

**THE ROAD TO SUCCESS**



Bassam Hussein

# THE ROAD TO SUCCESS

Narratives and Insights from Real-life Projects



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First Edition / Printing 1

ISBN: 978-82-450-2444-9

Graphic production: John Grieg, Bergen

Cover picture: © Miki80\_Dreamstime  
Typeset by Mari Røstvold

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*In loving memory of my mother Diba (1942–2010)*



# Preface

This book is not a typical textbook on project management nor is it a collection of real-life project cases. Although the book is written in a textbook format, it combines real-life project cases, research results from analyses of causes of success and failure in projects, and a theoretical review of key methods and terms in project management, supported by references and examples from these real-life cases. The main target group of this book is project management professionals who are seeking to gain insights into the perquisites of project success. Therefore, this book was written with the following goals in mind: (1) to provide the readers with a collection of real-life project cases from different types of industries and sectors, (2) to use empirical evidence from these real-life cases to facilitate understanding of essential concepts and methods in project management, and (3) to present new insights and understandings about project success gained from analysing the cases collectively.

The cases presented in this book cover diverse types of projects from various industries and businesses and give a good picture of how projects and project management are performed in Norway. To facilitate reading, understanding the cases, and the insights gained, I have divided this book into two parts. Part 1 is a hybrid part, which I call *Insights*, and contains a mix of findings and research results from the cases. These findings and results are combined with a theoretical review of some fundamental concepts, methods, and tools that are widely used in managing projects. Part 2 contains 21 real-life project cases (*Narratives*). Each case is supplemented with a few discussion questions and concludes with some insights regarding major causes of success or challenges encountered, and an evaluation of the project results.

## Acknowledgments

I would like to express my appreciation of all course participants who have shared inspiring narratives from their projects. The cases chosen are undoubtedly vivid tales, and they provide a good insight into the many challenges of managing projects.

I am especially grateful to Lasse Postmyr from Fagbokforlaget for his sincere encouragement and valuable contributions to bring this book project into life. I would like also to thank other members of Fagbokforlaget editorial, production and marketing staff, including Anna Dereń and Małgorzata Bąk. Special thanks also to my niece, Rula, for initial proofreading of the manuscript. I would like also to extend my appreciation to Catriona Turner for excellent translation of the cases from Norwegian into English, and for final proofreading of the manuscript.

I thank all those who have organized and managed all the courses I have given in further and continuing education programmes in project management at the Norwegian University of Science and Technology (NTNU). Last, but not least, I would like to take this opportunity to thank all students who have attended my courses on continuing education, internal company programmes, and in regular master's programmes at NTNU.

Bassam Hussein  
Trondheim, April 2018



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# **PART 1**

# **INSIGHTS**



# 1 Introduction

Case studies are good tools for learning. They offer the learner an opportunity to investigate what went right and what turned out badly. In addition, case studies describe the project context which enables the learner to explain why things went right or wrong. Understanding the context of any project is therefore a precondition for gaining valuable insights from that particular project. Moreover, understanding the context is a valuable aid to comprehend the underlying reasons for many of the decisions or actions taken throughout the project. Therefore, case studies are thought to be among the best approaches to learn project management (Kerzner 2006).

The purpose of this book is to provide project management professionals and project management scholars with an opportunity to learn from the experiences of others. This purpose was accomplished through:

- Presenting case studies from diverse types of projects from various industries and businesses. The cases presented in this book cover diverse types of projects from various industries and businesses and give a good picture of how projects and project management are performed in Norway. In order to help the reader to understand the main challenges of the cases, measures used and other project-related issues, I have identified some keywords for each case. These keywords give an indication of the main theoretical and conceptual models that form the basis of the case. The purpose is to give the reader an opportunity to search for the relevant project literature and to immerse themselves within the relevant models, concepts, and terms. In addition, for each case I have developed between four and six discussion questions. The purpose of these questions is to maximize the learning impact of the cases. The questions are primarily an aid to understanding the main

challenges in each case. Through these questions, the reader is invited to reflect on issues that are described in the case, and to compare the way the project was completed with project best practice that is either reported in the project literature or known from the reader's own experiences. Each case is also concluded with some insights regarding major causes of success or failure and an evaluation of the project results.

- Using specific situations, problems or approaches from these case studies to help communicate a more general idea or to explain terms from project management literature. Throughout the text of this book, the reader will find numerous examples of specific situations used to explain important project management related concepts such as complexity, uncertainty, stakeholder's analysis, success criteria, success factors, risk factors, purpose, goal, outcome, project organization and many others.
- The cases presented in this book are a tool to communicate ideas and concepts, as well as new insights. These new insights were developed by looking at these cases collectively from a researcher's point of view, and they include classification of project success factors based on project characteristics. This classification could aid project practitioners to select the critical success factors needed, based on the prominent characteristics of their projects in terms of extent of organizational complexity, extent of uncertainty, extent of constraints imposed, extent of intended changes, and the extent of project impact on business or organization as a whole. In addition, these new insights also suggest that soft factors such as trust, commitment, loyalty and openness are imperative to ensure project success.

## 1.1 Types of projects included in the book

In project management literature there is no consensus on what is the appropriate method to classify projects (Wysocki 2011, Hanisch 2012). However, there have been some efforts to apply a contingent approach to describe R&D projects based on the level of innovation, technology and market (Balachandra and Friar 1997). Wysocki (2011) argue that projects could be classified into the following categories:

- By size (cost, duration, scope of work, number of departments affected, and so on)
- By type (new, maintenance, upgrade, strategic, tactical, operational)
- By application (software, new product development, construction, and so on)
- By complexity and uncertainty

Briner, Hastings and Geddes (2001) use another approach to classify projects based on three criteria:

- The extent by which the output or deliverables can be defined (concrete verses open)
- The level of structure and formality (formal, semiformal, and informal)
- The level of the know-how (concrete, limited, open)

Briner, Hastings and Geddes (2001) suggest for instance that construction projects belong to a concrete type of projects because they have defined output or deliverables, and they are executed based on established project management principles and well-known methods. Open projects on the other hand are characterized by having self-organized activities, use of trial and errors until something works, and has no formal management structure. Typical examples of this type of projects include developing new ideas for business improvements or to test new concepts.

