

Developing and Managing Innovation in a Fast Changing and Complex World

Stig Ottosson

Developing and Managing Innovation in a Fast Changing and Complex World

Benefiting from Dynamic Principles

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Preface

It is difficult to know where is best to start treating such a complex topic as management of innovation and the development of innovations. However, based on my experience, I think it is good to start to give you some basic statements before we go into more details.

In short, innovations are new products (meaning goods and services) that are sold and used. Therefore, a new product or an invention is not an innovation but can be part of it. With sold is meant a wider view so that money does not need to be exchanged.

To coordinate all activities to develop an innovation is a complex management activity for which some parts can be planned and for which *creativity* and *improvisation* are needed when planning is not possible or rather meaningless to do in depth.

Creativity means shakings things up, both inside ourselves and in the world around us, and constant reorganizing of both cognitive schemata and, to a greater or lesser extent, the domain of the creative person's activity. (Montuori 2003)

Improvisation is thought of as making the best of things, while awaiting a return to the way things should be done. Improvisation is an exception, something we can "fall back on" when things don't go the way they should. (Montuori 2003)

Therefore, innovation management is different from management of mature businesses for which most things are well planned. Also, innovation management is place and situation dependent, meaning that the culture in the organization and the geographical area where the development takes place and the market where the initial marketing and sales takes place.

The more complex the leadership situation in a region or country is, the higher the demands to produce and market sustainable innovations and the more complex the innovation management as well as cost will be. Sweden, where I live and was brought up, is an example of a country with such a demanding management situation (see Fig. 1). Although Sweden's population is only equivalent to 0.13% of the total world population, it is the 33rd largest export economy in the world and the fourth most complex economy according to the Economic Complexity Index (ECI).



Fig. 1 Mapping leadership culture (Based on Meyer 2017)

Another example is that, although the Nordic countries, and especially Norway, have high labor costs with an average of 125 compared to the G7 countries of 108, they have managed to be successful on a global scale. “Therefore, there are important lessons to learn from high-cost countries that successfully compete in the global marketplace” (Holtskog et al. 2018, pp. 1 and 106).

An interesting example of what Fig. 1 illustrates is findings from a case study carried out at the vehicle R&D center China Europe Vehicle Technology, CEVT, at Lindholmen, Gothenburg (Holm and Zhang 2016). CEVT is a subsidiary of the Chinese Geely Holding group, which also is the owner of, for example, the vehicle manufacturers of Volvo Cars and Geely Auto.

Some conclusions in that report are that “Chinese and Swedish leaders have been inspired by different philosophies or models in their leadership, and they are usually connected to the cultural upbringing of these individuals. Every person’s upbringing affects their way of being and functioning in work settings, which is something that the managers at CEVT try to take into account. This affects leadership as well, and can lead to misunderstanding but also development, especially when learning from each other.”

My own experiences of innovation management and the development of innovations are mainly from the Nordic region of Europe, although, in that work, I have experienced the importance of cultural awareness when finding new markets for our innovations.

The leadership situation shown in Fig. 1 has strong connections to the cultural map (see Fig. 2). On the y-axis in that figure, traditional values emphasize the importance of religion, parent–child relationships, and authority. People who embrace these tend to reject divorce, abortion, euthanasia, and suicide. These societies also exhibit high levels of nationalism and national pride. On the x-axis,

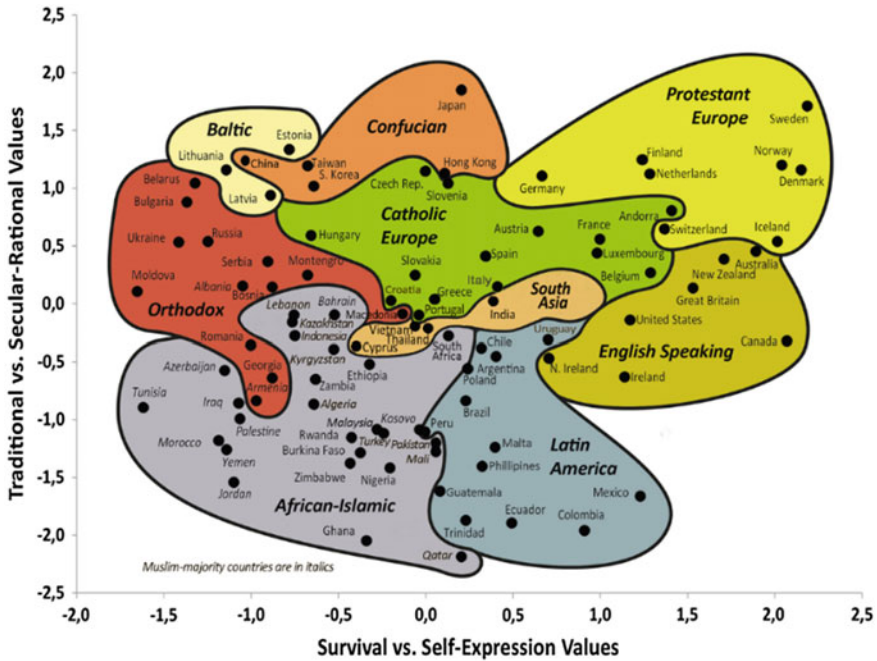


Fig. 2 The cultural map www.worldvaluessurvey.org/images/Culture_Map_2017_conclusive.png

survival values refer to economic and physical security and safety and are linked to low levels of trust and tolerance. On the other side, self-expression values give high priority to protecting the environment, promoting gender equality, and tolerating foreigners and homosexuals.

