implementation of KSNs. The project is funded by Emporiki Bank and GSRT.

Research Potential of the Black Sea Countries, BS-RESPOT

The Black Sea (BS) region is moving into a new era of stability and growth. This project aims at evaluating the strengths and weaknesses or research potential in selected BS countries, assessing the current situation in the field of innovation and explore more effective ways for the exploitation of research results, through collaboration among the countries in the region and with the EU. The project is funded by the EC, and is conducted in collaboration with the International Center of Black Sea Studies and other international organizations.

Assessing the Level of Management Practices in Greece

This project, conducted on behalf of the Hellenic Management Association (EEDE), aims to assess the level of management practices in Greece. A questionnaire was designed and tested, a sample was selected through an appropriate stratification procedure, and the research is currently in process.

Strategic Human Resource Performance Management

MSL has significant experience on the use of Balanced Scorecard as a tool for strategy development and implementation. The objective of this project is to develop a methodology and a set of measures for implementing Balanced Scorecard strategies, with a focus on the banking sector. The project is funded by Emporiki Bank and GSRT.

Strategic Innovation Management: Learning Processes Promoting Innovation Development in a Project Team

Considering the formulation of project teams as a crucial success factor in the modern business environment, this research project investigates and analyzes the learning processes in project teams during change and innovation-related projects, in order to highlight the factors that influence the knowledge and learning processes and create favorable conditions for change and innovation. The project is supported by a number of Greek and international firms participating in the survey and case study research.

Managing Change in the Public Sector

The objective of this research is to create a framework for change management in the public sector based on the New Public Management theory. The theoretical research issue consists of the conceptual refinement and empirical testing of a multi-lens theory of change in organizations. The applied research issue consists of identifying the context-specific determinants of successful implementation of change objectives in the public sector. The main methodology followed is case studies analysis.

Operations Management & ERP Systems Unit (OpeR)



The research team of OpeR, headed by Associate Professor George Ioannou, pursues applied and basic research in a number of scientific areas, which include:

- Supply Chain Management
- Enterprise Resource Planning Systems (ERPs)
- Operations Management

Some of the projects undertaken by MSL/OpeR in these areas are the following:

Supply Chain Optimization

MSL has an intense and long-term research activity in the area of Supply Chain Management. A number of projects and doctoral dissertations have been undertaken on different aspects of supply chain management, including optimal inventory management issues, use of option pricing techniques for the management of transshipment centers, selection of appropriate nodes for keeping inventory, effectively managing risk in a supply chain, issues relating to the coordination of supply chains, etc. The above work has led to a number of publications in leading journals internationally. The research activities in this area are partly funded by the Ministry of Education of Greece.

Reverse Supply Chains with applications in Waste Management using Web-Enabled technologies

The project focuses on the optimization of reverse supply chains with an application to the lubricants regeneration sector. New algorithmic solutions are developed and applied in a web-enabled ERP environment that manages waste monitoring at distributed locations, waste collection via special vehicles, intermediate storage at local transfer stations, and final delivery to refineries for processing

and recycling. This project is being conducted jointly with Cyclon and Konkat companies and is being funded by GSRT.

Vehicle Routing

Vehicle Routing and Scheduling is vital in today's logistics. MSL has been active in this area for a long time, developing efficient and effective models and algorithms for many variations of the Vehicle Routing Problem (VRP), such as the Capacitated VRP, VRP with Time Windows, the Heterogeneous VRP, the Pickup and Delivery VRP and others. In addition, Decision Support Systems are designed which enable dispatchers and schedulers to tackle intra-city and inter-city vehicle routing problems using GIS and GPS technology, wireless telecommunication facilities and shortest path algorithms. The algorithms developed in this area have been published in leading international journals, and have been acknowledged to be among the best in the world. This research has been partially funded by GSRT.

Optimization of banking customer-centric operations

The goal of the project was to develop CRM models and processes both from the internal (operational) perspective, and the external (customer perception) perspective. Samples from large banking institutions support the cases developed within the project. The project was sponsored by the Ministry of Education.

Advanced methodological approaches for effective ERP implementations

A project in this area focused on the development of an advanced methodology for handling the bottlenecks of ERP implementations via the application of the theory of constraints, and a comprehensive analysis of pro- and post-implementation issues. In addition, the project aimed to support the effective implementation of an integrated ERP System for both intra-company and inter-company web-based transactions, for M.J. Maillis SA, from which the project was also funded.