In this book, the cases presented in part 2 (*Narratives*) are grouped into five categories by application:

- Restructuring projects
- Information technology (IT) and software projects
- Construction projects
- Product development projects
- Research projects and studies

This classification is not grounded in any reason other than making it easier for the reader to find relevant project cases from a specific application.

### 1.1.1 Restructuring projects

In restructuring projects, people and work processes are in focus. Restructuring projects are also called soft projects (Crawford and Pollack 2004). The main characteristics of these projects are: (1) they do not have a tangible deliverable, and (2) transformation is an important outcome. Restructuring projects include those concerning the introduction of new work processes, the introduction of new training or education schemes, restructuring of an organization, attitude change, or phasing out of existing systems and processes. The vast majority of employees in any organization are likely to be protective of what they regard as familiar, and therefore any change can cause turmoil and trigger the need for more involvement and information than usual. Therefore, the main challenge in restructuring projects is how to motivate people to accept, implement, and realize the transformations intended by the project. Evidence from the cases suggests that involvement, high degrees of motivation, and the appointment of a competent project manager who has a thorough understanding of the organization and its culture, are among the most important prerequisites for realizing the intended transformation.

### 1.1.2 Information technology (IT) and software projects

IT and software projects could be considered a subcategory of restructuring projects if the primary objective is about changing the way people work through the acquisition or development of new IT solutions and software packages. These projects differ from restructuring projects in that their main delivery is more concrete. The main challenge in IT projects is to capture and manage successfully the expectations of diverse stakeholders, especially those who will use the new IT solutions (Francis and Rafi 2002, McLeod, MacDonell and Doolin 2007). The results of the analysis of the cases point to several success factors in IT projects, including the importance of not doing everything at once, but instead developing the project by having frequent small deliveries. The cases also point to the importance of continuous follow-up of project outcome throughout all project phases.



### 1.1.3 Construction projects

The main characteristics of construction projects are that they are developed under several types of constraints and limitations that place great demands on project planning and control. Another characteristic is that their deliverables are tangible and physically measurable, which makes them easier to follow-up. The cases illustrate that planning in the early stages, choices of procurement strategy, selection of contractors, and selection of contract type are among the most important success factors in construction projects. The findings also suggest that good interface management between the involved parties is an important factor for success.

### 1.1.4 Product development projects

In this type of project, the deliverables are tangible and concrete, and they may include new product development, the optimization of existing products, manufacture of products (built to print), and procurement of standardized or customized products. The cases show that scope management, availability of adequate technical resources, adequate risk management processes, follow-up and support by top management are among the most important success factors in product development projects.

### 1.1.5 Research projects and studies

This type of project is distinguished from other projects by the type of final deliverable. The main delivery of research projects and studies is usually a report that either provides a basis for a decision on the best possible options for continuation of a project or provides a basis for control. Findings from the cases show that the main challenge in this type of project is a high degree of uncertainty about the outcome, which means that these projects can easily be influenced by human factors.

## 1.2 Methodology

The insights on project success presented in this book are based mainly on a qualitative research approach with the use of case studies. A qualitative approach

is suitable when the goal of a study is to understand people and situations in specific contexts. In qualitative research the emphasis is on words rather than quantification during the collection and analysis of data. Creswell and Creswell (2009) describe the characteristics of the performance of qualitative research as follows:

- Exploring a problem and developing a thorough understanding of a phenomenon
- Having the literature review play a minor role but justify the problem
- Collecting data based on written text and/or quotes from a small number of individuals, to obtain their views
- Analysing the data for descriptions and themes, using text analysis, and interpreting the wider meaning of the findings
- Writing the research report using flexible emerging structures and evaluative criteria, and including the researchers' subjective reflexivity and bias.

Qualitative research methods are thus used to address a problem in which the variables that need to be explored are not specific. In this study, qualitative case study research has been used to develop insights into project success. Baxter and Jack (2008) suggest that case study research fits within the constructivist paradigm. This paradigm recognizes the importance of the subjective human creation of meaning, but it does not reject outright any notions of objectivity. One of the advantages of case study research approach is the close collaboration between the researcher and the respondents or participants, while enabling them to tell their stories. Through their stories, the participants are able to describe their views of reality, and this enables the researcher to gain a better understanding of the participant's actions. According to Yin (2014), a case study approach should be considered when: (1) the focus of the study is to answer 'how' and 'why' questions; (2) the behaviour of those involved in the study should not be manipulated; (3) the aim is to cover contextual conditions because they are believed to be relevant to the phenomenon under study; or (4) the boundaries between the phenomenon and context are unclear.

The database used for this study consisted of 400 real-life project cases from Norway. The cases cover diverse types of projects relating to various industries and businesses, and therefore give a good picture of how projects and project

management are performed in Norway. The cases were collected during a series of continuing education courses in project management for business professionals held at the Norwegian University of Science and Technology (NTNU). The gender, educational background, type, and work experience profile of the professionals were quite diverse. Some professionals were taking the courses as part of the mandatory prerequisite to obtain a master's degree in leadership at NTNU, while others were taking the courses in order to seek a more in-depth understanding of methods and practices in project management, or were attempting to secure a new career opportunity in project management. The average number of participants attending the courses held by the author each year to date has been in the range of 100–120 project professionals. All participants had a higher university degree and a few years of work experience, as well as some project management experience, either as project participants or as project managers. A summary profile of the course participants as to the type of industry they worked in and their job title is presented in Table 1.

**Table 1** Profile of course participants by type of industry and job title

| Example of industry type | Example of job title |
|--------------------------|----------------------|
| Offshore modifications   | R&D Project manager  |
| Air traffic control      | Senior advisor       |
| Consulting               | Project manager      |
| Higher education         | Project leader       |
| Facility management      | Support manager      |
| Automation/Industrial IT | Project coordinator  |
| Medical                  | Maintenance manager  |
| Railway                  | Department manager   |
| Construction             | Maintenance planner  |

Part of the teaching instructions for the courses has been to encourage the participants to write reflection reports about projects they have managed or in which they have participated. The purpose was threefold: (1) to encourage the participants to reflect on how their projects had been initiated, planned, and implemented; (2) to gain insight into the reasons that contributed to the failure or success of the projects; and (3) to share this knowledge and experience with other participants attending the courses through presentations and discussions of some selected cases.

