

## Problem Solving in Organizations

An indispensable guide enabling business and management students to develop their professional competences in real organizational settings, this new and fully updated edition of *Problem Solving in Organizations* equips the reader with the necessary toolkit to apply the theory outlined in this book to practical business problems.

By encouraging the reader to use the theory and showing them how to do so in a fuzzy, ambiguous and politically charged, real-life organizational context, this book offers a concise introduction to design-oriented and theory-informed problem solving in organizations. In addition, it gives support for designing the overall approach to a problem-solving project as well as support for each of the steps of the problem-solving cycle: problem definition, problem analysis, solution design, interventions and evaluation.

*Problem Solving in Organizations* is suitable for readers with a wide range of learning objectives, including undergraduates and graduates studying business and management, MBA students and professionals working in organizations.

**Joan Ernst van Aken** worked for many years in practice as a management consultant and as a manager of management consultants before joining Eindhoven University of Technology as a professor of organization science in 1990.

**Hans Berends** is Professor of Innovation and Organization at the Knowledge, Information and Innovation (KIN) Research Group, Faculty of Economics and Business Administration, Vrije Universiteit, Amsterdam.

# Problem Solving in Organizations

A Methodological Handbook  
for Business and Management  
Students

Joan Ernst van Aken  
Technische Universiteit Eindhoven

Hans Berends  
Vrije Universiteit, Amsterdam



**CAMBRIDGE**  
UNIVERSITY PRESS

**CAMBRIDGE**  
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India

79 Anson Road, #06–04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781108416269](http://www.cambridge.org/9781108416269)

DOI: 10.1017/9781108236164

© Joan van Aken and Hans Berends 2018

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2018

Printed in the United Kingdom by TJ International Ltd. Padstow Cornwall

*A catalogue record for this publication is available from the British Library.*

ISBN 978-1-108-41626-9 Hardback

ISBN 978-1-108-40277-4 Paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

## Contents

List of Figures	<i>page</i> ix
List of Tables	x
List of Boxes	xi
Preface	xiii

## PART I INTRODUCTION

<b>1 Scope and Nature of this Handbook</b>	<b>3</b>
1.1 Objectives and Target Audiences	3
1.2 Design-Oriented and Theory-Informed Problem Solving in Organizations	6
1.3 How to Use this Handbook	8
<b>2 Types of Student Projects</b>	<b>10</b>
2.1 Introduction	10
2.2 Two Basic Process Structures	11
2.3 Three Knowledge-Generating Research Processes	14
2.4 Problems Caused by Mixing Different Process Types	19
2.5 Concluding Remarks	22
<b>3 Problem-Solving Projects</b>	<b>24</b>
3.1 Introduction	24
3.2 Rational Problem Solving	24
3.3 Problem-Solving Strategies	26
3.4 Theory-Informed Field Problem Solving	28
3.5 The Application Domain of Design-Oriented and Theory-Informed Problem Solving	30
3.6 The Nature of Field Problem-Solving Projects	31
3.7 The Basic Set-up of a Field Problem-Solving Project	37
3.8 Problem-Solving Projects in Different Execution Modes	39
3.9 Characteristics of Good Field Problem-Solving Projects	42
3.10 Concluding Remarks	44

## PART II

# THE PROBLEM-SOLVING PROJECT

<b>4 Intake and Problem Definition</b>	47
4.1 Introduction	47
4.2 Intake and External Exploration	48
4.3 Internal Orientation and Problem Definition	52
4.4 Project Design	58
4.5 Project Proposal	65
4.6 Example	66
4.7 Concluding Remarks	73
<b>5 Theory-Informed Diagnosis of Business Problems</b>	74
5.1 Introduction	74
5.2 Modelling Business Processes and Systems	76
5.3 Analysis of the Business Problem and its Causes	80
5.4 Theoretical Grounding	87
5.5 Example: <i>EcoLogic</i>	90
5.6 Integrating the Diagnostic Story	93
5.7 Alternative Approaches	94
5.8 Concluding Remarks: From Diagnosis to Redesign	96
<b>6 Solution Design</b>	98
6.1 Introduction	98
6.2 The Role of the Solution Design	99
6.3 The Overall Solution Design Process	100
6.4 Synthesis–Evaluation Iterations	103
6.5 Solution Validation: The Concluding Evaluation	108
6.6 Solution Design: The IIS Case	112
6.7 Concluding Remarks	117
<b>7 Change Plan Design and the Change Process</b>	118
7.1 The Timing of Change Plan Design	118
7.2 Change Plan Design	120
7.3 The Actual Change Process	126
7.4 Change Plan Design: The IIS Case	127
7.5 The Importance of Developing Organizational Support	132
7.6 Concluding Remarks	134
<b>8 Evaluation, Learning and Project Termination</b>	136
8.1 Introduction	136
8.2 Project-Oriented Evaluation	137

