FUZZY LOGIC IN MANAGEMENT

CHRISTER CARLSSON IAMSR, Åbo Akademi University Åbo, Finland

MARIO FEDRIZZI
Department of Computer and Management Sciences
University of Trento, Trento, Italy

ROBERT FULLÉR
Department of Operations Research
Eötvös Loránd University, Budapest, Hungary



Kluwer Academic Publishers Boston/Dordrecht/London

Contents

List of Figures				ix
List of Tables				xi
Introduction				xiii
1.	MA	NAGE	MENT AND INTELLIGENT SUPPORT	
	TE	CHNOL	OGIES	1
	1	Manag	gement	2
	2	Decision	on Support Systems	4
	3	Hyper	Knowledge - a Brief Summary of Experiences	7
	4	New I	nformation Technology, Intelligent Systems and	
		Soft C	Computing	12
		4.1	Intelligent Software Agents	14
		4.2	Soft Computing	19
	5	Some	Lessons for Future DSS	24
2.	FUZZY SETS AND FUZZY LOGIC			29
	1	Fuzzy	Sets	29
		1.1	Fuzzy Relations	36
		1.2	The Extension Principle	38
		1.3	Fuzzy Implications	40
		1.4	Linguistic Variables and Quantifiers	41
		1.5	A Theory of Approximate Reasoning	44
		1.6	Possibilistic Mean Value and Variance of	
			Fuzzy Numbers	46
	2	Avera	ging operators	48
		2.1	The Paradigm of Decision Analysis	51
		2.2	An Agenda for Soft Decision Analysis	53

3.	GROUP DECISION SUPPORT SYSTEMS			57		
	1		Arrow Impossibility Theorem: From Classical to Approaches	59		
	2	Conse	nsus Modeling in GDM	62		
	3	A Soft Degree of Consensus Based on Fuzzy Logic with Linguistic Quantifiers				
	4	An In	teractive System for Consensus Reaching	69		
		4.1	A Brief Description of the System	70		
		4.2	Summary	78		
	5	The OCA Approach to Multicriteria Multiperson Consensus Modeling				
		5.1	Aggregation and Linguistic Approximation	79		
		5.2	The Session for Consensus Reaching	81		
	6	Quality Evaluation of Elderly Persons' Homes Using Fuzzy Quantifiers				
	7		cision Support System for Strategic Planning agh Scenarios	88		
		7.1	Predictions and Scenarios: Problems and Methods of Creation	89		
		7.2	Network Patterns for Knowledge Representation	91		
		7.3	Structural Analysis	94		
		7.4	Summary	96		
	8	Loan	An Artificial Neural Network Evaluator for Mortgage Loan Applications			
		8.1	The Neural Engine	99		
	9	9 A Linguistic Approach to Personnel Evaluation				
	10 An Application to Environmental Policies		pplication to Environmental Policies	108		
		10.1	Environment Protection in a Lagoon Ecosystem	112		
		10.2	Identification of the Interest Groups and Possible Alternatives	113		
		10.3	Analysis of the Results	114		
		10.4	Summary	117		
4.	FUZZY REAL OPTIONS FOR STRATEGIC PLANNING			127		
	1	A Fuz	zzy Approach to Real Option Valuation	131		
		1.1	Real Options in Strategic Planning	134		
	2	Nordi	c Telekom Inc.	136		
	3	Summary		139		

Contents vii

5.		UZZY A ECT	PPROACH TO REDUCING THE BULLWHIP	143		
	1	The B	ullwhip Effect, Some Additional Details	147		
		1.1	Explanations for the Bullwhip Effect	150		
		1.2	Demand Signal Processing	150		
		1.3	Order Batching	152		
		1.4	Price Variations	153		
	2	Fuzzy	Approaches to Demand Signal Processing	154		
	3		orid Soft Computing Platform for Taming the nip Effect	156		
	4	Summ	ary	160		
6.	KN	OWLEI	OGE MANAGEMENT	163		
	1	Introd	uction	163		
	2	The C	Current Stage of Knowledge Management Research 10			
	3	Knowl	edge Management: A Conceptual Framework	169		
	4	Knowl	edge Management Strategies	173		
	5	Knowle	edge Management Projects	175		
		5.1	Knowledge Repositories	177		
		5.2	Knowledge Transfer	179		
		5.3	Knowledge Asset Management	181		
	6	Research in Knowledge Management - Some Methodology Issues				
	7	IT-Sol	utions to Support Knowledge Management	189		
		7.1	Industry Foresight	197		
		7.2	Agent Technology and Industry Foresight	201		
		7.3	Interpretation Support for OW Scenarios	202		
		7.4	Interpretation Support for Planning Scenarios	205		
		7.5	Interpretation Support for Planning Models	209		
		7.6	Interpretation Support for Data Sources	212		
		7.7	Generic Interpretation of Agent Structures	213		
		7.8	Approximate Reasoning and Sense-Making	214		
		7.9	Scenario Lite: Foresight and Agent Software	215		
		7.10	Case Studies	221		
		7.10.1	Complex Adaptive Systems for Managing	001		
		7 10 0	Organizational Knowledge	221		
		7.10.2	• •	223		
		7.10.3	Collecting and Reusing Tacit Knowledge	224		

		7.10.4 Technology Intelligence - Following the	
		Markets and Internal Knowledge	225
		7.10.5 Knowledge Portal	227
7.	MC	BILE TECHNOLOGY APPLICATIONS	235
	1	Introduction	235
	2	Consumer Survey in Finland	240
	3	An Expert Survey in Finland	247
	4	Acceptance of Mobile Commerce in Finland,	
		Hong Kong and Singapore	251
	5	Mobile Commerce Products and Services	255