Note also that corruption that can be used to boost or reach positive results in business is not allowed or practiced in the Nordic countries (see Fig. 3).

Regarding situational dependencies for innovation management, there are, in principle, three main types of management situations: to develop incremental innovations managed by *project leaders* and managers, to develop more radical innovations managed by *entrepreneurs* and *intrapreneurs*, and to develop “survival innovations” managed by *renovateurs*. The three innovations appear within the *private sector*, the *public sector*, or in the *idealistic/nonprofit sector*. In the book, we will address all three types of management situations, the three leader types, and the three sector types.

Thus, we can distinguish between three main innovation types: *incremental innovations*, *radical innovations*, and *survival innovations*. The most common type of innovation is the *incremental innovation*, meaning to continuously develop products and services as well as business models and often also organizational settings until a disruption situation occurs (see Fig. 4) often initiated by a competitor in the market. Lean product development is one method to successfully

CORRUPTION PERCEPTIONS INDEX 2016

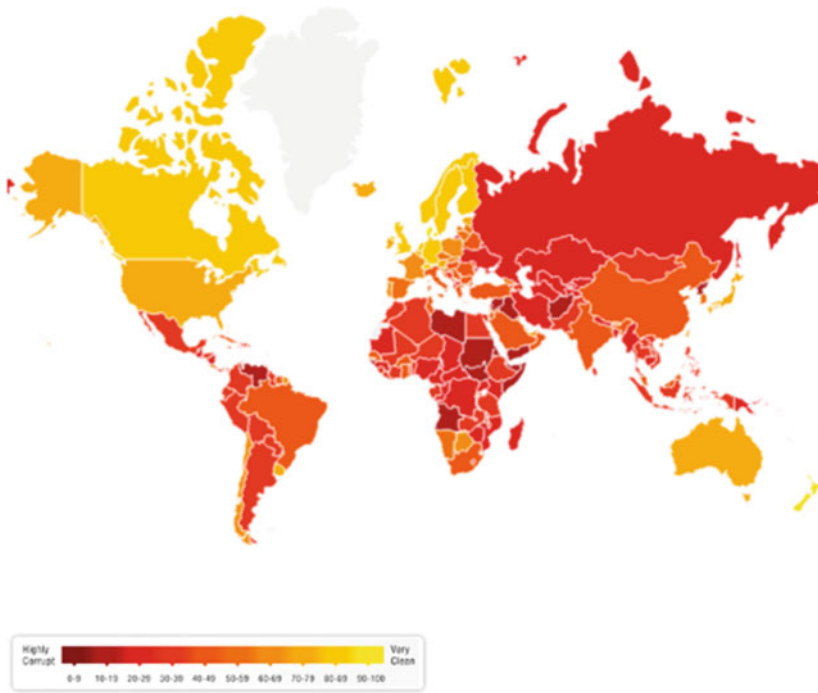


Fig. 3 The corruption map 2016 (www.transparency.org/news/feature/corruption_perceptions_index_20)

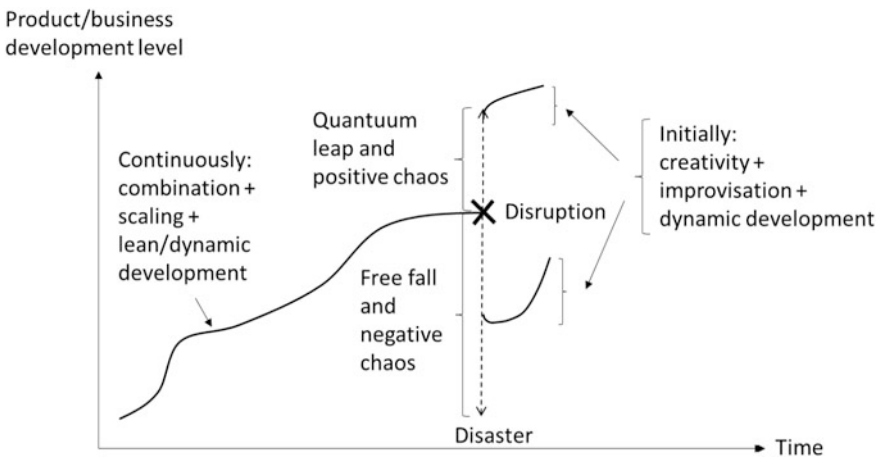


Fig. 4 Situational innovation (product and business) development

make continuous improvements of existing products and solutions. When a disruption situation occurs, there will be a free fall to stop or a new opportunity to develop based on new knowledge or a new solution that is sometimes called a *quantum leap*. The free fall means a negative chaos, while a positive chaos and a euphoric feeling often occur when a completely new opportunity appears. Note that the curves in Fig. 4 are not smooth in real development projects, which we will come back to.