The cases were collected using a questionnaire that consisted of open questions that the participants were asked to answer in writing. In these questionnaires, the participants were asked to describe in detail a project that they had contributed to as either project team members or project manager. The participants were also asked to identify the challenges that had been encountered, the means that were used to respond to the challenges, as well as to provide information about project context, and explain how the project was organized, planned, and executed.

In the period 2009–2014, I collected c. 400 project cases from different types of industries and applications. The size of each delivered case description was c. 4–8 A4 pages (2000–4000) words. A database created using Endnote software was used to categorize and index the delivered case descriptions. An overview of the classification of cases according to project type is shown in Table 2.

**Table 2** Classification of cases according to project type

| Total number of cases: 400                             | Restructuring projects | IT and software projects | Product development projects | Construction projects | Research projects and studies |
|--|------------------------|--------------------------|------------------------------|-----------------------|-------------------------------|
| Percentage of reported cases according to project type | 30%                    | 18%                      | 26%                          | 13%                   | 13%                           |

As the size of the database increased, and from in-class discussions with course participants, it became apparent that a number of factors had contributed to challenges and problems in the reported cases. One important group of factors that contributed to the challenges was the lack of full awareness about both the project and its operational context. In many cases, a project was treated as *an effort* that should be completed within agreed upon constraints of time, budget, and scope, regardless of the context. This view of projects does not capture the full reality of the project life cycle and its context. Failure to acknowledge other important attributes of the project effort beyond the constraints of time, cost, and scope had given rise to problems and challenges in the reported cases. However, there was enough evidence in the cases to support the hypothesis that implementing suitable measures to address different project characteristics contributed to success or at least reduced the level and scope of the reported

challenges. A detailed study was therefore initiated by the author to examine these observations closely. The study had the following objectives:

- To identify a list of all measures that had been applied in the reported cases in order to deliver the projects and achieve their objectives
- To identify the most important project characteristics embodied in the reported projects and compare the findings with reported findings in project literature
- To establish a correlation between success factors and the most important project characteristics
- To develop a conceptual model of project success based on the insights gained from the study
- To develop an understanding of how success is measured and ensured in the Norwegian project management context
- To identify the major categories of risks found in the projects and examine the relationship between types of risks and project characteristics.

Taking into consideration that the reports that constituted the databases were of varying qualities, it was therefore important to select good cases that contained rich and comprehensive information about the case projects. The selection of cases was done by the author on the basis of the following criteria:

- Description of project context and stakeholders
- Description of project rationale, purpose, and objectives
- Description of the relationship between the project organization and the parent organization
- Types and scope of uncertainties and identified risks
- Problems encountered and their causes and consequences
- Measures taken in response to problems encountered
- Factors contributed to success
- Evaluation of the project outcome
- Own reflections and insights.

This selection process yielded 30 real-life project cases that forms the basis of the insights presented in this book. Only 21 of these cases are included in Part 2,

where they are used to illustrate various concepts and terms. In addition to the cases presented in Part 2, I am going to use examples taken from other collected cases that are useful to illustrate concepts and terms. The cases provide a good foundation for further examination of the relationship between a project's characteristics and drivers for success or failure. The cases have been published in Norwegian (Hussein 2016) and are used as real-life examples in teaching project management at master's level at NTNU. The analysis of the cases was done together with business professionals who attended the project management courses in 2015 and in spring 2016. In total, c. 120 business professionals contributed to the analysis through group work, individual assignments, group discussions, and presentations under supervision of the author.

Involving project management professionals within the context of the classroom to speak about their own experiences as well as developing new insights, has been part of my efforts to merge learning and research. Merging learning and research as a teaching strategy provides students with unique opportunity to reflect on own experiences as well as on other experiences. I am pleased to say that this book presents the outcome of this teaching strategy.

### 1.3 Structure of the book

As I have indicated earlier, the first part of this book is a hybrid part titled *Insights*, which contains the findings obtained from the cases combined with presentation of some fundamental concepts, methods, and tools that are widely used in project management. Hereafter this book comprises the following chapters and their contents:

- Chapter 2: Provides a description of key project characteristics with examples from the cases. The cases demonstrate that projects have several characteristics that set them apart from the mainstream process-oriented or operational tasks. It is necessary to understand these characteristics in order to select appropriate strategies and measures that could improve the project's chances of success. In addition, acknowledgement and understanding of these characteristics are necessary in order to see the need for structured and systematic project management approach, and to develop a robust understanding of the difference between a project and an everyday process-oriented task.

- Chapter 3: Provides a brief theoretical overview of the concept of stakeholder management. In terms of project success or failure, stakeholder management is important for two reasons: (1) stakeholders contribute in one way or another to project success or failure. Therefore, we need to know who can contribute to project success and what type of contribution is needed. (2) stakeholders have concerns that should be met. How their concerns are met will obviously influence their judgement of project failure or success. They will judge the project as successful if their concerns are addressed, otherwise they will judge it as a failure. The purpose of stakeholder's management is to develop and implement proper communication strategies with various stakeholder groups in order to secure their contributions as well as addressing their concerns. Throughout Chapter 3, I use examples from real-life cases to explain various terms, problems, and concepts related to stakeholder management.
- Chapter 4: Introduces the concept of project life cycle and phases. It follows from the discussion in Chapter 3 that each major category of stakeholders represents an important perspective in the project's lifecycle. These perspectives and the uncertainty about the project and operational context all give rise to the project characteristics that I discussed in Chapter 2. This chapter emphasizes the importance of acknowledging project life cycle beyond delivering the *output*, but also considers the *outcome* of the project. Evidence from the cases shows that managing the project life cycle requires balancing and combining three main stakeholder perspectives: the owner's perspective, the end user's perspective, and the project organization's perspective as a strategy to ensure delivering the output and achieving the outcome.
- Chapter 5: Introduces the project initiation process and emphasizes its role in managing projects successfully. In this chapter, I introduce and explain various concepts, such as the rational, purpose, outcome, and output, and describe the similarities and differences between them with examples and ideas from the cases.
- Chapter 6: Gives an overview and summary of the main findings with regard to how success in projects is defined and measured in the presented cases.
- Chapter 7: Provides a description and summary of project success factors based on the findings from the cases. Furthermore, this chapter presents new insights on the correlation between success factors and each project char-

acteristics that were presented in Chapter 2. This chapter also includes an overview and discussion of cultural factors and various forms of biases and heuristics in projects that affect decision-making, and that might influence a project organization's ability to initiate and implement necessary measures to achieve success.