Another project examines the factors affecting the efficiency and effectiveness of the implementation of ERP systems to Small and Medium Enterprises, and identifies critical differences in concepts, choices and activities between SMEs and larger companies in ERP implementation.

Optimization Management of Financial Institutes, EUMOptfin

The project focused on developing mathematical models and systems for optimization of Financial Institutions operations management. In the context of the project a series of international seminars were conducted with the collaboration of the University of Vienna (AU), Erasmus University (NL), University of Bergamo (IT) and others.





Financial Engineering Research Unit (FRC)



The Financial Engineering Research Unit, headed by Professor Apostolos Refenes, encompasses research work that can be allocated in the following areas:

- Risk Management and Performance Attribution
- Structuring & Pricing Derivatives Securities
- Asset & Liability Management, Securitization & Real Estate Finance
- Financial Analytics & Econometric Modeling
- Energy, Climate & Environmental Finance
- Corporate Governance

Some of the projects undertaken by MSL/FRC in these areas are the following:

Performance Attribution for Multi-Currency Fixed Income Portfolios

The objective of this project was to provide the analytics, methodologies and procedures required for planning, developing and implementing a framework for reliable performance attribution measurement for multi-currency fixed income portfolios. Objectives included: Selection of performance metrics, evaluation of performance attribution methodologies, selection or construction of the appropriate benchmark portfolio, tracking error metrics and finally, planning and implementing performance attribution procedures. The project was sponsored by the Bank of Greece.

Conditional Correlation & Risk Management

The project developed dynamic measures for estimating and forecasting conditional and implied correlation, and evaluated their forecasting performance in various financial contexts using advanced statistical methods.

Volatility Derivatives

This project studied the numerous ways and products to price and hedge securities volatility. A new model of option pricing model was implemented where volatility is assumed to follow an autonomous diffusion process. Moreover, the development of a new volatility option on a tradable asset was proposed. Finally, the case of constructing a volatility index for the Greek stock market was explored based on the implied volatilities of the FTSE-20 index. The project was sponsored by the Athens Exchange Derivatives Market (ADEX).

Weather Risk Management and Derivatives

A major challenge faced by non-energy industries is the quantification of the impact of weather on demand for their products. Tailor-made risk management instruments, called weather derivatives, are now available which can compensate for lost earnings due to adverse weather-induced drops in sales, stock dumping, or loss of potential sales due to underproduction in extraordinarily hot weather. This research project aimed at developing a consistent methodology for quantifying the exposure of sales to weather seasonals and to propose specific hedging solutions based on weather derivatives such as swaps, options, catastrophe bonds, etc. The project was sponsored by a major Greek food company.

Environmental Risk Management and Transaction Systems

This project involves doctoral and postdoctoral research on the development of new mathematical and econometric models for environmental risk management. Jump diffusion stochastic processes are used and a wide range of environmental financial engineering problems are examined. It also investigates models, technologies and best practices concerning transaction systems for weather and climate derivatives. The project is funded by the Ministry of Education.

Pricing and Risk Management of Leasing

An important problem in Financial Engineering concerns the correct pricing of operating leases when residual values are uncertain. In this research project we examine innovative approaches such as Hedonic pricing and nonparametric methods for estimating the discount factors for leasing cash flows and residual values. These approaches are applied in the context of theories such as Modigliani-Miller, Contract Theory and real options. This research also examines problems in measuring and managing risks in portfolios of leasing residual values. More specifically, we investigate historical simulation approaches along with the effect of stochastic volatility and portfolio correlations.

Energy Finance

This research project concerns major organizations and corporations that are involved directly or indirectly in the production, management, distribution and consumption of energy (electricity, natural gas, fossil fuel, etc). It covers a broad range of topics such as development and pricing of securities in the spot and derivative energy market, risk management and hedging, productivity analysis, consumption curve forecasting, compliance issues, market organization, Electricity automated transaction systems, Real Option and Value-at-Risk applications in energy markets, etc.



Selected Publications



Since 2000, more than 75 papers of MSL research staff have been published in leading academic journals, and more than 150 working papers have appeared in the lab's Working Papers Series. A select list of publications follows.