Radical innovations appear as sudden steps up in the development level, sometimes called quantum leaps (see Fig. 4). They are based on knowledge breakthroughs that are developed and introduced in the market. In that case the technical development content is often initially large, and that the organizational and business development comes successively after the introduction of the product on the market.

“*Survival innovations*” are needed for an organization when a radical change is needed for the business to survive. It can be when a sudden step down occurs (see Fig. 4), for example, because of new laws or environmental changes, or when a market drop occurs for the business. This occurs because competitors have introduced new technology and/or marketing and sales principles. In that case, the technical development content initially is often small and that the organizational and business development is dominant, striving to improve the situation.

As the most complex innovation management situation seems to be how to bring up a new hardware commercial product, the book deals with the management and development of such an innovation to a great extent. However, a software commercial product or a nonprofit innovation contains many parts of a commercial hardware product, so the book should also be valuable if your mission is to build up such an innovation in any sector or any size of organization. The conclusions are hard drawn, although, in reality, it is possible to find exceptions to the rule.

Only with technological innovations can climate and environmental challenges be overcome and welfare increased. A remark, which might be controversial, is that by avoiding purchasing new products and repairing old ones, less money can be used for the development, making our future more sustainable (Westergård 2016). Thus, a sustainability paradox is that the more we consume, the more sustainable the society will be as more money for development will be available. However, the consumption should be responsible and it is important that the politicians set increasingly hard demands on the products that are developed and sold. One of my ambitions with this book is to give useful knowledge in how to develop sustainable products and innovations.

Another ambition is to give useful rules of thumb based on a dynamic mind-setting to treat different situations. Therefore, I strongly urge you to study and reflect on what is described in Appendix A.

Each chapter is written to stand on its own feet, which is why some repetitions appear in the chapters.

References to work older than 1995 are not, in general, given in the book as useful knowledge from earlier work can be seen as having been settled in general knowledge. When no references are given, references are to my own experiences and to other peoples' experiences that I have got access in different ways.

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Acknowledgements

Dr. Alan Turing—Father of the Modern Computer, realized that: “— a prerequisite to find out something new is that we have the ability to make mistakes, to go beyond the framework. The one who always thinks correctly creates nothing. The one who only follows the current opinions or programming, and to talk machine language, does not come up with anything truly innovative and cannot even be considered intelligent in a real sense” (Lagercrantz 2016, p. 285). He also is claimed to have said that “The mystery is always bigger than the solution of the mystery” (Lagercrantz 2016, p. 356), which has as a consequence that “The solutions are not perceived as remarkable when you know the answers. You do not understand how difficult it was to find them until you have an answer key.” (Lagercrantz 2016, p. 365)

Rendering and connecting to that, this book is the result of a search for methods and explanations since 1979 (see Fig. 5) of why a dynamic approach is more effective than the traditional Newtonian approaches for which disorder, chaos, and noise are not taken into account (e.g., Montuori 2003). My findings are based on countless mistakes, some successes, my questioning of different perceptions, extensive literature studies, countless conversations, and discussions, as well as amounts of creative incidents and tests of them together with combining bits and pieces to form a useful entity.

Although the writing of the book was a solitary activity, without the uncountable inputs from uncountable numbers of people it would not have been possible to write it. All the students I have had in the Nordic countries, Germany, and some other countries have helped me to reflect on the topic and to see more clearly and understand the complexity of creating sustainable innovations independent of whether it is within the private sector, the public sector, or the idealistic sector. However, especially I would like to thank Prof. Evastina Björk, Professor Emeritus Sandor Vajna, and Mr. Sri Kolla for our talks and discussions and their valuable