- Chapter 8: Provides an overview of different forms of project organizations as well as a short summary of the pros and cons of each form, with examples from the cases.
- Chapter 9: Provides an overview of well-known project planning tools, such as network diagrams, work breakdown structure (WBS), estimation methods, resource charts, and the S-curve and earned value method.
- Chapter 10: Provides a summary of typical risk factors exemplified by the cases, as well as a summary of the most important measures that were implemented to mitigate the risks. A good risk analysis can enable the project manager to reveal project characteristics and thus facilitate the choice of critical success factors to increase the likelihood of success in projects. A good, structured risk analysis can also be a means to create or safeguard critical shared values and norms, such as trust, openness, loyalty, and commitment.



## 2 Project characteristics

The word project originates from the Latin word *projectum*, which means before an action. In modern times, the word has been used to describe ‘an individual or collaborative enterprise, possibly involving research or design, that is carefully planned, usually by a project team, to achieve a particular aim’ (Dictionary 2017). Because of the diversity and multiplicity of projects’ objectives, there are many forms of projects, ranging from large-scale or mega projects involving hundreds of organizations and suppliers (Merrow 2011) to smaller projects such as construction of facilities, training programmes, product development, upgrading existing systems, or phasing out existing products and services. Because of the multiplicity of forms and purposes of projects, there are a number of different definitions of what constitutes a project. For example, Turner (2009) defines a project as ‘a temporary organization to which resources are assigned to do work to deliver beneficial change’. The Project Management Institute (PMBok 2013) defines a project more narrowly, as ‘a temporary endeavour undertaken to create a unique product, result or service’. Other such, as PRINCE2 (2009), define a project as ‘a temporary organization that is created for the purpose of delivering one or more business products according to an agreed business case’. Common to all definitions is that a project is regarded as a temporary assignment that has a defined purpose and a set of characteristics that distinguish project assignment from repetitive tasks (Cleland 2001, Pinto 2013).

The cases presented in this book demonstrate and exemplify some of these key characteristics of projects well. Grasping the scope and extent of project characteristics is necessary in order to comprehend the challenges that these characteristics contribute to project execution. This understanding is also crucial for the choice of how information should be shared and managed, for the choice of execution model, and for the selection of project organization struc-

ture and authority level to name a few. Chapter 7 highlights the main findings from these cases in terms of the relationship between project characteristics and the critical success factors needed in order to respond to or deal with each characteristic. The most common project characteristics presented and defined in the project management literature include:

- Organizational complexity
- Projects contribute to transformation
- Projects have impact on business or strategy
- Projects are executed under one or more types of constraints
- Uncertainty

The presence of excessive levels of project characteristics give rise to both project complexity and managerial complexity (Hussein 2012). The term complexity is in common usage and project practitioners have diverse understandings of the term. Azim, Gale, Lawlor-Wright, Kirkham, Khan and Alam (2010) attribute this diversity to the lack of a clear distinction between the terms 'complex' and 'complicated'. In the literature, there are at least 31 definitions of complexity (Gul and Khan 2011). In systems theory, the term complex refers to a system that is composed of interrelated subsystems, each of which is hierarchic in structure. In practice, commonly used synonyms for the term complex are difficult, complicated, intricate, involved, tangled, and knotty (Whitty and Maylor 2009). The term complex is perhaps used because of the lack of a more appropriate expression describing the interrelated features that affect the project life cycle and subsequently complicate decision-making. As a result, there are many perceptions of the meaning of complexity.

Broadly speaking, efforts to understand complexity in current project management literature can be grouped into three classes:

1. attempts to examine complex dynamic systems in terms of adaptability, non-linearity, emergence, feedback, self-organizing, and dependency, and to determine how these characteristics can be used to understand singular or multiple project environments (Aritua, Smith and Bower 2009)
2. studies that examine single elements, factors, or sources, or patterns that contribute to project or managerial complexity (summarized in Table 3)

3. studies that include efforts to propose or examine methods, processes or conceptual models that deal with one or several complexity factors.

**Table 3** Elements of project complexity in project management literature

| Authors   | Factors or elements of complexity   |
|---|---|
| Baccarini (1996)  | Two dimensions of complexities: organizational and technological complexity. Within each of them, Baccarini (1996) distinguishes between the number of elements (differentiation) and the degree of connection amongst those elements (interdependency)   |
| Williams (1999)   | Two complexities: structural complexity (number of elements and their interdependence) and uncertainty about goals and methods  |
| (Tatikonda and Rosenthal 2000)                              | Suggested that complexity contributes to uncertainty, a statement that was later supported by Remington, Zolin and Turner (2009), who argue that uncertainty causes technical complexity, while goal complexity causes uncertainty. Therefore, existence of uncertainty is not a good reason to consider a project as 'complex', because small projects can be classified as a complex category by this definition (Whitty and Maylor 2009)                   |
| (Geraldi and Adlbrecht 2007)                                | Three types of complexities: complexity of fact (caused by size and dependency between tasks), complexity of faith (originated because of newness of the project), and complexity of interaction (interfaces between people and organizations, including aspects such as politics and ambiguity)  |
| Maylor, Vidgen and Carver (2008)                            | Introduced dimensions of managerial complexities: Mission, Organization, Delivery, Stakeholders, and Team – with subcategories  |
| (Remington, Zolin and Turner 2009)                          | Identified several factors that increase the level of complexity experienced (severity factors)   |
| Bosch-Rekvelde, Jongkind, Mooi, Bakker and Verbraeck (2011) | Classified a large number of contributors to complexity (40 elements in total) in three main groups: Technological, Organizational and Environmental (TEO framework)  |
| Hussein (2012)  | Distinguished between complicated situations and singular elements: singular elements include number of stakeholders, number of tasks, interdependencies between tasks, diversity of languages, diversity of objectives, diversity of working practices, uncertainty regarding market situation, and uncertainty about objectives; complicated situations describe the consequences of having one or more of these elements on the project management effort. |