1. Psychoyios, D. and Skiadopoulos G., "Volatility Options Hedging Effectiveness Pricing and Model Error", *Journal of Futures Markets*, 26, 1-31, 2006
2. Dotsis, G. and Markellos, R.N., "The Finite Sample Properties of the GARCH Option Pricing Model", *Journal of Futures Markets* (forthcoming), 2006
3. Skintzi, V. and Refenes, A., "Bond Volatility Spillovers and Dynamic Correlation in European Bond Markets", *Journal of International Financial Markets, Institutions and Money*, 16, 23-40, 2006
4. Papalexandris, A., Ioannou, G., Soderquist, K.E., and Prastacos, G.P., "A Holistic Methodology for Putting the Balanced Scorecard into Action", *European Management Journal*, vol. 23, 2 pp 214-227, 2005
5. Repoussis P.P., Tarantilis C.D., and Ioannou G., "The Open Vehicle Routing with Time Windows", forthcoming in the *Journal of the Operational Research Society*, 2005
6. Tarantilis, C.D., "Solving the vehicle routing problem with adaptive memory programming methodology", *Computers and Operations Research*, Vol. 32, 9, 2309-2327, 2005.
7. Tarantilis, C.D., Gendreau, M. and Spinellis, D., "The Impact of Metaheuristic Strategies in Transportation & Logistics", *IEEE Intelligent Systems*, Vol. 20, 4, 16-18, 2005.
8. Skintzi, V. and Refenes, A., "Implied Correlation Index: A New Measure of Diversification", *Journal of Futures Markets*, 25, 171-197, 2005
9. Papalexandris, A., Ioannou, G. and Prastacos, G.P., "Implementing the Balanced Scorecard in Greece: a software firm's experience", *Long Range Planning*, Vol. 37, 4, 347-362, 2004.
10. Godener, A. and Soderquist, K.E., "Use and Impact of Performance Measurement Results in R&D and New Product Development: Exploratory Study", *R&D Management*, Vol. 34, 2, 191-219, 2004
11. Spanos, Y. and Prastacos G.P., "Understanding Organizational Capabilities: Towards a Conceptual Framework", *Journal of Knowledge Management*, vol. 8, 3, 31-43, 2004
12. Ioannou, G., Prastacos, G.P. and Skintzi, G., "Inventory Positioning in Multiple Product Supply Chains", *Annals of Operations Research*, Vol. 125, 195-213, 2004
13. Vakola, M., Tsaousis, I. and Nikolaou, I., "The Effect of Emotional Intelligence and Personality Variables on Attitudes toward Organizational Change", *Journal of Managerial Psychology*, Vol. 19, 2, 88-110, 2004
14. Tarantilis, C.D., Diakoulaki, D., Kiranoudis, C.T., "Combination of GIS and efficient routing algorithms for real life distribution-transportation operations", *European Journal of Operational Research*, vol. 152, 2, 437-453, 2004.
15. Spanos Y, Zaralis G., and Lioukas S., "Strategy and Industry effects on Profitability: Evidence from Greece", *Strategic Management Journal*, 25, 2, 139-165, 2004
16. Psychoyios, D., Skiadopoulos, G. and Alexakis P., "A Review of Stochastic Volatility Processes: Properties and Implications", *Journal of Risk Finance*, 4, 43-59, 2003
17. Nikolaou, I., "Fitting the person to the organization: examining the personality-job performance relationship from a new perspective", *Journal of Managerial Psychology*, 18, 639-648, 2003.
18. Markellos, R.N. and Mills, T.C., "Asset Pricing Dynamics", *European Journal of Finance*, 9, 533-556, 2003
19. Prastacos, G.P., Soderquist E., Spanos, Y. and Van Wassenhove L. "An Integrated Framework for Managing Change in the New Competitive Landscape", *European Management Journal*, vol. 20, 1, 55-71, 2002.
20. Spanos, Y., Prastacos, G.P. and Poulmenakou, A., "The Relationship between Information and Communication Technologies Adoption and Management", *Information & Management*, vol. 39, 659-675, 2002.
21. Spanos, Y. and Lioukas, S., "An Examination into the Casual Logic of Rent Generation: Contrasting Porter's Competitive Strategy Framework and the Resource-Based Perspective", *Strategic Management Journal*, vol. 22, 10, 907-934, 2001.
22. Markellos, R.N. and Mills, T.C., "Unit Roots in the CAPM?", *Applied Economics Letters*, 8, 499-502, 2001
23. Ioannou, G., Kritikos, M. and Prastacos, G., "A Greedy Look Ahead Heuristic for the Vehicle Routing Problem with Time Window Constraints", *Journal of the Operational Research Society*, vol. 52, 523-537, 2001.
24. Mills, T.C., Siriopoulos, C., Markellos, R.N., & Harizanis, D., "Seasonality in the Athens Stock Exchange", *Applied Financial Economics*, 10, 137-142, 2000
25. Ioannou, G. and Sullivan, W.G., "Use of Activity-Based Costing and Economic Value Analysis for the Justification of Capital Investments in Automated Material Handling Systems", *International Journal of Production Research*, vol. 37, 9, 2109-2134, 2000.



