Effective Innovation in Practice – Opportunities for Hands-on Learning
Additional case-based and advanced assignments with elaborations

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"Thinking is easy, acting is difficult, and to put one's thoughts into action is the most difficult thing in the world." Johann Wolfgang von Goethe (1749-1832)

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Additional case-based and advanced assignments with elaborations

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Preface

In January 2010 the textbook *Effective Innovation in Practice* was launched, resulting in many positive responses from lecturers, students and professionals. One of these came from Sebastian Piest, both a professional and a part-time business engineering student, who in August 2010 came up with the very challenging idea of writing a 'workbook based on the textbook'. It took nearly one year for us to be in a position to show the world the results of our writing process, a process which we both found to be very instructive. The cooperation in writing the book has been very satisfying and our various discussions covering innovation in practice have resulted in, what we believe are, several new-to-the-world ideas regarding technology-oriented innovation. We hope that our readers will feel the same.

In honoring Goethe's quote, our uppermost wish is to move students from a thinking phase into an active phase by challenging them with case-based and advanced assignments.

Through the use of this workbook, which includes a variety of challenging 'learning opportunities', we want to create a rich learning context for students who wish to learn how to cope effectively with the complex innovation landscape of organizations. We wish you a good and instructive journey in using this workbook in conjunction with the textbook. We hope that working through our learning method provides a new opportunity for hands-on learning in relation to effective technology-oriented innovation in practice. Through the use of both books, students will definitely become more successful innovators.

Contents

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Overview

In order to extend the value of the textbook in the most effective manner, the structure of the textbook is maintained. Based on the content of the textbook, each chapter is carefully designed to apply all of the concepts and tools on your own by basing it on the TDE Systems case. All chapters are developed to achieve the learning objectives related to four subjects (or combinations of these): Business Management and Research, Strategy Development, Technology Development and Innovation. All chapters end with a checklist to evaluate your learning process.

Chapter 1 is aimed at applying the basic concepts and ideas behind the terms 'innovation' and 'technology' and relating these terms towards the type of innovation TDE Systems is facing and currently dealing with. Since the definition of innovation is not available in a uniform and generally accepted way, you are challenged to develop your own definition based on the theories described in the textbook. In addition to innovation, you will investigate which initiatives are currently in progress within the TDE Systems organization and be required to conclude what the innovation risk space of the company is. Based on applying the basic concepts and tools of chapter 1, you will use a checklist to decide which learning context is most effective with regards to your own learning style and individual learning objectives.

Chapter 2 is aimed at mastering the basics of preparing business management research and will start with the personal learning objectives you have formulated in chapter 1. Step by step you will apply the individual concepts and tools found in the textbook in order to design your own research proposal. In particular, the basics of the different research steps and the regulative cycle for problem solving will be applied. The assignments in chapter 2 are designed to further explain the theory and make it operational for use in practice. When mastering all the basics you will be asked to write a research proposal. After completing all assignments you will be asked to evaluate your learning objectives from chapter 2 and set new objectives for the further development of knowledge and skills.

Chapter 3 is aimed at better understanding the essence of technology and innovation by exploring some historical facts and reviewing contextual factors. Specific learning objectives of this chapter are related to the knowledge and skills required to describe and analyze historical and modern contextual and internal factors. This concerns influencing organizations' innovation behavior and having knowledge of a set of concepts through which to carry out technology-oriented innovation management research. More specifically it concerns having the capability to use classification systems for framing organizations into sectors, and for obtaining an overview of main dimensions and indicators that organizations can use to arrive at conclusions regarding their innovation

performance. In general it involves getting a better view on the following innovation-related subjects: intuition, creativity, invention, technology and science.