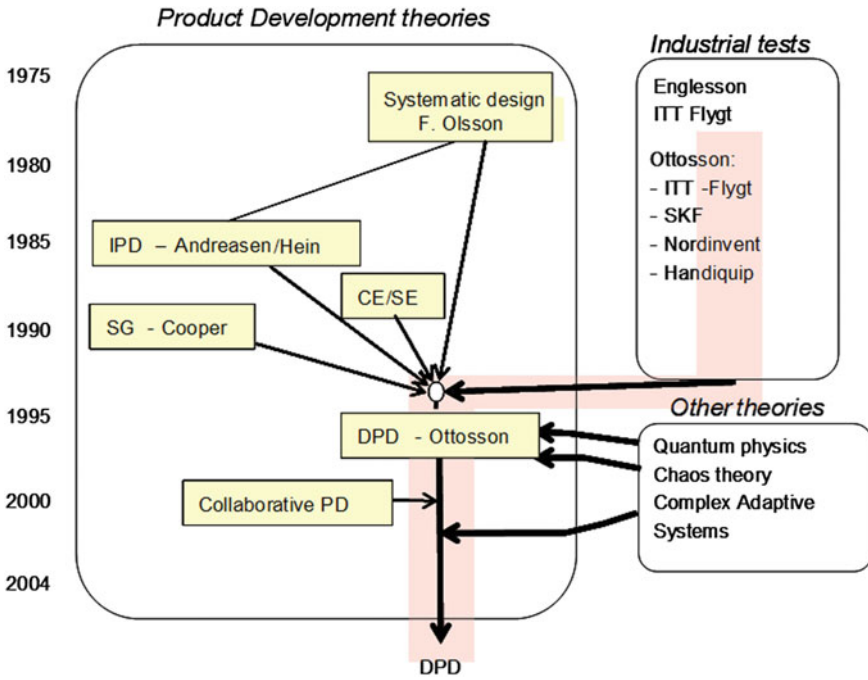


Fig. 5 The development of dynamic principles and methods from 1979 onward by combining and adding development principles based on industrial tests and theories (Ottosson 2006)

inputs and honest critical stance when I have made conclusions without solid ground to stand on. Not the least that has taught me how important it is to verbalize ideas to find out the weaknesses.

I also want to thank Mrs. Carol de Groot who has helped me with the language controls as well as pointing out unclear writing in the original text.

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Stig Ottosson

Contents

1	Introduction	1
1.1	What Is Meant by Products and Innovations?	1
1.2	Innovations in Different Sectors of Our Society	4
1.3	Three Lean Development and Innovation Development	6
1.4	What Is the Difference Between Research and Development?	7
2	Innovation Theory	11
2.1	Is Innovation a Buzz Word?	11
2.2	Different Views on Innovation?	12
2.3	Diffusion of Innovation	15
2.4	Communication Channels	16
2.5	Innovation as a Learning Process	17
2.6	Innovation Projects	19
2.7	Creativity	20
2.8	Product Values	22
2.9	Product Life Cycle	25
2.10	Three Metaphors	27
2.11	New Products	30
2.12	Market Adoption	31
2.13	Customers and Users	35
2.14	SWOT Analyses	38
3	The Entrepreneur	41
3.1	Inventors, Innovators and Entrepreneurs	41
3.2	Entrepreneurs in Different Roles	42
3.3	Managers and Entrepreneurs	43
3.4	The Qualities of an Entrepreneur	46
3.5	Entrepreneurship from Early to Late Stages	48
3.6	Leadership	49

3.7	Coaching and Mentoring	51
3.8	Building an Identity	53
3.9	Ethical and Moral Codes	54
3.10	Dealing with Stress and Conflicts	55
3.11	Burn Out Problems	57
4	Project Management	59
4.1	Projects in a Historical View	59
4.2	Projects and Processes	61
4.3	Complexity Aspects of Development Projects	62
4.4	Three Types of NPD Projects	64
4.5	Organizational Forms	67
4.6	Outsider or Insider Management?	69
4.7	Organizational Principles	73
4.8	Project Localities	74
4.9	Manning Principles	78
4.10	Project Sizes	81
4.11	Group Phases	82
4.12	Control Structure	84
4.13	Classical Project Planning	86
4.14	Dynamic Planning Principles	92
4.15	Project Follow Up Principles	94
5	Knowledge Generation	97
5.1	Knowledge Generation	97
5.2	The Learning Process	98
5.3	Personality Aspects	99
5.4	Competence Aspects	101
5.5	Personal Knowledge	104
5.6	Collective Knowledge	106
5.7	Transfer of Knowledge	107
5.8	Wisdom Streams	108
6	Different New Product Development Models	111
6.1	Introduction	111
6.2	The Classic View Versus the Dynamic View	111
6.3	Research Methods on Innovation and PD	115
6.4	Classical NPD Models	118
6.4.1	Serial Development	118
6.4.2	Stage-Gate [®] (SG)	119
6.5	Dynamic NPD Models	120
6.5.1	Lean Product Development (LPD)	120
6.5.2	Agile Software Development—ASD	123

