



MCDA Research Groups



CDSID – Center for Decision Systems and Information
Development - Brazil

Danielle Costa Morais, PhD - Assistant Professor
e-mail: daniellemorais@yahoo.com.br
Caroline Maria Miranda Mota, PhD - Assistant
Professor
Luciana Hazin Alencar, PhD - Assistant
Professor

The Center for Decision Systems and Information Development (CDSID - <http://www.cdsid.org.br>) is related to the Federal University of Pernambuco, in Brazil. The Center started its activities as a research group in 1987, yielding the status of consolidated research group in 1996 by CNPq (the Brazilian Research Council). The CDSID's mission is to create and transfer scientific knowledge in Information and Decision Systems, by applying it in organizations.

Research Members of CDSID include 10 researchers (Full and Assistant Professors) and more than 25 collaborators (PhD and MSc students) headed by Prof. Adiel T de Almeida. They work in areas related to Information and Decision Systems, by conducting research projects, training staff and undertaking consultancy activities in the business environment. The Center engages in interactions with several organizations, by means of contracts and agreements that receive institutional support from research associations, foundations and private companies. The Center is very active in applied research. Most of its members have achieved the recognition for their productivity in research from CNPq. CDSID encompasses several lines of research which use MCDA in different fields, publishing relevant studies.

Amongst the main applications areas of MCDA, we have found the following to be the most fruitful:

- **Performance Evaluation System:** contributes with methods and models to monitor and control socio-technical systems to support decision-making processes so as to maintain performance in accordance with availability requirements (reliability and maintainability), intrinsic quality, cost and other relevant goals.
- **Supply Chain (SC):** develops analysis, methods and models related to SC performance, selection of suppliers, routing problems, performance evaluation, etc. Many sectors have been involved in such studies, e.g. the civil construction industry, food industry, cosmetic industry, health sector, *inter alia*. The studies include subjects related to supplier selection models using multicriteria decision aid and group decision, identifying tools and techniques in order to select suppliers and evaluation in food industry, analysing the performance of the Supply Chain, and analyzing collaborative relationships.
- **Systems to Enhance Competitiveness:** contributes with methods and models associated with the Business Competitiveness Management which incorporates assessing the impacts of models for the competitive process, project management, and knowledge management with a view to prospective analysis and strategic systems, including prioritizing multicriteria decision models.
- **Group Decision and Negotiation:** develops models and methods of Group Decision and Negotiation. Some models use multicriteria methodology, and consider the preferences of each decision maker involved. The models are developed depending on the extent of divergence among the decision-makers involved in the decision process. Other models are developed by voting procedures in order to establish a collective preference from different individual ones. Also develops models that aggregate of expertise. In addition, develops studies on problem structuring methods as applied to several sectors of activity. It develops procedures to ensure fair division in distributive and integrative negotiation processes and studies of coalition analysis. Besides these issues, contributes studies on e-negotiation.
- **Risk Management:** develops models and methods for multidimensional risk management,

with the emphasis on industrial and technological risk, but this also involves risks and financial risks in projects. This includes MCDM methods integrated with stochastic models which often use subjective probability evaluation. For the industrial context, the main applications of these models have been on electricity plants, gas pipelines and in the context of energy from hydrogen.

- **Project Management:** develops methods of decision support for project management and risk assessment in project management. In addition, two research fields can be highlight: (1) To investigate the influence of culture, with regard to team behavior, the organizational approach, tools and methodologies, for the success or failure of a project; (2) to contribute with methods and models for planning, controlling and monitoring projects, with a view to supporting organizations in the decision-making process involving multiple objectives (criteria). Projects and research interests cover areas of knowledge such as: Civil Engineering; Information Systems (Software Development); the Petrochemical Industry and the Energy Industry. The main projects developed by the center are: The effect of cultural perspectives on perceptions of success and failure in an IS/IT project, with a project team drawn from seven different countries; COLABORE: Software for collaborative relationship between Activities and Projects, Management model for prioritizing and selecting Research & Development (R&D) Projects, using a multicriteria approach; Process planning and managing projects with multicriteria evaluation; and Support for the basic features of MS Project tool with respect to constructing transmission lines.
- **Water Resources Management:** This is very often an important point of discussion with regard to global concerns. This line of research develops studies and models for Information and Decision systems to aid in a structured way the decision process regarding conflicts arising from multiple uses of water, the availability of water, controlling water losses, strategies for conserving water in urban areas, and other decisions problems related to hydrographic basins. The center develops techniques and processes of group decision and negotiation in order to improve the participation of civil society in decision processes, by generating a participatory multicriteria group decision model to make the process more efficient. The center has developed projects such as: 1) Decision making on a water supply system using multicriteria analysis; 2) Group Decision-Making that informs the Management Strategy for dealing with Leakages in a Water Network; 3) Integrated model of

problem structuring and multicriteria group decision-making for social sustainable development; 4) Rehabilitating a water network: a group decision-making approach; 5) A Multicriteria Group Decision Model to Support Watershed Committees in Brazil, and so forth.