Chapter 4 is aimed at understanding both the current and future state of an organization as well as the complex path between those two states. Firstly you are challenged to describe your way of viewing organizations in detail in order to understand the importance of knowing how to look at innovation and innovating organizations. You will define your way of looking at management and organizing as well as setting the requirements for innovation processes and structures. In addition to the models and theories, you will be introduced to metaphorical thinking. Secondly you will apply the proposed models for diagnosing an organization and its surrounding. Through several perspectives you will apply models and theories in much more detail, and form your opinion on the use and effectiveness of each. The chapter is highly focused on learning activities and will let you develop yourself through both single loop and double loop learning activities, whilst establishing the fundamentals for deutero learning.

Chapter 5 is aimed at gaining a better understanding of the relationship between technology-oriented innovation and strategy development. This chapter is intended to achieve the learning objectives at a more integrated level. Specific learning objectives of this chapter are related to the knowledge and skills required to describe and analyze external and internal factors. These factors relate to the knowledge of a set of concepts for developing a proper business plan and the capability to carry out strategic analysis as a basis for developing a technology-oriented innovation strategy. The concepts of chapter 5 will be applied in more detail in chapter 6.

Chapter 6 is aimed at gaining a better understanding of the innovation landscape and complex internal and external aspects involved. Possible approaches, mapping tools, and powerful concepts for exploring and 'coloring' the innovation landscape are dealt with. This chapter is particularly developed to achieve the learning objectives relevant to the subject of technology development, as a substantial part of innovation. Specific learning objectives of this chapter focus upon the knowledge and skills for carrying out research activities related to the innovation landscape.

Chapter 7 is aimed at gaining advanced insights into ways of becoming a more effective innovating organization and is based on all the chapters of the textbook. This chapter is developed to achieve an integrated way of looking at organizations. It helps you to answer the question: how to become a more effective innovating organization? Learning objectives of this chapter are related to: developing knowledge and skills in an integrated way, research activities aimed at creating a more effective innovating organization including product design and process design.

Guideline for effective learning

With regard to the elaborations presented in this workbook, we can distinguish four main types:

1. **Example elaboration:** After reading the textbook, this type of elaboration can help you to understand what quality and extent of answers we expect. The most important details are shown in this elaboration;
2. **Start-up elaboration:** In this elaboration type we show just a part of an outcome followed by an explanation with the steps that are needed to be able to deliver a more complete and proper elaboration. Sometimes these elaborations incorporate frameworks/ checklists that need to be filled in;
3. **Methodological focused elaboration:** This elaboration type explains the methodological path needed to be able to derive a proper outcome;
4. **Discussion activating elaboration:** In this type of elaboration (in combination with the corresponding assignment) we want to stimulate discussions in classrooms. An outcome has been given but this should be seen as just a starting point for further in-depth discussions between lecturer and students, or between students.

For all types of elaborations the reader is advised, after first reading the assignment, to carefully read the corresponding sections in the textbook referred to in brackets alongside each assignment. Sometimes you can find supporting material in the appendix of the chapter in which the assignment is located.

Although all assignments are centered on the TDE Systems case, the reader is advised to also use additional cases involving other sectors than the TDE Systems own sector. As a first step, the NACE classification system of economic activities can assist in finding other cases. After using a few cases, the reader is encouraged to search for opportunities, assisted by schools, to apply these assignments in a real life environment. Therefore we advise you to try to find organizations that are able to provide students with enough suitable information to be able to work through the assignments.

To be able to undertake the assignments properly, sometimes you need further information. We are aware of this need, but decided to use just a limited literature list in order to stimulate readers to improve their skills in terms of executing proper literature research. To be able to do this effectively you can find a template for a search plan below. It is strongly advised to use this template, including the examples between parentheses, before carrying out any literature research.

