1 Scope and nature of this handbook

1.1 Objectives and target audiences

Marc checks his PowerPoint presentation one last time. He is a bit nervous, and feels some stage fright. At the same time, he is also quite elated. This afternoon he will get a full hour at the weekly factory management meeting to present and defend his design for a new mid-term production planning system, in which sales plans, made by the marketing department at headquarters, are translated into a production plan for the factory in city K.

It was several months ago that Marc, a graduate MBA student, had started his internship at the factory in city K of a large company dealing in industrial measuring equipment. During the intake the assignment had looked quite straightforward, but during the orientation stage in the first weeks it proved to be quite a complex one, partly because of political tensions between headquarters and the factory and partly because the factory's knowledge of the capacity of its various production facilities proved to be too limited. After the orientation phase, therefore, the assignment was broadened somewhat. It was not always easy; some people supported his assignment, giving him much time and many ideas, but others were somewhat sceptical, and were reluctant to interrupt their busy schedules to talk with him (especially at headquarters). However, with the strong support of the factory manager, his principal for the assignment, his company supervisor and his academic supervisor, and, furthermore, with the methodological support of the book *Problem Solving in Organizations*, he had been able to overcome all the obstacles. He had carried out a systematic review of the literature on the various aspects of his assignment and

had used it as a major input into the design of his planning system; his design was surely an example of the 'state of the art'.

Now he is confident that the meeting will be successful and that his design will be formally adopted. The key participants of the meeting have been briefed by him beforehand on his design, and most seem to support it, including the factory manager. The only one whose position he is not sure of is the logistics manager, who kept asking awkward questions. Never mind, though; the die has been cast. He has done everything he can to produce a really sound design; he is ready for the final test of his internship!

This handbook gives a design-oriented and theory-informed methodology for business or organizational problem solving projects, whether driven by an individual student such as Marc or a group of students, or a junior professional working in or for an organization. Our methodology has been developed for university business or management course programmes such as MBA courses, which consider the development of student competences to solve real-life business or organization problems as a key objective of their programme. In other words, our methodology is for business or management courses aiming to educate professionals. The core competence of the scientist is explanatory research, researching and explaining what is – the actual. However, for professionals such as doctors, lawyers and engineers, it is field problem solving (FPS). Professionals are interested in changing 'the actual' into 'the preferred'.

By 'field problem' we mean a situation in reality, which in the view of some influential stakeholders can or should be improved, such as a sick person, a polluted water well or an unreliable logistical system. This handbook provides the methodology for dealing with field problems in business and management (as opposed to dealing with pure knowledge problems, such as the question of why rain and sun produce a rainbow).

For the business or management student, the development of the competence of dealing with field problems can be supported by in-house courses on problem solving methodologies, based on written case studies. However, a very important complement to this in-house training is problem solving in a real-life context. This can be achieved in various ways, ranging from a trainee within a company taking on a problem solving project of six months or so to a smaller project undertaken by a group of students visiting a company on a few occasions to do their analyses and present their proposals.

The target audiences of this book include undergraduate and graduate students of business or management course programmes in addition to young

professionals from other disciplines who want to develop their competence in problem solving in organizations. For most, the main learning objective will be the design and execution of FPS projects in a professional manner. However, for graduate students, the learning objectives can – and maybe should – also include the competence of adding to the knowledge base in their field. The first objective of an FPS project is to improve the performance of the business system under consideration; the first use of the knowledge developed in the project is to solve a specific case. However, such a project can also produce knowledge that can be transferred to other settings, especially if there are comparable case studies available, allowing for generalization across cases. This book also deals with the possibilities of developing generic knowledge as well.

This handbook can be used in a general classroom course to prepare for business or organizational problem solving fieldwork, and subsequently as a sourcebook for preparing and running actual field projects. It can also be used as additional reading (possibly with one or more classroom training sessions) for a disciplinary course aiming to combine theory with the application of that theory in practice.

The methodology of this handbook has been developed on the basis of more than ten years' experience in supervising business or organizational problem solving projects by students of the techno-MBA course at Eindhoven University of Technology and the business course programme at Groningen University. These included short group assignments in field problem solving, but most were six- to nine-month graduation projects, aimed at further developing students' competences in theory-informed field problem solving. The business or organization problems to be solved typically had a significant technical-economic content. However, this handbook deals with the conceptual and technical set-up of the project itself, not with methods related to the content of the problem. Unlike many books on consulting (see, for example, Albert, 1980; Kubr, 1996), this book does not have sections on problem solving in different disciplinary contexts. Typically, in the context of a university course, university supervisors will provide students with the necessary disciplinary support. Chapter 3 provides further discussion on the nature and application of our methodology for field problem solving.

