

Bengt Lindell

**MULTI-CRITERIA ANALYSIS
IN LEGAL REASONING**



Multi-criteria Analysis in Legal Reasoning

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Preface

This book explores a structured method for making legal overall assessments and balancing of interests. The method originates from decision theory and is called multi-criteria analysis. The model that is used is additive and is referred to in this book as the simple additive weighting (SAW), which is well known in decision theory and can be used in overall assessments when there are one or more objectives, multiple options and a number of decision-making criteria. However, most people in the legal profession are probably not familiar with decision theory. In an attempt to describe the method in a simple and educational way, this book therefore contains 22 graphic figures and 21 tables as well as a number of concrete examples of the application of multi-criteria analysis and the simple additive model. In addition, simple additive weighting in some examples is used together with fuzzy logic. The book should be seen as an introduction to these decision theory tools, which are intended to be used for problem structuring, analysis and decision support in overall assessments and balancing of interests. My hope is that it will provide inspiration and spark interest in methods that are used in fields of science other than law and which have much to contribute in a legal decision-making context.

Financial support for the book, which was first published in Swedish in 2015 by iUSTUS publishing company in Uppsala, has been provided by the Swedish Foundation for Jurisprudential Research (Institutet för rättsvetenskaplig forskning), to which I would hereby like to express my heartfelt gratitude. For this publication, the contents have been revised somewhat and the book has also been given a shorter title.¹

¹ Translation into English by Chris Kleinman.

Abbreviations

(all laws and institutions listed refer to Sweden unless otherwise noted)

AD	The Labour Court
ADR	Alternative dispute resolution
AHP	Analytical hierarchy process
AvtL	The Contracts Act (1915:218)
Bill	Government Bill
BrB	The Penal Code (1962:700)
CBCA	Criteria-based content analysis
DDA	Data development analysis
ECHR	European Convention of Human Rights
FB	The Parental Code (1949:381)
HD	The Supreme Court
JT	Juridisk tidskrift (Swedish legal journal)
LAK	Act on Public Video Surveillance (1998:150)
MADM	Multi-attribute decision model
MANOVA	Multiple Analysis of Variance
MAUT	Multi-attribute utility theory
MAVT	Multi-attribute value theory
MB	The Environmental Code (1998:808)
MCA	Multi-criteria analysis
MCDA	Multi-criteria decision analysis
MCDM	Multi-criteria decision method
MÖD	The Land and Environment Courts
MODM	Multi-objective decision model
NCAP	New Cars Assessment Program
NIX	NIX registry, Swedish service to block unwanted telephone sales
NJA	Nytt juridiskt arkiv, avd. 1 (Journal presenting Swedish Supreme Court cases) 1
NJA	Nytt juridiskt arkiv, avd. 2 (Journal presenting new laws and surrounding issues) 2
PBL	The Planning and Building Act (2010:900)
PUL	The Personal Data Act (1998:204)
RÅ	Yearbook from the Supreme Administrative Court

RB	The Code of Judicial Procedure (1942:740)
RF	Instrument of Government (1974:152)
RM	Reality monitoring
SAOL	Swedish Academy Glossary
SAW	Simple additive weighting
SMART	Simple multi-attribute rating technique
SOU	Swedish Government Official Reports
SvJT	Svensk Juristtidning (Swedish journal of jurisprudence)
SWEDMA	Swedish Direct Marketing Association
TfR	Tidskrift for Retsvidenskap (Norwegian journal of jurisprudence)
TJFF	Magazine published by the Law Student Association in Finland
TOPSIS	Technique for ordering of preference by similarity to ideal solution

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1. Overall assessments and balancing of interests

1.1 INTRODUCTION

The Swedish Academy Glossary (SAOL) does not list a definition for the term 'overall assessment'. However, the term 'overall assessment' refers to a number of factors, aspects or perspectives that are brought together into a comprehensive assessment, an overall assessment. In this book, the word has a more specific meaning. An overall assessment means that a choice must be made between several possible decision options using certain criteria in order to achieve one or more objectives. This definition addresses both the meaning and the purpose of an overall assessment.