Activities of MSL

MSL's main goal is to develop research in its main areas of activity, but also to disseminate the results of this research within the academic and business communities internationally. To achieve this, the laboratory pursues a series of activities, which include:

- Research, in collaboration with other research or academic institutions, as well as business organizations, which is funded by national or international funding agencies, state organizations, or private businesses
- Publication of a Working Papers Series, to be distributed to academics and collaborating institutions for initial distribution of research results, review and feedback
- Publication of scientific papers in renowned international academic journals, collective volumes, etc. and participation in conferences, to present research results

- Consultancy work for organizations and businesses, thus contributing to the solution of complex managerial problems through the implementation of original methodologies and tools
- Publication of a periodic research magazine that presents the results of research activities, for use by managers,
- Development and maintenance of a website that presents all the MSL activities, as well as a management science portal, for supporting research
- Organization of conferences, and research seminars to present/discuss important research results
- Organization of management development programs for managers in important topics of management practice.

The areas of research covered by the three research units of MSL are the following:



Research Unit	Areas of interest
InnKnow	Innovation and R&D Management
	Knowledge Management and Competency-Based Management
	Entrepreneurship and New Business Development
	Strategic Performance Measurement – Balanced Scorecard
	Management of Organizational Change and Development
OPeR	Business Process Management
	Enterprise Resource Planning Systems
	Operations Management
FRC	Risk Management and Performance Analysis
	Structuring and Pricing Derivatives Securities
	Asset and Liability Management
	Real Estate Finance and Securitization
	Financial Analytics and Econometric Modeling
	Energy, Climate and Environmental Finance
	Corporate Governance



Collaborating Institutions



A basic pillar of our activities is our cooperation with distinguished academic and research institutes or other organizations. In these partnerships, MSL is interested to provide its know-how and assistance in its areas of expertise, while at the same time develop research on topics of mutual interest. Institutions from more than 15 countries have been collaborating with MSL in the recent years. An indicative list follows.

Austria

- Joanneum Research, Forschungsgesellschaft MbH
- University of Vienna

China

- University of International Business and Economics, Economic Cooperation and Development Research Center, Beijing

Cyprus

- University of Cyprus, Nicosia

Finland

- Helsinki University of Technology, Dept. of Industrial Engineering & Management

France

- Université Louis Pasteur, BETA Bureau d' Economie Théorique et Appliquée, Strasbourg

- Grenoble Ecole de Management, Centre TIME, Grenoble
- INSEAD, RISE Center, Fontainebleau

Germany

- Fraunhofer Institute Systems and Innovation Research
- Centre for European Economic Research GmbH (ZEW)
- VDI – The Association of German Engineers, Düsseldorf

Greece

- International Center for Black Sea Studies
- National Technical University of Athens
- National School of Public Health, Athens
- Hellenic Management Association (EEDE)

Hungary

- Hungarian Academy of Sciences, Institute of Economics

India

- Narjee Monjee Institute of Management and Higher Studies (NMIMS), Mumbai

Italy

- Foundation for Research on Technology Migration and Integration (FORMIT)
- University of Bergamo

Netherlands

- Delf University of Technology (TU Delft)
- Erasmus University
- Un. of Maastricht, Research Institute on Innovation & Technology (MERIT), Maastricht

Poland

- Warsaw School of Economics, World Economy Research Institute, Warsaw

Turkey

- ISIK University, Istanbul
- METU - Middle East Technical University, Ankara
- Kahramanmaraş Sütçü İmam University, Turkey
- Turkish Academy of Sciences

UK

- University of Manchester, Policy Research in Engineering, Science & Technology Center (PREST)
- Loughborough University, Center for International, Financial and Economics Research (CIFER)
- The University of Sheffield, Management School

Ukraine

- National Academy of Sciences of Ukraine, Dobrov Center, Ukraine

USA

- George Washington University, Center for International Science and Technology Policy, Washington DC



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