1.2 Design-oriented and theory-informed problem solving in organizations

As is discussed in more detail in Chapter 3, a real-life FPS project typically consists of an analysis and design element, an organizational change element

and a learning element, during which the organization aims to realize improved performance on the basis of the designed solution. The methodology presented in this handbook focuses on the design of the solution for the business problem, on the design of the change process needed to realize that solution in new or adapted roles and procedures, and on the analyses needed to make those designs. It is about business improvement on the basis of designed sound solutions (as opposed to a 'muddling through' approach). This is why we use the term 'design-oriented'. We only briefly discuss the actual management of the change and learning parts themselves, reflecting the actual practice of business students undertaking an FPS project. Typically they will focus on the two designs (and work on developing organizational support for these designs), but will leave the – possibly quite protracted – change and learning parts to the organization itself. Therefore, our focus is largely on the design part of the problem solving project.

'Theory-informed' means that, in this approach, problem solving is not carried out in a craftsman-like way, largely relying on one's own experience and informed common sense. Rather, it is informed by theory, using state-of-the-art literature. The literature to be used in field problem solving entails two complementary aspects:

(1) *object* and *realization knowledge*: knowledge of the *object* of problem solving – that is, knowledge of organizations and management in general, and of various business systems and functions such as marketing, operations, innovation and finance in particular; and knowledge of the *realization* of business or organizational solutions through planned change; and
(2) *process knowledge*: knowledge of approaches and methods to be used in the analysis and design of business solutions and change plans, from problem definition to decision-making on proposed solutions and change plans.

This handbook focuses on the second category, that of process knowledge for business problem solving. It also discusses some elements of realization knowledge in the context of change plan design, but it does not discuss object knowledge, as this will be provided by the disciplinary courses of the business programme, supported by the academic supervisors of the problem solving project.

'Theory-informed' does not, of course, mean copying theory into particular cases. Theory is by definition generic and must always be contextualized for

use in actual problem solving. 'Theory-informed' in field problem solving within an academic programme specifically means the *comprehensive*, *critical* and *creative* use of theory:

(1) *comprehensive*, because problem solving should be based on a systematic review of the existing literature on the issues in question;
(2) *critical*, because one should judge the value and limitations of existing literature, among other things, on the basis of the evidence given (for instance, the design of business solutions may be informed by 'management literature', as long as one is aware of its limitations); and
(3) *creative*, because one should not just use theory but aim to build on it, play with it and add to it in order to produce appealing designs.

Theory-informed design can be seen as design on an academic level, in which theory is very important, but at the same time with an awareness of its limitations. We therefore follow Tranfield, Denyer and Smart (2003) in using the term 'theory-informed' rather than 'theory-based'.

Nevertheless, this book can be regarded as a handbook on the methodology of evidence-based management (see, for example, Pfeffer and Sutton, 2006; Rousseau, 2006, 2012). As stated in the introduction, this handbook may in fact be treated as a basic course in EBMgt.

EBMgt is an application of the ideas of evidence-based medicine (see, for example, Trinder and Reynolds, 2000) and the more general evidence-based practice (see, for example, Hamer and Collinson, 2005; Young *et al.*, 2002). We see as the defining characteristic of evidence-based practice the comprehensive, critical and creative use of theory in field problem solving, as opposed to more craftsmanship-like approaches, based on personal experience and informed common sense; and this is exactly what this handbook proposes to do in the field of business and management.

Opponents of evidence-based practice fear that the term 'evidence-based' implies that a professional should use only interventions for which there is sufficient 'evidence', and that the 'best practices' resulting from the available evidence should be followed to the letter. This is not only impossible – existing theory is always limited and should, furthermore, always be contextualized to the case at hand – but also undesirable, because it constrains professional judgement and inhibits creativity and innovation. For us, evidence-based practice – including EBMgt – means only the *comprehensive*, *critical* and *creative* use of theory in field problem solving; no more, no less.

1.3 How to use this handbook

This handbook provides theory on how to set up and drive an FPS project. It should be used in a comprehensive, critical and creative way. By 'comprehensive', we mean that the theory should not be used as a menu from which readers pick and choose certain elements. Rather, the approach as a whole should be followed. At the same time, the theory should be used critically, as far as is appropriate for the business problem in question. Chapter 3 supports the critical aspect by discussing the limitations of this theory and the types of problems for which it can be used. The creative use aspect means that the approach given in this handbook is not simply to be copied but to be contextualized. The approach provided should be regarded as a 'design model': a general model to be used as the basis for the design of the specific set-up of an FPS project for a particular setting. The approach of this handbook is a kind of 'norm process': a well-tested example of how to do something, described in terms of a 'generic context'. In reality, no context is generic, so one always has to make one's own specific project design. At the same time, one should be able to justify any deviation from the norm process on the grounds of the requirements of the specific context, or on the grounds of the recognized limitations of the norm process itself.