Virtually everyone makes overall assessments on a daily basis. This might involve big, important things like purchasing a home: What is our price range? What city/neighbourhood? Running costs (taxes, maintenance, utilities)? Proximity to daycare, school and work? Renovation needs? And so on. Or the assessment might involve where the family should go on holiday. There are a few options (e.g., Spain, Bulgaria or Italy) and a number of selection criteria such as cost, climate and how child-friendly it is. Another example is buying a new car, which will be explored in detail later on. Even in such cases, there are several different options to consider when evaluating the different car models, which have different prices, different environmental performance, different collision safety and comfort levels, and so on.

All overall assessments in this book involve making a decision according to the definition given in the introduction. This also applies for overall assessments made in a legal context. The structured method for overall assessments that will be presented can thus be used in all types of overall assessments, whether these involve buying a house, a holiday or a car, or, for example, assessing if a clause in a contract is 'unreasonable'. In addition, it does not matter which area of law the overall assessment concerns.

Balancing of interests also involves multiple options, criteria and objectives. One important issue that will be examined is if there is any difference between overall assessments and balancing of interests, and if so, what that difference may be.

Legal overall assessments and balancing of interests have great significance for the parties involved and for society at large. Typical examples of such assessments and balancing will be provided later in this chapter. This may involve, for example, the use of land and water, whether an agreement should be nullified, whether camera surveillance should be permitted, what is consistent with 'the best interests of the child' in a custody dispute or on the use of an optional rule in the Swedish Code of Judicial Procedure (hereinafter 'RB'). The decision may concern very large sums of money or an individual's future. Erroneous decisions can furthermore cause major damage – economically, socially and materially. Decisions must therefore be carefully and thoroughly considered. They must also, in every instance involving the exercise of power, be transparent and people affected must have been given an opportunity to participate in the decision-making process. Complicated decisions that require an overall assessment are, however, often informal in the sense that the decision-maker simplifies by not carefully investigating different options, criteria and objectives, either because this takes time and may be costly, or because structured models for decision-making seem difficult to grasp or implement. Instead, shortcuts are taken, which in the literature of the field are often called heuristics.¹

The structured analysis for decision-making in overall assessments and balancing of interests that will be discussed in Chapter 2 is referred to in this book as multi-criteria analysis, hereinafter referred to by its acronym MCA. This concept is also often referred to as multiple-criteria decision analysis (MCDA). The designation for the methods used in this analysis is multi-criteria decision methods (MCDM). In addition, a distinction is usually made between multi-objective decision models (MODM) and multi-attribute decision models (MADM), which are umbrella terms that encompasses many models. The first of these is used in the planning process that precedes a decision. MADM is used when there are fixed options and formulated criteria for the decision to be made. The basic model described in Chapter 2 includes both. A distinction is furthermore made in MCA between multi-attribute value theory (MAVT) and multi-attribute utility theory (MAUT). The difference between them is that MAVT presupposes that the decision criteria and the outcomes are certain, while MAUT is a model that also handles uncertainty.²

¹ For a discussion on shortened decision paths, see Chapter 3.

² About the aforesaid, see Paul Goodwin and George Wright, *Decision Analysis for Management Judgment* (Wiley, 4th edn, 2012) 34, JS Dodgson and others, 'Multi-criteria Analysis: A Manual' <http://eprints.lse.ac.uk/12761/1/Multi-criteria_Analysis.pdf> 50 (retrieved 15 July 2016), also see Valerie Belton