Subject of the literature research
(Time to market)
Main question to be answered by the literature research
(What kind of problems are related to firms' time to market and how to deal with these problems in practice)
Boundary of the literature research
(Only English articles will be searched for and the time period 2009-2011 has been chosen as preferred period)
Searching terms
(First: time to market and TTM; second: time to market as a subject in an article as well as in the abstract; third: time to market related to the terms product lifecycle, launching, concurrent engineering)
Catalogs
(University Library)
Journals
(Journal of Innovation Performance: N.B. this is an example that does not exist)

Chapter 1
Introduction

> "I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do." Leonardo da Vinci (1452-1519)

These words of Leonardo da Vinci are the key message that are contained in this book. The knowledge base which the textbook provides is not enough; we must apply this knowledge in order to obtain real value and achieve better business results in practice.

Specific learning objectives of chapter 1 are:
- Mastering the basic concepts of innovation and technology;
- Recognizing and describing the innovation phase that TDE Systems is currently in;
- Recognizing and describing the types of new combinations which are to be made;
- Applying the model of risk space;
- Creating initial ideas about the innovation landscape.

Reflection

To check if you can apply the basics of chapter 1 fill in the checkboxes:
- ❏ I know which learning style is the most effective for me.
- ❏ I have defined individual learning objectives.
- ❏ I can name four authors who have given their definition of innovation.
- ❏ I have transformed different definitions of innovation into my own definition.
- ❏ I have identified the phase within the innovation process that TDE Systems is currently in.
- ❏ I can name four authors who have given their definition of technology.
- ❏ I have transformed different definitions of technology into my own definition.
- ❏ I can name three modern words which are related to technology.
- ❏ I have merged innovation and technology into my own definition of technology-oriented innovation.
- ❏ I can name the three risks factors of the risk space.
- ❏ I have recognized the critical process steps associated with moving towards effective innovation.

Design of business management research

"Arriving at one goal is the starting point to another." John Dewey (1859-1952)

Mastering the basics of chapter 1, is the starting point for chapter 2 which will focus upon the in-depth knowledge that is needed for undertaking business management research in practice. The specific learning objectives of chapter 2 are:

- Designing a research proposal;
- Applying the regulative cycle;
- Forming an opinion on the importance of the research methodology;
- Analyzing a problem systematically;
- Evaluating your learning objectives (assignment 2, chapter 1) regarding 'management and doing business management research'.

All of the chapter 2 assignments together have to be seen as a single methodologically focused approach with the main goal being to support a student's learning process regarding the development of a proper research proposal. The regulative research cycle is the point of departure here, keeping Dewey's quote in mind. Students can use the chapter 2 assignments that are provided as a first step in deriving a proper research proposal based on a careful study of the TDE Systems case.

It is not possible to derive a complex research proposal in a single pass. It will need an iterative process: one step forwards, may be two steps backwards, and then going into next cycle. We expect that the assignments and answers provided will efficiently support the extremely complex process required for students to ultimately deliver a proper research proposal according to the requirements presented in chapter 2 of the textbook.

Sample File ©Maj Engineering Publishing

Reflection

To check if you can apply the basics of chapter 2 fill in the checkboxes:
- ❏ I know which steps are involved when undertaking business management research.
- ❏ I have demonstrated how to apply these research steps on the TDE Systems case.
- ❏ I know which phases are described in the regulative cycle.
- ❏ I have applied the regulative cycle on the TDE Systems case.
- ❏ I have formed my opinion on the importance of the research methodology.
- ❏ I have analyzed a problem systematically and applied the tools and methods involved.
- ❏ I can judge when there is a need for preliminary investigation.
- ❏ I can explain the terms 'problem ownership' and 'problem statement'.
- ❏ I have designed a research proposal for the TDE Systems case.
- ❏ I have evaluated my research proposal for the TDE Systems case through the use of checklists.
- ❏ I have achieved my personal learning objectives and set new objectives for further development.

Historical events related to science, technology and innovation

> "The intellect has little to do on the road to discovery. There comes a leap in consciousness, call it intuition or what you will, and the solution comes to you and you don't know how or why." Albert Einstein (1879 - 1955)

The quote of Albert Einstein, a genius and a great thinker with ideas that have had an enormous impact on our society, tells us that the use of the power of reasoning in discovery processes that are aimed at creating solutions related to problems in practice is relative. In addition to using only an analytical thinking process, the use of intuition is also recommended by Einstein, even if you don't know how or why the solution will arrive. While being productive, certain intuition-based solutions will probably come to you.