The main thesis of these studies suggests that current project management methods fail to appropriately deal with complex projects (Thomas and Mengel 2008, Müller and Turner 2010). However, some authors believe that complexity does not necessarily require sophisticated and extra-ordinary control

mechanisms. For example, Whitty and Maylor (2009) argue that just because a project is called complex, it does not necessarily mean that complex managerial tools and techniques are required for its control.

## 2.1 Organizational complexity

Projects can involve either individuals or multiple individuals. However, due to the sophistication and technical complexities of most products or services, projects usually involve multiple individuals, multiple organizational units, and multiple stakeholders. The multiplicity, as well as the diversity of stakeholders could give rise to organizational complexity.

As indicated by the findings listed in Table 3, organizational complexity is one of several dimensions that causes complexity or complications in projects (Baccarini 1996, Williams 1999, Bosch-Rekvelde, Jongkind, Mooi, Bakker and Verbraeck 2011, Hussein, Pigagaite and Silva 2014). Organizational complexity arises because of the magnitude and diversity with regard to the suppliers, the internal and external resources, and the skills needed in order to achieve the project objectives. Diversity reflects the degree of variation among stakeholders or within the project scope.

Diversity of stakeholders include diversity in their geographical location, their national culture, their working practices, their awareness of objectives (goal perception), and variety of skills or disciplines used in the project. This notion of diversity corresponds with the concept of differentiation described by Baccarini (1996). Clearly, the extent of this organizational complexity will vary depending on the complexity of the project's end product. A sample case, *Development of a nationwide biodrugs register*, shown in Box 1, demonstrates facets of organizational complexities and shows some of its consequences. The sample case shows that dealing with organizational complexity requires both time and effort to align different expectations. Alignment is important on all levels in order to create a common understanding of the purpose and scope of the project as well as to establish a common project culture.

**Box 1 Development of a nationwide biodrugs register**

The goal of this project is to establish a nationwide register for biodrugs. The purpose is to obtain detailed data about the use and effectiveness of these biodrugs, and then make the data available for research and further development. In order to ensure success, it was therefore essential that the involved health institutions and their employees in the project committed themselves to the practice of actually collecting and registering these data. A source of complexity in this project was the large number of specialists involved in the project. In addition, these specialists belonged to different health and research institutions. They therefore had different working cultures as far as registration was concerned.

Considerable time and effort have been used to harmonize and establish a common working practice for collecting and recording data. These efforts were further complicated by a lack of understanding about the benefits that the project could achieve among the participated institutions. There was also uncertainty (lack of knowledge) about legal requirements to which the project had to adhere. The main effort of the project management was to align the project upward and downward. For the steering group that was willing but unable or unsure about objectives/expected impact of the project, the alignment was upward. The project was aligned downward with the partners in order to harmonize the working practice and to agree on project scope. These efforts required the implementation of robust communication processes, establishing a better meeting culture, and a better understanding of group processes, and finally, willingness to swallow one's own pride.

**2.2 Transformation**

Transformation or change is a broad and abstract concept, and it is emphasized by many researchers as a key attribute of project assignments (Cleland 2001). Change is about altering all or parts of the 'now situation' to a new desired state using the product, service, or result that the project was initiated to deliver (Gareis 2010). The need for transformation or change is not evident in all types of projects, but it is a fundamental concept in restructuring projects, and in IT projects initiated to improve existing working processes. In this context, change may mean changing the way employees work to rationalize existing operational processes. Change can also mean the development of new products or processes in order to eliminate quality defects in the products or services that an organization offers. People play a vital role in this process of change due to their potential for resistance or opposition to change (Ford, Ford and D'Amelio

2008). The degree of change can be very extensive, such as in restructuring projects. In some cases the change is limited to a small improvement in the existing product or process. Kerzner (2013) argues that restructuring projects are considered among the most complex projects. The inherent complexity in restructuring projects is due to the human element in these projects, since there are many needs, expectations, and requirements to satisfy. These expectations and requirements could be related to project execution or project outcome or to both. Among the cases that demonstrate this dimension is *Fast-track joint replacement surgery*. An excerpt from the case description is provided in Box 2.

**Box 2 Project description excerpt: Fast-track joint replacement surgery**

The purpose of the project was to improve the existing workflow in joint replacement surgery in a regional hospital in Norway. The goal was to increase the number of surgeries per day without affecting the safety of the patients. Other expected benefits included reducing the number of days a patient had to stay at the hospital before returning home.

There were many stakeholders in the project, since it affected many other clinics and departments with many professions: anaesthetists and nurse anaesthetists, orthopaedic surgeons and physicians, physiotherapists, theatre nurses and technicians, cleaning assistants, intensive care nurses, nurses in the outpatient clinics, nurses in the sleeping ward, sterile services technicians, and office service providers. A large project group was appointed to safeguard all functions, with 15 members representing all affected entities. Most of the project members were line managers with a high level of expertise in their field. Additionally, other projects within the organization were affected by the project.

The case demonstrates the large scope of changes that had to be implemented to streamline the treatment of joint replacement surgery in a regional hospital in Norway. The case description mentions a number of challenges that are typically associated with transformation, such as establishing commitment and loyalty to decisions taken during the project.