Unlike MAVT, MAUT does not impose a requirement for independence on the criteria. However, it is rather complicated to use. The simple additive model, simple additive weighting (SAW), which is an MADM method, will therefore be used in this book, but simple multi-attribute rating technique (SMART) will also be described. Some uncertainty can be taken into account in these methods, for example by giving criteria less weight in the sensitivity analysis or by assessing uncertainty when selecting options.³ Another alternative is to add a probability assessment afterwards. The results from the MCA analysis can then be multiplied by the probability of an option occurring.⁴ In this way, probability can rather easily be taken into account even when using the additive model. Uncertainty can furthermore be handled with fuzzy logic, which can be combined with MCA. Fuzzy logic, which primarily belongs to the scientific fields of philosophy, mathematics and technology, is used for things like computer programming and the control and regulation of machines. Fuzzy logic is based on set theory and on the premise that language is vague. Water can, for example, be described as 'warm', 'lukewarm' or 'cool', but there is no way to put a precise linguistic label on these states or the transitions between them. When, for example, does 'lukewarm' become 'warm' and how to describe this in words? Fuzzy logic seems to fit well into a legal context because legal language is often vague. The basics of fuzzy logic will be introduced and applied in Chapter 4. Fuzzy logic will also be applied in Chapter 6.

The abbreviation MCA, which is used consistently throughout this book in lieu of the terms MCDA and MCDM, is an umbrella term for a large number of different techniques and models which are used,

and Theodor Stewart, *Multiple Criteria Analysis. An Integrated Approach* (Kluwer 2002) 119ff and Freerk A Lootsma, *Multi-Criteria Analysis via Ratio and Difference Judgement* (Kluwer Academic Publisher, 1999) 15ff. Easily approachable literature on the fundamentals of MCA is also available on the Internet. See e.g., Dodgson and others, mentioned above, to which references are made in this book; Vicky Mabin and Michael Beattie, *A Practical Guide to Multi-Criteria Decision Analysis* <http://www.victoria.ac.nz/som/researchprojects/publications/Multi-Criteria_Decision_Analysis.pdf> (retrieved 5 July 2016) and GA Mendoza, P Macan and others, *Guidelines for Applying Multi-Criteria Analysis to the Assessment of Criteria and Indicators* (1999, The Criteria and Toolbox series, Center for International Forestry Research) <http://www.cifor.org/livesinforests/publications/pdf_files/toolbox-9c.pdf> (accessed 22 July 2016).

³ See section 2.3.8, below.

⁴ Jacek Malczewski, *GIS and Multicriteria Decision Analysis* (Wiley 1999) 214, Ralf L Keeny and Howard Raiffa, *Decisions with Multiple Objectives: Preference and Value Tradeoffs* (Cambridge University Press 1993) 219ff.

for example, in large-scale projects such as the construction of airports, roads, power plants and, not least, in land and environmental planning. When, for example, an airport is to be built, a multitude of factors must be taken into account, such as noise, emissions, safety, and transport routes to and from the airport. In the end, a great number of circumstances must be analysed, considered and weighed before a decision can be made on where the airport will be located. A large-scale project can include such an enormous number of factors that an intuitive overall assessment becomes impossible. Instead, a structured decision model is required, experts must be consulted, and computer support used.

As will be discussed in Chapter 2, two MCA models that have been used for a long time and found to be robust, namely SMART and SAW – which are additive, part of the MAVT family and have the same basic structure – can present difficulties when used in a legal context as direct decision tools. They can, however, be used as analytical tools to structure the decision material and for tentative decision support. It is also possible in a legal context to mathematically combine numeric scoring and weighing. However, it is important to be careful with the results and match these against intuition.⁵ Of course, MCA must be adapted to a legal context. This adaptation poses some difficulties, yet also provides relief in other respects. Attempting to make this adaptation has been a key objective in this book.