Intuition, in short, is the power or faculty of attaining direct knowledge or cognition without evident rational thought and inference (Webster Dictionary). When applied to innovation, questions could, for example, be developed by learning from innovation practices and by interpreting historical innovative events and important contextual factors such as: the economic situation, living standards and governmental plans for stimulating effective innovation.

The aim of this chapter is to provide a better understanding of the essence of technology and innovation by exploring historical facts, by reviewing contextual factors and by introducing in more detail a few important technology-oriented innovation concepts, derived from Management Science literature.

Specific learning objectives of this chapter are related to:

- Knowledge and skills required to describe and analyze the historical and modern contextual factors and internal factors that influence an organization's innovation behavior;
- Knowledge of a set of concepts required to carry out technology-oriented innovation management research;
- The capability to use classification systems for framing organizations into sectors;
- Main dimensions and indicators that organizations can use to measure their innovation score according to innovation scoreboards;
- A clearer understanding of the following innovation-related subjects: intuition, creativity, invention, technology and science.

Reflection

To check if you can apply the basics of chapter 3, fill in the checkboxes:
- ❏ I know the relationship between technology and time areas expressing human activities.
- ❏ I can name authors (and their concepts), who developed important technology-oriented innovation concepts.
- ❏ I can reproduce the old and new technology definition.
- ❏ I can explain why and how the NACC classification system has to be used.
- ❏ I can explain, based on the dynamic innovation system, the main figures involved in innovation processes at a country level.
- ❏ I can name seven dimensions relevant to European innovation performance.
- ❏ I can name the different kinds of Aristotelian knowledge and explain them with concrete examples.

Managing effective innovation in practice

> "It all depends on how we look at things, and not how they are in themselves."
> Carl Jung (1875-1961)

Carl Jung warns us against trying to understand only the essence of innovation, the success of effective innovation in practice strongly depends on the way innovators look at things related to innovation.

This chapter will offer you tools and concepts for managing innovation more effectively in practice, based on modern business management sciences and is aimed at achieving the following learning objectives:

- Recognizing the type of innovation you are facing;
- Learning to understand better how to manage an innovating organization;
- Developing your point of view when analyzing organizations;
- Applying instruments for a better understanding of innovating organizations;
- Applying the changing framework for innovation.

Reflection

To check if you can apply the basics of chapter 4 fill in the checkboxes.

❏ I know how to determine the innovation capabilities of an organization.
❏ I have developed criteria to measure the innovation capabilities of an organization.
❏ I can name several examples of different generations' innovation models.
❏ I have found several modern innovation models.
❏ I have applied the theory of 4P's of innovation space.
❏ I know which type of innovation suits me best regarding my preferred learning style.
❏ I have formulated my personal principles for the innovation process.
❏ I have learned through single loop and double loop learning activities.
❏ I have set the basics for deutero learning and pinpointed my learning objectives towards this.
❏ I have formulated my opinion and definitions regarding management and organization.
❏ I have described my way of managing and organizing.
❏ I have described my way of viewing organizations.
❏ I have applied the metaphors of Morgan and designed my own metaphors.
❏ I can apply the proposed innovation models, concepts and tools of this chapter on my own.
❏ I have developed a critical approach to the use of innovation models and their effectiveness.
❏ I have designed my own research framework.
❏ I have designed my own process model for innovation.
❏ I have designed an ideal-typical organogram for innovating organizations.
❏ I have designed a change framework to manage the structure of the innovation process.