8.3	Learning for the Future	143
8.4	Scientific Reflection	146
8.5	Personal and Professional Development	148
8.6	Project Termination and Reporting	149
8.7	Concluding Remarks	150

## PART III METHODS

<b>9</b>	<b>Qualitative Research Methods</b>	153
9.1	Qualitative Versus Quantitative	153
9.2	Unit of Analysis	155
9.3	Sampling and Case Selection	158
9.4	Qualitative Data-Collection Methods	161
9.5	Qualitative Methods of Analysis	165
9.6	Concluding Remarks	169
<b>10</b>	<b>Searching and Using Scholarly Literature</b>	171
10.1	Introduction	171
10.2	Types of Publication	172
10.3	Focusing a Literature Review	175
10.4	Searching the Literature	177
10.5	Integrating Ideas and Findings	180
10.6	Concluding Remarks	183
<b>11</b>	<b>Quality Criteria for Research</b>	184
11.1	Introduction	184
11.2	Controllability	186
11.3	Reliability	187
11.4	Validity	192
11.5	Recognition of Results	196
11.6	Concluding Remarks	197

## PART IV DESIGNS, DESIGNING AND DESIGN SCIENCE RESEARCH

<b>12</b>	<b>Designs and Designing</b>	201
12.1	Introduction	201
12.2	Designing Material Artefacts: Designs and Designing	202

12.3	Designing Material Artefacts: The Overall Design Process	206
12.4	The Design of Material Artefacts: Synthesis–Evaluation Iterations	210
12.5	The Design of Material Artefacts: Minimal Specification and Hidden Properties	213
12.6	Social System Design	214
12.7	Paradigmatic Starting Points in Social System Design	219
12.8	Concluding Remarks	222

### **13 Design Science Research: Developing Generic Solutions for Field Problems** 223

13.1	Introduction	223
13.2	The Key Methodological Problem in Developing Generic Solutions	225
13.3	A Learning Strategy for Developing Generic Solutions	227
13.4	Key Characteristics of Design Science Research	228
13.5	Using Generic Solutions in the Swamp of Practice: Evidence–Based Practice	233
13.6	Operational Issues in Conducting Design Science Research	235
13.7	Concluding Remarks	240

## PART V CASES

<b>14 Cases</b>	243
14.1	Introduction 243
14.2	The Assignment: Make a Project Proposal 244
14.3	Six Cases 245

References	260
The index for <i>Problem Solving in Organizations</i>	271

## Figures

2.1	The empirical cycle	<i>page</i> 12
2.2	The problem-solving cycle	13
2.3	The theory development process	15
2.4	The theory-testing process	17
2.5	Process for developing generic solutions	19
4.1	Example of a preliminary cause-and-effect tree	56
4.2	General structure of a research framework for diagnostic research in FPS projects	60
5.1	An example of a process diagram	79
5.2	Results of incident analysis at <i>EcoLogic</i>	91
5.3	Information-processing model	92
5.4	Ishikawa diagram for a group of patients with COPD	94
6.1	A general model for a design process	100
6.2	The key activities in actual designing: synthesis–evaluation iterations	103
8.1	Possible research designs for evaluation studies	138
8.2	Number of damaged and missing products over a two-year period at a logistic service provider	139
12.1	Process, object and realization design	204
12.2	A general model for a design process	206
12.3	Synthesis–evaluation iterations (loop A) and requirement–design iterations (loop B)	210



## Tables

9.1	Choosing the unit of analysis	<i>page</i> 156
9.2	Strategies for selecting cases of a unit of analysis	159
13.1	The differences between the explanatory and the design science research paradigm	233

## Boxes

2.1	Example of Theory Development Process	<i>page</i> 16
2.2	Example of Theory-Testing Process	18
2.3	Example of Generic Solution-Oriented Theory Development	20
2.4	Example 1	22
2.5	Example 2	23
4.1	Example of the Use of an External Exploration	49
4.2	Examples of Business Problems and Corresponding Assignments	51
4.3	Examples of Parts of Four Exploratory Interviews Regarding the <i>EcoLogic Research Case</i>	66
4.4	Example of a Project Proposal	68
5.1	An Indirect Validation of a Business Problem	82
5.2	Multiple Sources of Evidence	86

## Preface

This handbook gives a methodology for problem solving in organizations. Its primary target audience consists of undergraduate and graduate students in business and management. However, the problem-solving methodology given in this handbook can also be used by other people working in an organizational context, like (junior) management consultants, engineers and professionals in hospitals or government agencies, as well as students in other disciplines than business and management but who expect to work in an organizational context.

This third edition is a major revision of the 2012 edition, as well as being much more student-friendly. It is written for *you*, the business and management student. We owe many thanks for the contributions to the first and second edition of this book by our former co-writer, Dr Hans van der Bij.