- 6.5.3 Agile Hardware Development 124
- 6.5.4 Dynamic Product Development—DPD™ 124
- 7 Dynamic Product Development (DPD™) 127**
 - 7.1 Introduction 127
 - 7.2 Organization 128
 - 7.3 Users/Use—Society—Business 131
 - 7.4 Product Values 132
 - 7.5 From Need, Want or Wish to Ready Product 134
 - 7.5.1 Finding Out the Product to Develop 134
 - 7.5.2 Concept Development 136
 - 7.5.3 From Concept to Ready Product 139
 - 7.6 Design for X—DfX 141
 - 7.6.1 Overall View 141
 - 7.6.2 Design for Usability—DfU 143
 - 7.6.3 DfAe (Design for Aesthetics) 146
 - 7.6.4 DfEr (Design for Ergonomics) 147
 - 7.6.5 DfMRS (Design for Maintenance, Repair, and Service) 147
 - 7.6.6 DfC (Design for Comfort) 148
 - 7.7 Work Principles 149
 - 7.7.1 Make Useful Scenarios 149
 - 7.7.2 The Framing Principle 149
 - 7.7.3 Reinventing the Wheel 151
 - 7.7.4 Co-location 151
 - 7.7.5 The Principle of Flowing Water 152
 - 7.7.6 Switch Between Activities! 153
 - 7.7.7 ‘Lagom’ and the Pareto Principle 153
 - 7.7.8 Preliminary Decisions 154
 - 7.7.9 Make Many Small, and Few Large Decisions 155
 - 7.7.10 Design and Verify Concurrently 156
 - 7.7.11 Using the Walls 156
 - 7.7.12 Notebooks 158
 - 7.7.13 Weekly Reports 159
 - 7.7.14 Information Systems 159
 - 7.8 Verification 160
 - 7.8.1 Modelling 161
 - 7.8.2 Prototyping 161
 - 7.8.3 Simulation 162
 - 7.8.4 Rapid Prototyping 163
 - 7.8.5 Scanning 164
 - 7.8.6 Virtual Reality 165

7.8.7	Augmented Reality	166
7.8.8	Pugh Matrix Analyses	167
7.9	Manuals	168
8	Marketing New Products	169
8.1	Introduction	169
8.2	Market History	170
8.3	Aims of Marketing	171
8.4	Customer Considerations	171
8.4.1	Customer Loyalty	171
8.4.2	Buyer Categories	173
8.4.3	Attitude Development	176
8.5	Marketing Concept Development	178
8.5.1	Market Research	178
8.5.2	Marketing Strategy	179
8.5.3	Brand and Branding	180
8.5.4	Content Marketing	181
8.5.5	Market Segmentation	182
8.5.6	Marketing Material Considerations	184
8.6	Pricing Considerations	185
8.7	Marketing Methods	190
8.7.1	Traditional Marketing	191
8.7.2	Internet Marketing	192
8.7.3	Cross-Media Marketing	195
8.7.4	Event Marketing	195
8.7.5	Relationship Marketing and CRM	196
8.7.6	Viral Marketing	197
8.7.7	QR-Codes in Marketing	198
8.7.8	Virtual Reality and Augmented Reality in Marketing	198
8.8	Market Channels	200
8.8.1	General Considerations	200
8.8.2	Sales via Co-operation Partners	204
8.9	Feed-Back Investigations	206
8.9.1	Observations, Dialogues, and Interviews	206
8.9.2	Surveys/Questionnaires	208
8.9.3	Mystery Shopping	209
8.9.4	On-Site Shopping	210
8.9.5	Phone Shopping	210
8.9.6	Internet/Web Shopping	210
9	Sales of New Products	213
9.1	Introduction	213
9.2	The Importance of the First Order	213

- 9.3 The Art of Rhetoric 215
- 9.4 The Initial Sales 216
- 9.5 Satisfying Expectations 217
- 9.6 Price-Setting New Products 219
- 9.7 Enhancing Sales 219
- 9.8 Customer Trust 220
- 9.9 Prospecting 221
- 9.10 Sales Tip-Offs 222
- 9.11 Easily Made Mistakes 225
- 9.12 Field Work 225
- 9.13 A Final Remark 227
- 10 Financing Innovation 229**
 - 10.1 Introduction 229
 - 10.2 Risk Capital 231
 - 10.3 Venture Capital 234
 - 10.4 Business Loan 236
 - 10.5 Crowdfunding 236
- Appendix A: Two Views of Life 239**
- Appendix B: A Renovation Project 245**
- Appendix C: 3D-Printing as a Creative Modelling
and Prototyping Tool 255**
- References 265**
- Index 273**

Acronyms

AR	Action Research and Augmented Reality
ASD	Agile Software Development
B2B	Business-to-business
B2C	Business to consumer
BAD	Brain-Aided Design
C&E	Cause and Effect
CAD	Computer-Aided Design
CE	Concurrent Engineering
CEO	Chief Executive Office
CI	Cultural Identity
CMS	Content Management System
CPC	Cost per click
CPM	Critical Path Method
CRM	Customer relationship management
Dfa	Design for all
DFMA	Design for Manufacture and Assembly
DfU	Design for Usability
DfX/DFX	Design for X
DMU	Digital Mock-Up
DPD	Dynamic Product Development
EDM	Engineering Design Management
F2F	Face-to-Face
FAQ	Frequently Asked Questions
FFE	Fuzzy Front End
FFF	Freeform Fabrication
FTA	Failure Tree Analyzes
Glocal	Global and local
HDM	Head-Mounted Displays
HR	Human Relations
IAR	Insider Action Research