Chapter 5
Strategic management of technology-oriented innovation

> "However beautiful the strategy, you should occasionally look at the results."
> Winston Churchill (1874-1965)

The quote of Winston Churchill casts doubt on organizational strategic effectiveness in situations where organizations have just an explicit strategy in the form of a strategic business plan. That's not enough! What actually matters is that organizational results are actually achieved in practice, based on a proper and well communicated business plan. According to the 'Plan-Do-Check-Act' (PDCA) cycle (developed by the Total Quality Management guru Dr. W. Edwards Deming) a strategic development process ('plan'-stage), requires as a follow-up the do, check and act elements. You always have to look at the concrete strategic results ('check'-stage) and adjust the business plan ('act'-stage) in the meantime (e.g. once a year). Strategy development is a continuous process.

This chapter is aimed at providing a better understanding of the relationship between technology-oriented innovation and strategy development and the corresponding past, present and future aspects of a company. Innovation activities have to be closely related to the company's strategy. An innovation strategy without a proper business plan will not work effectively. This chapter has been developed to achieve the learning objectives relevant to business and innovation strategy. The specific learning objectives of this chapter are related to:

- Knowledge and skills to describe and analyze strategic external and internal factors;
- Knowledge of a set of concepts required to develop a proper business plan;
- Capability to carry out strategic analysis as the basis for developing a technology-oriented innovation strategy;
- Providing an overview of some relevant subjects related to the development of a business strategy, with the focus on technology-oriented innovation.

Assignment 6:   product-market-technology combinations   (section 5.2)

In the textbook the business definition, from scholars above, is extended to PMT combinations. Draw a table that includes these PMT combinations.

Assignment 7:   PMT combinations using Abell,   (sections 5.2 and 3.2.1)
**   Maslow and Kottler**

Bearing in mind the definition "a business is a set of related product-market-technology combinations", try to discover for TDE Systems the current and future PMT combinations by using Abel's business definition model, Maslow's needs levels and Kottler's product level. Construct a table to show what combinations are possible. Work-out two PMT combinations including the micro CHP and room thermostat.

Assignment 8:   strategy diagnoses against an ideal   (sections 4.6 and 5.2)
**   typical situation**

Use the ideal typical situation, shown in textbook figures 4.14 and 5.3, to work out if the existing TDE Systems organization strongly differs from this ideal situation. What are strategic consequences?

Assignment 9:   general structure of a strategic business plan   (section 5.3)

In textbook figure 5.4: proposed outline structure of a strategic business plan, you can find two general organizational subjects: 'total quality management' and 'planning and control cycle and innovation'. Do you think other 'general' main subjects (each business plan chapter contains one main subject) should be involved? Support your views with well constructed arguments.

Assignment 10: strategy development: (sections 2.2 and 5.3)
**   kinds of regulative research**

If the Board of TDE Systems is developing a business plan according to figure 5.4 in the textbook: proposed outline structure (chapters) of a strategic business plan, what kind(s) of regulative research cycle are they covering?

Reflection

To check if you can apply the basics of chapter 5, fill in the checkboxes:
- ❏ I can explain properly why it is so important to have an explicit and well communicated business strategy.
- ❏ I know the relationship between strategy and technology-oriented innovation.
- ❏ I can explain and apply Abel's Business Definition model based on the TDE Systems case.
- ❏ I can name the authors (and their concepts), who developed important strategic concepts and are relevant for carrying out research when developing a strategic business plan, including an innovation strategy.
- ❏ I can reproduce the strategic communication levels according to Thompson and Strickland.
- ❏ I can explain how, in an ideal typical situation, an innovating organization should be organized.
- ❏ I know the main chapters including the main subjects of a strategic business plan and why they are important to use in such a plan.
- ❏ I know how to express a company's vague vision by using the Balanced Score Card.
- ❏ I am able to explain the essence of a business strategy development process including the concepts and theories involved.
- ❏ I know how to derive a company's critical success factors and core competencies.
- ❏ I know how to set up a PMT strategy including a check for organizational consequences.