## 2.3 Business perspective

The concept of transformation is not limited to the changes concerning the way employees work to rationalize existing operational processes. In a wider perspective, transformation means that projects are a means to realize business

objectives or strategies (Srivannaboon 2006, Winter, Smith, Morris and Cicmil 2006, Shenhar, Milosevic, Dvir and Thamhain 2007, Ingason and Jónasson 2009, Williams and Samset 2010, Klakegg 2015). The business or strategic perspective therefore plays a key role in the selection, allocation, and prioritization of resources to various projects in which an organization operates (Turner 2006). The importance of a project in an organization may therefore vary depending on the impact the project has on the business or strategy. Among the cases demonstrating this dimension is *Cost optimization of a product*. The main objective of the project was to exploit a market window through a quick upgrade of an existing product to extend its lifetime. The upgrade was therefore a deliberate strategy to solve a problem pending the development of new technology or new product. The main intention was to secure market share and earnings and thus the survival of the company. One of the main reasons for the challenges encountered in the case study was failure to allocate proper human resources to the project.

Almost every case presented in this book shows that proper alignment of project purpose with the business objectives or strategy is a key success factor. Such alignment requires a clear description of the outcome of the project for business, and how projects should contribute to the growth or survival of the parent organization. Cooke-Davies (2002) goes even further and suggests that one of the most important conditions for organizational success is to align project success criteria to business objectives or strategy.

## 2.4 Constraints

Another important feature of project assignments is that they are accomplished within one or several constraints, such as time constraints, budget constraints, specifications or resource constraints (Rolstadås 2006, PMBoK 2013). A time-constrained project implies that the project must be completed within a specified time or deliver to the market on a certain date to achieve a benefit (Pinto 2013). The time window for some of these projects is critical due to the market situation or because of requirements from the client or public authorities, such as the case *Installation of underfloor heating in a sampling cabinet*. Other constraints may include compliance with strict quality standards from a client. *Construction project B4* is an example of a project characterized by many con-

straints. An excerpt from the case description is given in Box 3. This case project had to adhere to the following constraints:

- Reduce construction time from 18 months to 14 months
- Deliver the project within a budget of NOK 131 million
- Zero defects
- A self-imposed subjective constraint by project team to deliver the best project in the area.

**Box 3 Project description excerpt: Construction project B4**

This case is about the construction of 60 apartments in Building Phase 4. The project duration was originally stipulated as 18 months and had a budgeted construction cost of NOK 131 million. The developer company 'X' was also responsible for managing the construction project. The management team consisted of six employees: one project manager, one engineering design manager, three building services managers (one of whom had the main responsibility), and one customer coordinator.

The same project team had participated in the implementation of phase 3 (B3), which was a fairly similar housing project to project B4. The construction time for B3 was 18 months, but due to a very hectic period at the end and handover of apartments that had some errors and omissions, the deadline was barely met. The project execution did not run well, and after the project was finished, the project team suffered from internal tensions and poor motivation.

Additionally, due to the poor results at the earlier stage of construction, there were instructions by the senior management in company X in order to reduce the construction time from 18 months to 14 months. This was a conscious choice, as it was felt that it would be realistic to achieve the deadline, and hence there would not be any uncontrolled risks as long as there was a 2 to 3 months buffer in the contract. The team at B4 therefore had to 'reorganize' itself, and the project manager faced a major challenge to improve the low morale, and to meet the requirements of a significantly shorter construction time than in the previous building phases. The administration, too, consisted of fewer people than in B3, and therefore the construction time of just 14 months for B4 was initially considered very demanding.

The final measurable indicator of quality was the number of errors and omissions at handover, and the target for B4 was zero defects and hence satisfied customers. Moreover, the project team had set itself a goal of executing 'the best project in the area', meaning it would be better than the previous three stages of the construction in terms of quality, time, and cost.



## 2.5 Uncertainty

Uncertainty is an inevitable aspect of most projects, but even the most proficient managers have difficulty handling it (De Meyer, Loch and Pich 2002). Novelty is considered a major source of uncertainty in projects (Tatikonda and Rosenthal 2000, Loch, De Meyer and Pich 2007).

There are many facets of uncertainties in projects and there are many causes of uncertainty (De Meyer, Loch and Pich 2002, Pich, Loch and De Meyer 2002, Sommer and Loch 2004, Hällgren and Maaninen-Olsson 2005, Atkinson, Crawford and Ward 2006, Perminova, Gustafsson and Wikström 2008, Ward and Chapman 2008, Lenfle 2011, Brady, Davies and Nightingale 2012, Cruz and Marques 2013). However, there is a common consensus that uncertainty is affected by many factors, but can be perceived differently by different people working on the same project. According to Geraldini and Adlbrecht (2007) some aspects of uncertainties are more about faith than facts. Atkinson, Crawford and Ward (2006) distinguish between three types of uncertainties in projects:

1. Uncertainty in estimates: includes lack of assurance regarding how much time and effort will be required to complete a particular activity. The sources of uncertainty may result from vagueness, ambiguity, lack of data, assumptions, known and unknown sources of bias (Buehler, Griffin and Ross 2002), limited control of relevant project players, and ignorance about how much effort it is worth expending to clarify the situation.
2. Uncertainty associated with people. This includes uncertainty regarding the willingness and ability of the project parties to commit or perform as required or expected. The uncertainty arises from several factors associated with each project party, including: the objectives and motivation of each party, the quality and reliability of work undertaken, the extent to which each party's objectives are aligned with the project owner's objectives, the actual abilities of the party, and the availability of the party.
3. Uncertainty associated with managing each stage in the project life cycle. Sources of uncertainty include proper allocation of resources, determining the level of follow-up, and determining routines for control changes.

Cleden (2009) argues that in order to manage uncertainty the project manager must ask the right questions, be continually sceptical of the answers received and act where possible only on the basis of impartial evidence. I have identified examples of questions that reflect sources of uncertainties in project management (Hussein 2012), and these are listed in Table 4.