ICT	Information and Communication Technology
IoT	Internet of Things
IP	Intellectual Properties
IPD	Integrated Product Development
ISO	International Organization for Standardization
LABDA	Look, Ask, Model, Discuss, and Act
LCA	Life Cycle Analyzes
LPD	Lean Product Development
M2M	Machine-to-machine
MAD	Model-Aided Design
MBWA	Management by walking around
MLM	Multilevel Marketing
NPD	New Product Development
PAD	Pencil-Aided Design
PAR	Participation Action Research
PCT	Performance, Cost, and Time
PD	Product Development
PDM	Product Data Management
PERT	Program Evaluation and Review Technique
PLC	Product Life Cycle
PMU	Physical Mock-Up
PPC	Pay per click
PR	Public Relations
Q	Quality
QFD	Quality Function Deployment
QR code	Quick Response
R&D	Research and Development
SEO	Search Engines Optimization
SG	Stage-Gate
SME	Small- and medium-sized enterprise
Specs	Specifications
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TPS	Toyota Production System
TRIZ	Theory of Inventive Problem Solving
UCD	User-Centered Design
UD	Universal Design
USP	Unique Selling Points
VC	Venture Capital
VR	Virtual Reality
www	World Wide Web

List of Figures

Fig. 1.1	Actions to develop a sustainable product solution (Ottosson et al. 2016)	3
Fig. 1.2	Innovative work in different sectors has different aims	5
Fig. 1.3	To improve the core business, Lean projects are used. To develop new innovations, innovation projects are used.	7
Fig. 1.4	Lean projects can be handled in the core business while Innovation projects are best taken care of outside the core business	8
Fig. 1.5	The organization of an innovation project.	9
Fig. 2.1	There can be three different initiators behind the desire to develop a new innovation	12
Fig. 2.2	A quantum leap means jumping from one level to another without first starting at a lower level.	13
Fig. 2.3	A wider definition of the demands on an innovation	14
Fig. 2.4	The sales chain	14
Fig. 2.5	The adoption curve becomes an S-curve when cumulative adoption is used	15
Fig. 2.6	The two-way communication loop	17
Fig. 2.7	An innovation project is like finding the way through a labyrinth. The way to get through it is unknown until the way through has been found.	18
Fig. 2.8	In an innovation project, important puzzle pieces are often missing and they must be found with partly irrational methods that get information by chance	19
Fig. 2.9	Innovation development, orchestrated by the entrepreneur, takes place in a complex, adaptive social system	20
Fig. 2.10	An example of the supply chain for hardware products (inspired by Chen and Paulraj 2004).	21
Fig. 2.11	To cut down the time from new findings to a commercial product, a creative/inventive network can help the idea owners to speed up and improve the development process.	22

Fig. 2.12 Three product types (Ottosson 2013) 25

Fig. 2.13 The process from the birth of an innovation until it is removed from sales (PLC stands for the commercial product life cycle). 25

Fig. 2.14 PLCs vary between branches. There is a trend that PLCs are decreasing as is indicated in the Figure (Ottosson 2004-C). 27

Fig. 2.15 Different realities with metaphors for the early stages of the development 28

Fig. 2.16 A mature larger supplier will normally have products of different levels of newness. These products will be considered to have different newness by the market (from Wikipedia August 2007) 30

Fig. 2.17 The use of engraved behaviors is positive for the success of a new product (Gourville 2006). 32

Fig. 2.18 The principal adoption curve for an innovation 32

Fig. 2.19 Examples of variables determining the rate of adoption of innovation (based on Rogers 2003, p. 222). 33

Fig. 2.20 From a single revolutionary solution, many solutions will develop, ending with a few dominating solutions 34

Fig. 2.21 The population can be divided in three broad user groups for which different standard product solutions have to be adjusted or adapted (based on U.S. Bureau of Census 1997) 38

Fig. 2.22 Different user categories 38

Fig. 2.23 An example of primary, secondary, and co-users 39

Fig. 2.24 Examples of factors that will influence the possibilities for success with an innovation project 39

Fig. 3.1 The pure entrepreneur’s and the pure manager’s respective focus (Johannisson 1992) 44

Fig. 3.2 The entrepreneur needs to be in front of her/his own organization, showing the road to take, while the manager ensures that the organization follows orders 44

Fig. 3.3 When a split identity in an organization is transformed into a unified identity, the efficiency increases as well as the wellbeing and other positive effects 53

Fig. 4.1 The project management process seen from a classical point of view 60

Fig. 4.2 Product development (PD) projects are often dependent on many factors that, in turn, are time dependent, making them truly complex/unforeseeable 63

Fig. 4.3 A wish is at a high dream level that might be satisfied in the distant future, while a need is concrete and already existent 65

Fig. 4.4 The time from product development start of need-, want- and wish-based development to when a commercial product is ready depends on which start conditions there are. Also the shapes of the curves vary considerably 66

Fig. 4.5 In classical development, early final decisions are used while late final decisions are used for dynamic development 67

Fig. 4.6 The line organization is between the Chief Executive Officer and the departments. The matrix is in the case created when projects are formed 68

Fig. 4.7 Exercising dynamic leadership means to be present in the middle of the activities allowing a controlled freedom in the team. In this case the situation for a small- or medium-sized enterprise (SME) is pictured 69