Innovation landscape: opportunities, uncertainties, risks and new value creation

> "Thinking is easy, acting is difficult, and to put one's thoughts into action is the most difficult thing in the world." Johann Wolfgang von Goethe (1749-1832)

Applied to the innovation landscape, the quote from Goethe can be interpreted as moving an innovator from a thinking phase into an applying phase. Referring to Kolb's learning cycle, this primarily concerns a converging learning style. According to Goethe's quote, putting one's thoughts into action is not easy and demands an innovative learning environment that makes it possible to create excellent innovation ideas. But don't forget reality. You have to understand that there could be resistance to the processes tasked with delivering new innovation ideas.

This chapter is aimed at providing a better understanding of the innovation landscape and the complex aspects related to the external environment and the organization on its own. Possible approaches, mapping tools, and powerful concepts for exploring and 'coloring' the innovation landscape are given. The specific learning objectives of this chapter are related to the:

- Knowledge and skills to carry out research activities related to the innovation landscape;
- Knowledge of a set of concepts to describe and analyze the innovation landscape;
- Capability to carry out product and process development activities based on the customer value and organization value creation concept;
- Acquisition of an overview of some other relevant organization management concepts related to technology-oriented innovation.

Reflection

To check if you can apply the basics of chapter 6, fill in the checkboxes:

- ❏ I know what is meant by the innovation landscape.
- ❏ I know what levels can be distinguished in this landscape.
- ❏ I can name the authors (and their concepts) who developed important concepts related to the innovation landscape of organizations.
- ❏ I can explain what new value creation related to innovation means.
- ❏ I can explain why and how to use the Development Funnel.
- ❏ I know how to apply the concepts of organization value and customer value in practice.
- ❏ I can explain the process of developing an aggregated project plan.
- ❏ I can name the possible pitfalls for product development projects.
- ❏ I know the design steps according to Cross.
- ❏ I can explain what Time to Market means.
- ❏ I know what is meant by the variable 'performance' in the technology lifecycle.
- ❏ I can name the different categories of technologies.
- ❏ I can explain what Base, Key, Pacing, and Emerging technologies are, and give practical examples.
- ❏ I can explain Basic, Applied, Development, Demonstrate types of research, and give practical examples.
- ❏ I understand the stages in the decision of whether to adopt or reject an innovation.
- ❏ I know the types of customers related to Rogers Adoption / Innovation Curve.

How to become a more effective innovating organization

> "Within a few years most value-driven innovating organizations will make use of dashboards to measure and control innovation performance. This will very soon become just as common as dashboards nowadays are used to measure and control manufacturing performance. " (Koos Slagter)

This chapter is intended to give insights into ways of becoming a more effective innovating organization based on all the earlier textbook chapters. It is aimed at achieving an integrated level with regard to business management and research, strategy development, technology development and innovation. It focuses on the question: how to become an effective innovating organization? Specific learning objectives of this chapter are:

- Development of knowledge and skills, in an integrated way, to be able to carry out research activities with the aim of creating a more effective innovating organization;
- Improving knowledge of a set of concepts to describe and analyze organizations in order to enable them to be more effective;
- Increasing the capability to carry out product design and process design systematically;
- Gaining an overview of some other relevant organizational questions that managers of innovating organizations should be able to answer in order to become more effective innovators.

Reflection

To check if you can apply the basics of chapter 7, fill in the checkboxes:
- ❏ I understand the basics of an effective innovating organization.
- ❏ I know the process of systematically addressing product design including the main steps.
- ❏ I can name the authors (and their concepts) who developed important concepts related to product and process development.
- ❏ I can explain what 'listening to the Voice of the Customer' means in practice.
- ❏ I can visualize the QFD framework.
- ❏ I can name three measures for judging processes generally based on Slack's transformation process model.
- ❏ At an introductory level I can sum up the principles of Lean Manufacturing and Six Sigma.
- ❏ I am able to apply the Pareto and Ishikawa concepts.
- ❏ I know the concept of Muda.
- ❏ I can explain what process mapping involves.