**Table 4** Examples of questions that reflect sources of uncertainties. Source (Hussein 2012)

|   |  |
|---|--|
| How to get the stakeholders to understand the potential benefits of the project   | How to make sure that all the stakeholders feel that their diverse expertise is included |
| How to manage communication in the light of diversity   | How to handle interface between the involved parties                                     |
| How to align the project to motivate people to commit to the project  | How to create a common culture among diverse working practices                           |
| How to reduce or eliminate personal conflicts   | How to guide or support inexperienced human resources                                    |
| How to define and agree upon priorities of task   | How to measure and report progress (identify what has been completed)                    |
| How to manage adjustments, rework, and changes  | How to manage time, including finding time to meet, to create a better meeting culture   |
| How to manage practical tasks including: identifying the type of technology/solution needed to achieve the requirements, getting many subsystems to work together, adapting the product to satisfy the requirements, and ensuring quality | How to create and maintain a high level of motivation among project members              |
| How to acquire appropriate expertise/resources  | How to manage and communicate approval processes with external stakeholders              |

The above types of uncertainties are classified by Ramasesh and Browning (2014) as the Known–Unknown uncertainties and can be addressed through the conventional techniques of risk and opportunity management. Ramasesh and Browning (2014) have also studied the unrecognized uncertainties known as Unknown Unknown or Unks. Unks. They argue that the driving factors for failing to recognize the unk. unks. could be attributed to, among other things, behavioural issues such as overreliance on past experiences, biases, heuristics and dysfunctional project culture.

Evidence from cases suggests that experience and competence, in addition to good processes to uncover potential sources of uncertainties such as risk management, trust and flexibility combined with awareness about biases and

heuristics, are important perquisites in order to address uncertainty successfully.

Among the cases that show this dimension is the case *IT tools for optimizing well drilling*. An excerpt from the description of the case *IT tools for optimizing well drilling* is provided in Box 4. The project consisted of two subprojects. The first project was an ordinary, deliverable project without any development of new technology. Project 2 was far more extensive and had a far greater degree of innovation and uncertainty. Additionally, Project 2 start-up was delayed by 2 years, and this contributed further to the uncertainties regarding the scope of the work and the supplier's commitment to the project. The case shows that delays and lack of trust regarding commitment from the client also had an impact on the supplier's willingness to commit and prioritize resources for the project.

**Box 4 Project description excerpt: IT tools for optimizing well drilling**

Drilling is expensive and time consuming, and the client (an oil service company) had established a department that dealt with innovation in the field. Managers from the client company and managers in a supplier company had decided to find out whether a newly developed IT solution could be adapted to the needs of the client. The contract was signed after several very productive workshops involving experts in different areas of both organizations, who had arrived at a common vision of how to optimize well drilling.

The supplier was to deliver the existing solution, which had been implemented by other clients, as well as a module that had been especially developed for the client. During the meetings this module was specified and a rough estimate was quoted.

The project was set up as two subprojects, of which Project 1 was to implement existing solutions and train clients in the use of the solution. Project 2 was to develop special modules and was estimated to require c. 15,000 hours. Project 1 followed a fixed project plan that had been examined thoroughly by several earlier clients, with no developments, only configuration and implementation.

The Project 2 started two years after the specification of the new module was prepared. This pause was a source of several challenges. The team of experts who had worked on the specifications with the client was assigned to work on other projects, and none of the client's project teams had any knowledge of how the specifications had come into existence.

The manager responsible for the project department in the client organization was the only person who had any knowledge of the specifications, and although he

was supportive, he was also responsible for many projects and was not technically minded. The specifications were high level and had to be broken down to make sense, which was a very lengthy and painstaking process since there was no longer a common understanding of what had been agreed. When it became clear that the client wanted to have a new round of specification work, the whole project was shifted by six months, and the resources in the supplier firm were assigned to other tasks. The top management was not willing to hire new people due to the inherent risk in the lack of anchoring in the client organization, and the risk that the scope was unclear due to the re-evaluations performed by the client.

When the client was ready to re-initiate the development project, several key resources were tied up in projects that the head of development regarded as having equally high priority, and this time the project was delayed from the supplier side. Since supplier was not as involved in this round of work on the specifications as earlier, the project seemed unfamiliar to the key persons who had worked with the client in the original phase. Thus, there was no longer ownership of the activities that were to be done.

Eventually, the project got underway, only to be discovered that the changes to the specification were so extensive that the time estimates for some of the tasks differed greatly. Far more time and resources had been used than could be invoiced under the terms of the contract, which led to dissatisfaction among the management in the supplier company. In addition, the client changed the project manager during Project 2, and as a result the project lost its anchoring and competence, as well as the client's trust that had been built up through Project 1.

When about one-third of the project had been completed, it was abandoned by the client. Ownership of the client company was taken over by a new chairperson, who no longer saw the purpose of Project 2 and was of the opinion that Project 1 was valid at the time. The vision for the project was not transferred with ownership, and there was no support in the client's organization to ensure the project's success. The project was never resumed.

## 2.6 Correlations between project characteristics

In 2016 I used a Web-based survey that was sent to over 1500 project practitioners in order to investigate possible correlations between project characteristics. The survey respondents were asked to recall a project that they had thorough knowledge of, and to rate the degree of listed characteristics on a scale from 1 to 10. A total of 47 respondents delivered valid responses. A correlation test was

then conducted using an SPSS software package, the results of which are shown in Table 5.

The results of the test revealed that uncertainty and organizational complexity were correlated with a correlation coefficient of 0.462 and with a p-value of (0.01), which can be considered a significant correlation. This finding supports earlier findings by Tatikonda and Rosenthal (2000), who suggested that organizational complexity contributes to uncertainty because complexity makes it harder to recognize all possible outcomes and thus leads to a higher likelihood of unknowns. A statement that was supported later by Remington, Zolin and Turner (2009) and by Ramasesh and Browning (2014).