The core idea in writing this textbook is that business and management course programmes are to educate professionals, not researchers. The key competence of any professional, like a medical doctor, engineer or lawyer, is *knowledge-intensive field problem solving*. This also applies to graduates of business schools, by most considered as professional schools. A powerful way for students to develop this key competence is to engage in problem solving in real organizational settings under academic supervision. By solving ‘paper cases’ you can develop a number of cognitive competences, but certainly not all the competences that are needed to be successful in the fuzzy, ambiguous and politically charged real-life organizational context. This handbook aims to provide you with a strong methodological basis for problem solving in organizations.

The theory given here can best be mastered through a – possibly brief – classroom course in which the contents of this handbook are discussed and in which, on the basis of some (paper) cases, training is given on issues such as problem definition, developing a project proposal, problem analysis and solution design. However, a much richer learning experience can be realized if such classroom training is followed by the further development of problem-solving competences through actual problem solving in the field, individually or in a (small) group. In this way the student can develop real ‘clinical experience’.

The scientification of the field of business and management has enabled it to develop into a respectable social science. This has led to the idea that the core

competence of the business or management graduate is carrying out good explanatory research and that fieldwork for a business or management student should be doing this type of research. For academically trained people in disciplines such as sociology or ethnography, carrying out good explanatory research is indeed their core competence, and so for students in these disciplines fieldwork typically consists of doing descriptive and explanatory research. However, as mentioned above, we believe that the core competence of business or management graduates is not to do sound explanatory research, but to do effective knowledge-intensive field problem solving; in other words, not just researching ‘the actual’, but also designing and realizing ‘the preferred’.

Business or organizational problem solving is very different from business or organizational explanatory research. There are many books on methodology for business or organizational research, which are often quite similar to more general social science research methodology. However, they give the methodology for analysing *what is*, and focus on the development of descriptive and explanatory knowledge. In business or organizational problem solving, on the other hand, the focus is on designing *what can be*, or *what should be*, in order to improve the performance of a specific business system on one or more criteria. In order to be able to design a business system, or to redesign an existing one, you must analyse the present system and the possible causes of its less than satisfactory performance. For this, many standard methods of social science research can help. However, problem and context analysis is only a part of field problem solving. These analyses should be at the service of the subsequent design of solutions (and the associated change plans). Therefore, the methodology given here is *design-oriented*: a problem-solving project following this methodology aims at the design of a sound solution and change plan, and at the subsequent actual realization of performance improvement with the help of these designs. It is about realizing business performance improvement on the basis of sound plans. It is not about making just sophisticated analyses.

The methodology of this handbook is also *theory-informed*. In practice, problem solving in organizations is often carried out in a craftsman-like way, on the basis of business experience and common sense. However, the methodology presented in this book is theory-informed, aiming at designing business solutions, based on state-of-the-art thinking on the types of business systems and types of problems in question and on the methods to be used in solving business problems (without, of course, discarding common sense and relevant experience). Because of this, our approach can be regarded as a methodology for

*evidence-based practice* (EBP). In fact, this book may be regarded as a foundation course in EBP in business and management.

Our approach builds on the traditions of rational problem solving. The types of problem that are best suited to this approach should have a significant substantive content, needing a knowledge-intensive strategy for analysis and design. At the same time, the approach recognizes that organizations are social systems, that realizing improvements in business system performance entails organizational change and that effective organizational change needs not only technical and social-economic interventions (such as the presentation of a promising solution to the problem), but political and cultural interventions as well. Therefore, our focus is not simply on the design of solutions but also on the design of the change process that is needed to actually realize the performance improvement, and on the development of organizational support for the solution and for the change plan. So, the student-consultant will play the role of the expert as well as the role of process facilitator (at least by preparing the change process, needed to solve the chosen problem).

Business schools tend to be regarded as professional schools, like medical schools and engineering schools. In this view, business and management graduates are regarded as professionals, implying that knowledge-intensive problem solving (or EBP) is their core competence. However, in an *academic* approach to the profession, graduate students also need to develop the competence to add to the knowledge base of their field (just as medical doctors and engineers need to be able to add to the knowledge base of their fields, even if field problem solving is their core competence). Field problem-solving projects generate a rich knowledge base, which can be used not only to solve the specific problem at hand but also as a basis to generalize across cases, thus developing new and relevant generic knowledge. This book will also give methodological support for using the results of field problem solving for research, more specifically for design science research. If academic supervisors choose the projects they are to supervise in line with their research interests, these projects can provide strong support for their research output.

Field problem solving should, in our opinion, be a very important element in any business or management course programme, as it aims to develop your core competence as a business and management alumnus. However, it is carried out in a terrain that has many more pitfalls and traps for the unwary than a university library. We hope that the methodology given in this handbook will help you, the student, to navigate this challenging but important and rewarding landscape.