Deciding on a legal dispute that requires an overall assessment or a balancing of interests is usually easier than determining where an airport should be located – or in any case different. This is true even for complicated disputes with a number of factors to take into consideration. A legitimate question is therefore whether a structured decision model is really needed for legal decision-making. Would it not be just as well to weigh different factors intuitively? Another partially related question is whether a structured decision model – intended primarily for large projects – should be used in legal decision-making. Intuition, which will be briefly discussed in Chapter 3, is both good and necessary. Intuition does not, however, provide transparency, is not structured and is insufficient when the decision basis is too expansive. The other question and possible concern – that MCA might be inappropriate to use in a legal context – is more complicated. As already mentioned, MCA could be used as soon as there is a

⁵ Cf Andy Stirling and Sue Meyer, *Rethinking Risk: A Pilot Multi-criteria Mapping of a Genetically Modified Crop in Agricultural Systems in the UK* <<http://users.sussex.ac.uk/~prfh0/Rethinking%20Risk.pdf>> (1999) (retrieved 1 July 2016). Also see section 3.5 below.

situation with several possible decision options, criteria and goals. When MCA is used for large projects involving, for example, infrastructure or the planning of other public activities, most of the data used is measurable in some way (costs, quantities, distance, volume of different types of emissions, and so on).⁶ In practice, however, MAVT and the additive model are also used on factors that can only be assessed subjectively.

In legal assessments, the criteria for decision-making are rarely measurable. The importance of individual legal facts (criteria) is mainly assessed subjectively. 'Importance' here refers to both the strength and the relevance of concrete legal facts as well as their relative weight. In overall assessments and balancing of interests in particular, different relevant and concrete legal facts are not equally important – some carry more weight than the others. This is true also with respect to evidentiary facts, that is, the value of a piece of evidence, which are usually not measurable but are instead assessed subjectively. In addition, the evidentiary value of different evidentiary facts varies. Even though the evidentiary value of an individual evidentiary fact is generally not objectively measurable but is instead decided intuitively, some legal doctrine recommends the use of mathematical methods for the evaluation of evidence. Thus, there are already structured methods for the evaluation of evidence, such as the evidentiary value method and the evidentiary theme method.⁷ MCA, such as it is used in this book, can therefore for questions of law be seen as a counterpart to these methods for evaluation of evidence.

Because the importance of concrete legal facts in overall assessments and balancing of interests is assessed subjectively, the results of the analysis naturally become more uncertain than if there had been measurable data.⁸ MCA can nevertheless provide valuable decision support, particularly as there are often many factors to take into account in overall assessments and balancing of interests. In any case, using MCA the decision-makers must make a thorough analysis of each individual factor, thus it explicitly forces them to take a position on what they consider important or less important. Presumably, this then leads to a better decision than if

⁶ See e.g., *Multikriterieanalyser vid prioriteringar inom hälso-och sjukvården – kriterier och analysmetoder*. Linköpings universitet, Prioriteringscentrum (2013:2) and *Multikriterieanalys för hållbar efterbehandling: Metodutveckling och exempel på tillämpning*. (Swedish Environmental Protection Agency (2009) Report 5891).

⁷ Section 6.1.1, below.

⁸ Dodgson and others (n 2) 27, 124. The problem with subjective assessments is lessened if the decision-maker is a professional, for example a judge who makes decisions on a daily basis.

everything had been assessed intuitively. The above question on whether it is appropriate to use MCA in a legal context can thus be answered in the affirmative. This is true even if the method will be used only to structure and analyse the decision basis and the decision-maker does not want to set numeric values on different criteria and put the effort into conducting a comprehensive mathematical MCA analysis.

How MCA can be applied to overall assessments of legal issues is discussed in Chapter 4. The examples are illustrated with graphic figures in order to show the different stages in MCA and the simple additive model. The premise in the examples is that there are no uncertainties with respect to evidentiary issues (questions of facts), that is, the facts are not uncertain. Consequently, the overall assessments that are made in this chapter concern the legal significance and weight of several different concrete legal facts in the case which together give, or may give, rise to a legal consequence – or at least could be argued to do so (questions of law).