Fig. 4.8 The traditional Line Organization with an outsider management position means a softer management than an insider management position 70

Fig. 4.9 When no formal manager (leader) is appointed, self-organization will occur, meaning dialogues take place between the team members in order to solve problems efficiently 70

Fig. 4.10 Exercising dynamic leadership means also moving around in the localities and talking with the team members 72

Fig. 4.11 In the dynamic organization, the New Operation/Business Board is an insider board of the development project, which is the opposite to that of a conventional organization 75

Fig. 4.12 The interaction between the Project Committee and the project for need-based development limited to the gates (the small black rectangles) (Olsson 1976) 75

Fig. 4.13 Optimal project rooms are maybe hexagonal rooms with the sides of three meters (photo Stig Ottosson 2007) 79

Fig. 4.14 The number of communication routes is dependent on the number of team members 82

Fig. 4.15 The five phases a team experiences when a simultaneous start is arranged with many people who do not know each other well in advance 83

Fig. 4.16 Metaphorical project terms 85

Fig. 4.17 A project normally has three decision levels 86

Fig. 4.18 An example of a planned PCT outcome and real outcome of a project 87

Fig. 4.19 An example of the detailed planning of a project seen from the project leader level in Fig. 4.17 88

Fig. 4.20 The activities in Fig. 4.18 are assembled to phases/stages that are separated by gates (G1–G5) 88

Fig. 4.21 Milestones are connected to performance, while gates are used to control that the project does not exceed the time limits which have been set in advance 89

Fig. 4.22 Figure 4.21 represented as Gantt scheme with added accumulated cost estimation (p stands for persons). 90

Fig. 4.23 The CPM—Critical Path Method tells which path takes longest time 90

Fig. 4.24 The figure is trimmed to get rid of waiting times causing a shorter total project time on account of higher accumulated costs 91

Fig. 4.25 The corresponding CPM scheme to Fig. 4.24. 91

Fig. 4.26 If few gates are used, the probability will be high that a development project will be stopped—“Killed”—before the targets are reached 93

Fig. 4.27 A real case of a want-based product development project (Björk and Ottosson 2008) 94

Fig. 4.28 Examples of commercial follow up representations of projects. 94

Fig. 4.29 Examples of commercial follow up representations of projects. 95

Fig. 4.30 Examples of commercial follow up representations of a project. 95

Fig. 4.31 A representation of the communication and work in a one-week project (Ottosson 2014). 96

Fig. 5.1 The knowledge generation loop 98

Fig. 5.2 The solid line shows the behavior of a person in relaxed situations. 100

Fig. 5.3 The four extreme personality colors 102

Fig. 5.4 Different steps going from being a novice to being a maestro 103

Fig. 5.5 The practitioner’s way of expanding techne. Solutions in the figure are, for example models, prototypes, or manufactured products 105

Fig. 5.6 The researcher’s way of expanding her/his episteme 105

Fig. 5.7 With time, a person grows her/his Phronesis if she/he continuously expands her/his techne and episteme (Ottosson 2006) 106

Fig. 5.8 It is important is to find ways for wisdom gains in the different projects and add them to the corporate wisdom 109

Fig. 6.1 Serial development used when satisfying a need, compared with the iterative development needed when satisfying a want or a wish. 112

Fig. 6.2 Gates in the serial development models are like a traffic light, while in the dynamic model they are exchanged with traffic islands, meaning a safer and more efficient system. 113

Fig. 6.3 Research can be done as prospective studies and retrospective studies. Dependent on which track the researcher chooses to use, different research methods can be used (Björk and Ottosson 2007) 115

Fig. 6.4 Reliability, depending on the investigation method used. 116

Fig. 6.5 The Figure illustrates the relations between Action Research (AR), Insider Action Research (IAR) and Participation Action Research (PAR). PL = Project Leader (Holmdahl 2007). 116

Fig. 6.6 Activity peaks of different magnitudes occur and are unevenly distributed. To catch them, it is not enough to be present now and then (Björk 2003). 117

Fig. 6.7 The serial development model for hardware products is still used in some companies 118

Fig. 6.8 The Stage-Gate® model (Cooper 1994). 119

Fig. 6.9 The lean product development process as it often is described (Swan and Furuhjelm 2010) 122

Fig. 6.10 What precedes the start of a traditional product development project differs much between the traditional and dynamic views 125

Fig. 6.11 An important difference between the traditional way and the dynamic way of working is the number of demands to solve at each moment of time 125

Fig. 7.1 The principle of developing different concepts into one new product 129

Fig. 7.2 Different topics to cover when a complicated product is developed (the terms will be discussed later) (Ottosson 2015) 130

Fig. 7.3 Outer and inner demands for each team member dealing with technical questions of the product development (Ottosson 2015) 131

Fig. 7.4 A product emits different “manifestations” that are received by our senses 133

Fig. 7.5 The creative process and some methods to find solutions. 134

Fig. 7.6 To find a functional solution from a wish, different steps are needed 137