This rejection of a recipe-like approach also entails that this book contains no specific formats or forms for, say, meeting minutes, project plans or progress reports. Students have to design these themselves.

Although, in our experience, graduate students are quite able to use a handbook such as this in self-study, to prepare and manage their problem solving projects in the field, a good way to learn this approach is to follow a classroom course using this book. We use it in a course consisting of a few explanatory lectures, self-study and a number of training sessions, in which written case studies are used to train for activities such as problem definition, designing a problem solving approach and preparing a project proposal. However, the best learning experience is in the field: defining problems, capturing data and exploring solutions in the messy, political and sensitive world of real-life business, thereby developing the tacit knowledge needed to apply the codified knowledge of the business course programme. No written case study can give the student that learning experience. Even students with previous business experience, who tend to tackle problems on the basis of their experience and common sense, can benefit from this design-oriented and theory-informed approach to business and organizational problem solving.

2 Student projects

2.1 Introduction

This handbook deals with fieldwork by business or management students. Such fieldwork can be carried out in the context of a specific course, but can also be done as a graduation project at the end of a course programme to further develop the student's competences and to produce a 'masterpiece' – that is, a project report that proves that the student did indeed master the desired competences.

The approach chosen for a graduation project depends on the research paradigm of the school, the supervisors for the student fieldwork and the student's own preferences. As is discussed in more detail in Section 5.2, there are two main research paradigms to be used in student fieldwork in business or management, namely the *explanatory paradigm* and the *design science paradigm*. The explanatory paradigm is the research paradigm of mainstream research in most social sciences; the design science paradigm is the research paradigm of professional schools, such as medical schools, engineering schools and, increasingly, business schools.

A student project according to the explanatory paradigm aims to produce descriptive and explanatory knowledge. Such a project may follow the *empirical cycle*. A student project according to the design science paradigm aims to produce solutions to field problems, and may follow the *problem solving cycle*.

The objective of bachelor graduation projects typically is to produce specific, context-bound knowledge. If the empirical cycle is used, this may, for instance,

be knowledge about the market potential or the cost structure of a given product. If the problem solving cycle is used, the knowledge produced can be a solution (plus its implementation plan) for a given field problem, such as a programme to reduce the selling costs of a given company, or a design for an electronic patient file for a general hospital.

For master graduation projects, the objective of the graduation project can be somewhat more ambitious, including not only specific, context-bound knowledge but also some improvement of or addition to some generic theory. If the empirical cycle is used, this could entail descriptive or explanatory theory; if the problem solving cycle is used, this could involve either additions to explanatory theory or additions to generic design knowledge, to be used to design solutions to field problems. This handbook presents a design-oriented and theory-informed methodology for executing the second type of project. However, in the present chapter both types of project are discussed, to show the differences between the two and to position the problem solving project. In the next section we discuss both the empirical cycle and the problem solving cycle, and in section 2.3 we examine knowledge-producing processes on the basis of these cycles. Section 2.4 shows the problems if you mix the different cycles, and Section 2.5 gives some concluding remarks.

2.2 Two basic process structures

There are two basic process structures for carrying out fieldwork in business or management – that is, two basic sets of process steps, with the relationships between these steps. These follow, respectively, the *empirical cycle* (de Groot, 1969; Saunders, Lewis and Thornhill, 2007; Blumberg, Cooper and Schindler, 2011) and the *problem solving cycle* (Dewey, 1910; Hedrick, Bickman and Rog, 1993; van Strien, 1997; Easterby-Smith, Thorpe and Lowe, 2002; Saunders, Lewis and Thornhill, 2007).

Although the two cycles have some research activities in common and although some common quality criteria have to be satisfied, the two cycles are very different. We explain first the empirical cycle, as shown in Figure 2.1.