In Chapter 5, certain evidentiary issues with respect to prognostic assessments in law are discussed from the perspective of utility theory, which is integrated into MAUT. There is a clear difference between the entertainment of evidentiary questions in law and according to the utility theory. In law, disputed facts are usually handled separately in the way that legal consequences are attached to facts that have been proven in accordance with the applicable standard of proof. Utility theory, on the other hand, merges probability and utility into an integrated value. This chapter discusses and demonstrates how utility can and should be taken into account in a legal context when the law stipulates prognostic assessments.

The sixth and final chapter of the book provides a short summary of the evidentiary law theories – the evidentiary value method and the evidentiary theme method – which have been the focus of the law of evidence debate in Sweden and Scandinavia in recent decades. This description provides a framework for understanding the subsequent sections in the chapter on different aspects of evidence evaluation and the use of MCA and fuzzy logic in the assessment of oral testimonies and on the burden of proof and standard of proof.

1.1.1 Is MCA a Legal Method?

The question of what constitutes a legal method is controversial. A broad definition is that every method used to solve legal problems is a legal method. In this case, MCA is a legal method if it is used for this purpose. Legal method is, however, usually and traditionally associated with different ways of deciding on the meaning of a rule of law, that is, with interpretation and application of law. For example, the German legal philosopher

Philipp Heck advocated a method proposing that all application of law is the result of balancing of interests. Yet, Heck's methodology, which came to be called the jurisprudence of interests ('*Interessenjurisprudenz*'), deals with an entirely different sort of balancing of interests than that discussed in this book. Heck argues that it is not possible to determine the contents of a legislative rule based solely on the aim or purpose of the law. The law is instead the result of a tug of war between different factors and can therefore only be understood as effects of a conflict of interest:

Es ist nicht möglich, den Inhalt einer Gesetzenorm nur aus ihrem Zweck zu erklären. Das Gesetz ist, wie jede Handlung, die Resultante, gleichsam die Kraftdiagonalen ringender Faktoren, deren Wirkung wir nur als Interessenkonflikt erfassen können.⁹

Teleological interpretation, which was criticized by Heck, is another well-known method that can be used to determine the meaning of a legislative rule.¹⁰

Both MCA and law application methods are normative. The aim of MCA is to help the decision-maker make the 'best' decision possible. The aim of a law application method is also to help the decision-maker (the legal decision-maker) make the 'best' ruling possible. However, no attempt is made in this book to fit MCA into a law application method, since the methods for the application of law and for decision-making under MCA have different starting points. Regarding, for example, the teleological method, as presented by Ekelöf, the goal of this is to achieve morality and behaviour modification and, from these starting points, make the 'best' decision possible.¹¹ Even with this objective it is quite appropriate to use MCA, which does not have the aim of indicating from which values individual legal facts in a case should be assessed. The purpose of MCA is instead to provide a structured analysis and decision model. What values the individual decision-maker then wants to insert into the model depends on what he or she considers important and what will lead to a 'good' decision. The scoring and weighting of criteria with regard to the different

⁹ Philipp Heck, *Das Problem der Rechtsgewinnung. Gesetzesauslegung und Interessenjurisprudenz: Begriffsbildung und Interessenjurisprudenz*. Redigiert von Roland Dubischer (Verlag Gehlen 1968) 55.

¹⁰ Cf n 11 below and Per Olof Ekelöf and Henrik Edelstam, *Rättegång: Första häftet* (8th edn, Norstedts Juridik 2002) 80. Also see Per Henrik Lindblom, *Miljöprocess, Del 1* (Iustus 2001) 81, footnote 20.

¹¹ Per Olof Ekelöf, *Teleological Construction of Statutes* (1958) 2 *Scandinavian Studies in Law* 75. Professor Ekelöf († 1990) was a prominent professor of procedural law at the Faculty of Law at Uppsala University.