- **Reliability and Maintenance Engineering:** develops models and methods for Managing and Maintaining Engineering Systems. Reliability, Maintenance, Safety and Decision Support Systems together constitute one of the most newest research approaches currently being developed. According to some important authors in this area, analyzing reliability and risk analysis pertains to quantified measures of uncertainty about certain adverse events. However, since quantified measures of uncertainty are only an intermediate step in the process of decision making, authors advocate, in a broader view, that the analysis of reliability and risk is simply a set of tools to support the process of structuring problems of decision making under uncertainty. Thus, this perspective makes the analysis of risk and reliability one of the most prominent research areas amongst the different areas studied by this research group. It is worth noting that it is as a result of CDSID studies that consideration of multiple risk dimensions has become mainstream practice even in groups whose views on analyzing risk and reliability are more conservative. In addition, issues of special interest to modeling maintenance have been developed. Subjects such as modeling for maintenance contracts; using Multicriteria decision models to support maintenance planning; and a multicriteria decision model to determine inspection intervals for monitoring the condition of equipment are among the main contributions of this center. Besides several articles on this area, the group has made some important contributions by supporting companies through undertaking Research and Development of special interest to a company.
- **Multicriteria Methods and Models:** this line of research deals with developing new multicriteria methods and models and decision support. Methodological developments have been proposed concerning real life applications and include contributions on compensatory and non-compensatory methods, ordinal methods, as well integration of known methods, such as outranking approach and utility theory.
- **Planning and Management Information Systems:** contributes with methodologies for planning and management information systems incorporating the vision to set up or remodel an information system in an organization, including its strategic assessment and business processes, and methods of multicriteria decision support for

prioritizing actions. Such research aims to provide adequate organizational solutions, by taking into consideration, *inter alia*, the great impact of Information Systems on the productivity and quality of companies and the importance of Planning and Management Information Systems appropriately. Among the methodologies and tools applied by the group in this context we highlight Multicriteria Decision, DEA, Game Theory, Statistical Inference, Group Decision and Negotiation, Business Process Management (BPM), the Balanced Scorecard (BSC). The main topics of projects funded in the information Management area are: 1) Models for Management Information Systems – Proposals for corporate planning and project management in information systems; 2) A study of the relations between the Information Systems department and other Business Functions; 3) Developing and applying a methodology for planning information systems; 4) Diagnosing the maturity and the conceptual adequacy of information systems planning in Brazilian companies.

- **Portfolio of Projects:** develops methods and models for managing a Project Portfolio, a selection of portfolios, given multiple objectives and the probabilistic dynamic behavior of the environment. Research and Development (R&D) projects have been the main focus of this line.
- **Decision Support Systems:** contributes to designing and developing interactive systems, which include in its architecture: decision model base and data base to support the organizations in decision making involving multiple objectives (criteria) in dynamic environment, including non-structured process.

Some research collaborations of CDSID with European institutions have led to sending PhD students abroad and also receiving researchers from abroad.

The Center regularly participates in the most important conferences on Operations Research and Management Sciences. Given the classical approach of optimization that is common in these conferences, some of the papers presented by the group that deal with multicriteria have provided a very interesting space for discussing potentialities for enriching the optimization approach.

Further, the members of CDSID are invited to attend and organize sessions at the most important conferences all around the world. In addition, the Center has promoted the Seminar of Information and Decision (SIDS-www.gpsid.org.br/sids). This event is dedicated to themes related to information and decision systems. Some of the keynote speakers have been: Prof. Ralph Keeney (Fuqua School of Business, Duke University, Durham – USA); Prof. Lyn Thomas (University of Southampton, UK); Prof. José Figueira (CEG-IST, Center for Management Studies of Instituto Superior Técnico -

Portugal) and Prof. Melvin Shakun (Leonard N. Stern School of Business, New York University).

At present, the CDSID is among the highest rated research groups in Brazil, as evaluated by CNPq (the Brazilian Research Funding Bureau). Members of the group have also participated in various front-line academic activities in Brazil, such as, by being a member of Board Direction of SOBRAPO (the Operational Research Society of Brazil), members of committees of CNPq and CAPES (the Brazilian Post-Graduate Evaluation Bureau), ABEPRO (the Brazilian Association for Production and Management Engineering) and so on.

Further information:

Address: CDSID – UFPE. PO Box: 7462; Recife - PE, 50.722-970, Brazil,

Web-page: www.cdsid.org.br