The observation step is the start of the empirical cycle. In this step one focuses on a certain type of business phenomenon in the real world and on what has been written about it in the academic literature. The observation may result in the conclusion that many companies have to deal with this type of

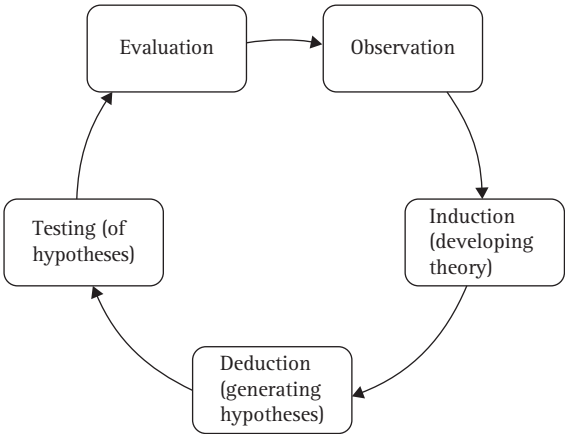

Figure 2.1 The empirical cycle
Sources: based on de Groot (1969); Saunders, Lewis and Thornhill (2007); and Blumberg, Cooper and Schindler (2011).

phenomenon, though the academic literature has not yet addressed it adequately. During the induction step, possible explanations for the issue are developed, aided by related literature – that is, the academic literature that deals with this issue, or, at least, is expected to deal with the issue. The induction step is a theory-developing step.

In the deduction step, the most promising ideas of the induction step are transformed into hypotheses: statements that can be verified by empirical observation and measurement. In the next step, the testing step, the hypotheses are empirically tested. This is typically done through the application of statistical techniques, and sometimes by case studies. Finally, during the evaluation step, the outcomes of the empirical test are examined and interpreted. This may lead to a new research question and a rerun of the empirical cycle.

The empirical cycle can also be used for non-academic reasons, such as to generate specific knowledge for a company. For instance, the empirical cycle can be used to get to know the needs and preferences of a particular group of customers.

Let us now consider the problem solving cycle, which is shown in Figure 2.2 (see Section 3.7 for a more detailed discussion of the problem solving cycle).

The problem solving cycle is driven by the needs arising when a company has a business problem. Business problems are not given but chosen by stakeholders. In general, companies face a problem mess of interrelated problems (see Ackoff, 1981a, on the concept of a 'problem mess'). To formulate a clear business problem, this problem mess has to be identified and structured.

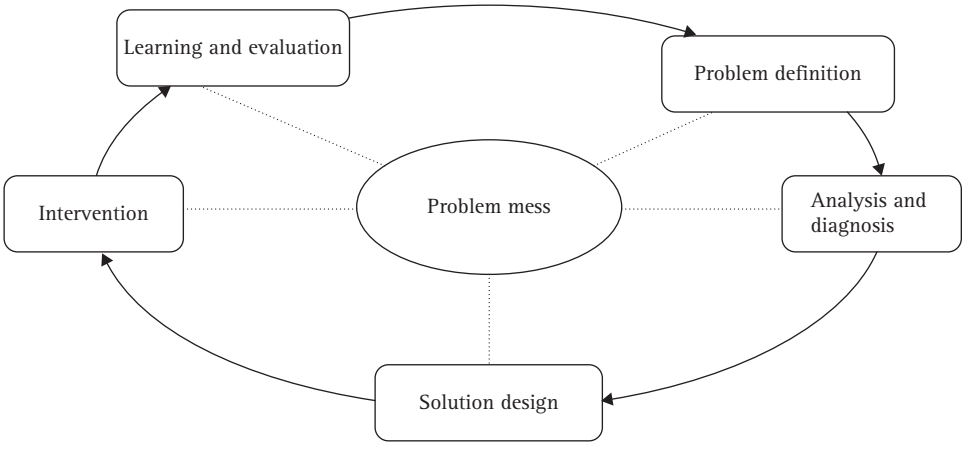

Figure 2.2 The problem solving cycle
Sources: based on Dewey (1910); Hedrick, Bickman and Rog (1993); van Strien (1997); Easterby-Smith, Thorpe and Lowe (2002); Saunders, Lewis and Thornhill (2007); and van Aken (2007).

This structuring process is the first step of the problem solving cycle, resulting in a problem definition.

The next step in the problem solving cycle consists of analysis and diagnosis. During this step, the problem and its context are analysed and the causes of the problem established as far as possible. Once the business problem and its most important causes have been identified and validated, a solution can be designed. This is done in the next step of the problem solving cycle. The designed solution has to tackle the most important causes. In this step the implementation of the solution also has to be designed.

The final steps of the problem solving cycle are the intervention and the learning/evaluation steps. In the intervention step, the solution to the business problem is implemented at the company on the basis of the actions conceived in the design step. In the evaluation step, the effects of the implemented solution are assessed. This evaluation may lead to the definition of a new business problem and a restart of the problem solving cycle.

Whether a project should apply the problem solving cycle or the empirical cycle depends on the kind of problem that is to be addressed. The objective of a descriptive or explanatory research project is to develop knowledge. In an academic context, this is generic knowledge; in a business context, it is specific knowledge, such as the motivation of one's employees or the preferences of one's customers. The purpose of such research is to solve a *pure knowledge problem* in the immaterial world of knowledge. The purpose of a field problem