Elaborations

Assignment 4:   core process of new value creation

Scholars distinguish between social innovation and technical innovation, the latter being closely related to technology-oriented innovation. According to the modern technology definition, see page 53 of the textbook, and with regard to economic activities nowadays, we can speak about the processing of valued tangible and intangible products. Innovation is concerned with something new, therefore the core of innovation is the process of new value creation delivering valued products based on valued processes. From this perspective we can conclude that the core of new value creation is product and process development.

Assignment 5:   organizational task level

The organizational task level is concerned with a new environment related to the micro CHP product-market-technology combination. Instead of modeling organizations in terms of macro-meso-micro levels, it is also possible to model them in terms of a general environment (i.e. macro level including DESTEPG factors) and a task environment. In analyzing the organizational task environment, economic scholars divide this analysis into two parts: a sector analysis (meso level) and a specific task environment analysis (micro level). Referring to the micro CHP, the new specific task environment includes all relevant actors, such as: customers, suppliers (for components, capital goods, know how, etc.) and distributors with whom TDE will directly interact in the near future. It concerns all actors who will have a direct impact , to a greater or lesser extent, on TDE's future goals.

Assignment 6:   input-output-transformation model

In order to draw a useful model we have to split the process described in assignment 6, into process parts belonging to the input, parts belonging to the transformation process and parts belonging to the output of the process. These sub-processes also contain transformation processes as follows:

■ **Parts belonging to input and transformation**
New value creation in practice firstly involves the process of transforming ideas into new or improved product concepts and/or process concepts. Secondly it involves the process of incorporating these concepts into the primary activities of a firm.

Booz, Allen and Hamilton, expressed the following development phases:

1. Exploration: the search for product ideas to meet company objectives;
2. Screening: a quick analysis to determine which ideas are relevant to study in more detail;
3. Business analysis: the expansion of the idea, through creative analysis, into a concrete business recommendation, including product features, financial analysis, risk analysis, market assessment, and a program for the product;
4. Development: turning the idea-on-paper into a product in-hand, demonstrable and producible. This stage focuses on R&D and the inventive capability of the firm. When unanticipated problems arise, new solutions and trade-offs are sought;
5. Testing: the technical and commercial experiments necessary to verify earlier technical and business judgments;
6. Commercialization: launching the product into full-scale production and sale: committing the company's reputation and resources.

They concluded that it generally takes nearly 60 ideas to yield just one successful new product, and only about 7 of the 60 ideas arrive at the development stage of industrial new product processes. Modern insights are more positive (1 to 11). What we can learn is that it makes sense to structure the innovation process and firms have to do their homework well before confronting customers and competitors with new products. I don't like the negative colored (dissonance) name of the curve. It doesn't accurately reflect the essence of the model. I prefer the positive sounding Success Rate Curve.

Epilogue

First of all I want to express my gratitude to Koos Slagter for giving me the trust and opportunity to co-produce this work. A year ago I couldn't imagine the impact of this learning experience; it was truly a great experience to write this workbook. With this workbook I hope to have provided a contribution in extending the value of the textbook and to have closed the gap between the primarily single loop focused learning experience the textbook offers to a double loop experience. By delivering this workbook I also hope to have given a valuable return to the course of Business Engineering I was attending. I wish future students good luck in becoming successful innovators and hope this workbook contributes to their learning experience as much as it did to mine.

Sebastian Piest

I experienced the writing period as a very interesting one, gaining new insights into the secrets of innovation and in working together with Sebastian, a young talent with a very creative mind. During the writing process all our discussions (including those with the publishing team) were very fruitful and cooperative.

My ambition before, was to add new insights related to technology-oriented innovation to the business engineering knowledgebase. This seems to have been achieved now, so I should say: mission completed!

Koos Slagter