**Table 5** Correlations between various project characteristics examined with Pearson's correlation coefficient

| Characteristic            | Organizational complexity | Transformation | Impact on business | Constraints   | Uncertainty |
|---------------------------|---------------------------|----------------|--------------------|---------------|-------------|
| Organizational complexity | 1                         |                |                    |               |             |
| Transformation            | 0.218 (0.46)              | 1              |                    |               |             |
| Impact on business        | 0.246 (0.355)             | 0.493 (0.006)  | 1                  |               |             |
| Constraints               | 0.35 (0.854)              | 0.322 (0.083)  | 0.368 (0.045)      | 1             |             |
| Uncertainty               | 0.462 (0.01)              | 0.131 (0.490)  | 0.246 (0.191)      | 0.601 (0.000) | 1           |

Diversity of stakeholders leads to contradictory expectations. The task that faces project managers is to act in accordance with these contradictory expectations since they constitute the point of departure for the project. These contradictory expectations therefore give rise to several questions that require proper decision-making.

Uncertainty is intensified by another characteristic in projects: the imposed constraints. Table 5 shows a strong correlation between uncertainty and constraints with a correlation coefficient of 0.601 and p-value of 0.000. Constraints represent external and internal conditions that limit the project manager's degree of freedom. One might therefore conclude that a major cause of perceived uncertainty in projects is the presence of a high number of constraints combined with a high level of organizational complexities.

The results from the correlation test show a strong correlation between transformation and impact on business. This correlation implies that the purpose of transformation is to achieve either some business objectives or some strategic objectives. For this reason, Turner (2009) combines these two under one characteristic, since business objectives will only be achieved if the intended transformation has been implemented successfully. However, I opted to differentiate between the two characteristics because in some projects the need for transformation is either not evident or is less significant. For instance, in the case project *Relocation of a warehouse*, the project had a significant impact on business, but it did not result in a fundamental change of working culture or working environment for the company's staff.

## 2.7 Project characteristics and success

As I have indicated in the introduction, the content of this book is not just limited to using the cases as a tool to communicate idea and concepts, but the book also presents new insights. What are these new insights and how should they contribute to manage projects in a better way?

In order to explain the need for these new insights let us consider two cases: *Relocation of a warehouse* and *Construction project B4*. For each project I asked several groups of business professionals to assess the extent of each characteristic on a scale of 1 to 5, where 1 meant little or negligible and 5 meant very substantial. For example, from description given in the case *Relocation of a warehouse*, it is apparent that the project had great impact on the organization because the supply function from warehouse to shops was extremely important as the stores did not keep buffer stock. Any delay in the supply of goods would have had a negative impact on a store's sales. The project had relatively moderate organizational complexities and no particularly strict restrictions on resources or costs. The description also shows that the project had a low degree of uncertainty, since the firm had completed a similar project in 2012 and had acquired a thorough knowledge of project complexity. Furthermore, the project would not have caused any significant change with regard to the way business was conducted after the completion of the relocation of the warehouse.

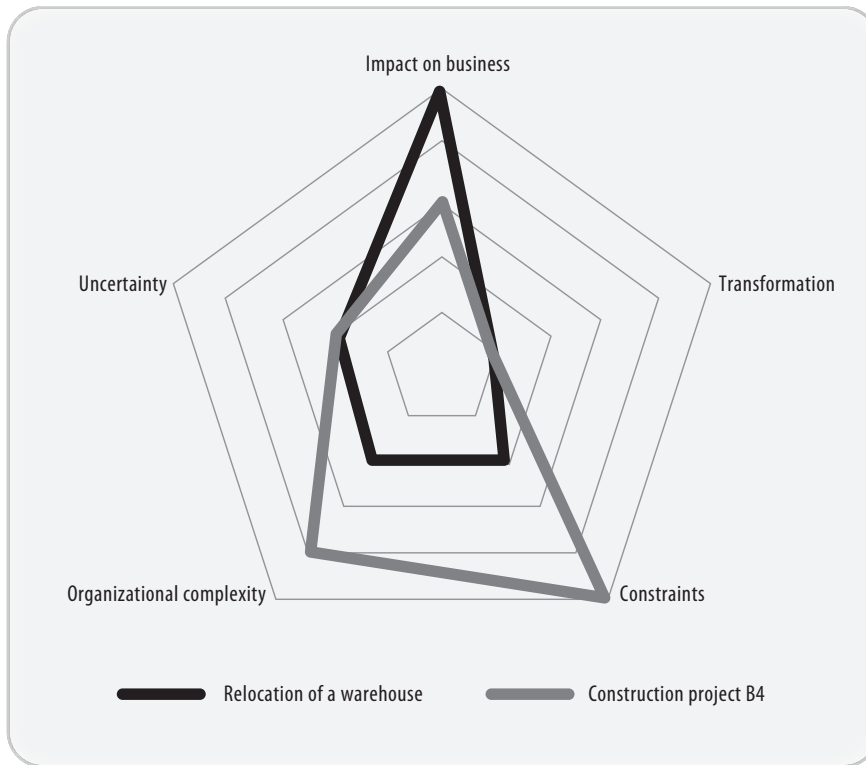


Figure 1 Comparison of the extent of project characteristics in two projects

For comparison, I considered the project *Construction project B4*. This project was characterized by high level of constraints (clear instructions for the reduction of completion time and zero defects), and the project had a moderate level of uncertainty as it was Phase 4 of a larger construction project. Also, the project was important for the builder, and it had a considerable amount of organizational complexity because of the large number of contractors and sub-contractors involved. The different characteristics of these two projects can be illustrated by a spider diagram, as shown in Figure 1.

The diagram shows that the project *Relocation of a warehouse* has significant impact on business, while the project *Construction project B4* is organizationally complex and will be executed under a very tight schedule and with zero errors. Obviously these two projects require different emphasises or approaches not

because they belong to two different domains, but rather because they will be executed in different contexts.

The analysis of project characteristics of each project case described in the book, and the results of the analysis of success factors or failure factors for each case provide valid grounds to suggest that each project characteristic requires some critical ground rules that must be adhered to throughout the project life cycle in order to increase the probability of success. These ground rules describe the things that must be right in order to succeed, and they are referred to in project management literature as critical success factors (Rockart 1980). In Chapters 6 and 7, I explore the concept of success in projects in details and present the findings from the cases with regard both to how success is evaluated and to the possible links between success factors and project characteristics.



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