Fig. 7.7 Figure 7.6 transferred to a time-function diagram 137

Fig. 7.8 When 3D-printing is used for modelling, the sequence in Fig. 7.5 needs to be changed (Ottosson et al. 2016). 138

Fig. 7.9 When reversed engineering is the start of the development, the BAD-PAD procedure can be simplified 138

Fig. 7.10 The concept development is an iterative process in DPD™ 139

Fig. 7.11 Reliability depending on which investigation method is used 139

Fig. 7.12 Initially when a concept is developed and later when problems occur, the ways of working shown in the Figure have shown to be efficient (Ottosson 2015) 140

Fig. 7.13 When problems occur in the development of a new product, BAD, PAD, and MAD help to find solutions to continue the CAD work 140

Fig. 7.14 The order in which a new mechanical product is preferably developed (Ottosson et al. 2016) 142

Fig. 7.15 Unfortunately, the efficient work time in a need-based PD project is often in the range 20–50% 143

Fig. 7.16 The development of a commercial product starting with a wish means combining Figs. 7.6 and 7.13 143

Fig. 7.17 The framing principle means to first find solutions for the most difficult intersections between the extreme pairs. In this case, only two pairs of extremes are shown 150

Fig. 7.18 A multi-axes diagram can be used to find extreme values for each demand. 151

Fig. 7.19 The metaphor of flowing water is used to solve problems without losing momentum (*photo* Stig Ottosson and sketch from Holmdahl 2007) 153

Fig. 7.20 Shift between tasks when good-enough solutions have been reached (the start is in the center and acceptable solutions are at the marks on each axis) 154

Fig. 7.21 An example of a “war room” (www.workdesign.com) 157

Fig. 8.1 In a mature market organization many activities have to be covered 172

Fig. 8.2 The number of first-time buyers of an article/product (or an opinion) is small at first, and will then increase and peak, after which it starts to decrease. 174

Fig. 8.3 Gradually our own image of a product is developed by input from different sources 177

Fig. 8.4 The final logo of the brand Handiquip® 181

Fig. 8.5 Some internal and external factors to consider for the making of marketing material 184

Fig. 8.6 When the customer is placed at the center of marketing activities, the basic product becomes only a part of the total offer 185

Fig. 8.7 Basic and premium products can be placed in Maslow’s stairway 187

Fig. 8.8 Margins measured in price/production cost varies a great deal, depending on emotional and image value for the food-related products 187

Fig. 8.9 Strategic price-setting includes many influencing parts except the basic price. 188

Fig. 8.10 Different marketing methods that are linked to each other 191

Fig. 8.11 Different traditional marketing methods that are linked to each other. 191

Fig. 8.12 Different internet marketing methods that are linked to each other. 193

Fig. 8.13 An example of product placement for Volvo in a children’s book (Norlin and Burman 2008). 194

Fig. 8.14 Examples of different event marketing methods 196

Fig. 8.15 A corn field cut to form a 29.000 m² QR code that can be scanned at a distance of about 3 km. *Photo Kraay Family Farm*. 198

Fig. 8.16 Examples of different options for manufacturers to reach the market. 200

Fig. 8.17 For a mature product, it is mainly the customer who looks for the product, while the sellers look for customers for a new product 201

Fig. 8.18 The time to introduction onto the market is based on the number of middlemen between the producer and customer/consumer. The example times are for an industrial product 202

Fig. 8.19 For increased income there is an eventual requirement for new geographical markets to be reached, either direct or via other channels. 203

Fig. 9.1 Different sales activities to take care of when the innovation has matured to be a standard product in the company 214

Fig. 9.2 By using other people’s network, your own network expands. 228

Fig. 10.1 Four important components to make an innovation 230

Fig. 10.2 From a successful start, the incoming staff will play an ever increasing role to establish the innovation on the market 230

Fig. 10.3 The J-curve counts in general as well for ROI as for the cash flow of a new business. 231

Fig. 10.4 Three important curves for a start-up enterprise during its first twelve months from the start. 231

Fig. 10.5 There is often a choice from where to start the development of a new business 232

Fig. 10.6 If the start is from a challenge in Fig. 10.5, a suitable entrepreneur needs to have different knowledge and experience 232

Fig. 10.7 Some common risk capital sources. 233

Fig. 10.8 Some common terms connected to risk capital investments
and when they appear 234

Fig. 10.9 The organization of VC 235

Fig. 10.10 The inventors Stuart and Cedar Anderson with their
Honey-On-Tap Beehive (www.youtube.com/watch?v=0_pj4cz2VJM) 237

Fig. A.1 Some differences between the Dynamic paradigm and the
Classic paradigm. 240

List of Tables

Table 2.1	Differences between playing dice, poker and chess (Järrehult 2006)	28
Table 2.2	A successful innovation project transforms into a business process (based on Kurtz and Snowden (2003))	29
Table 2.3	Levels of novelty in investigated patents given during the 1970s and 1980s (Altshuller 1980)	31
Table 3.1	This synthesis shows the entrepreneur’s and the manager’s guiding rules (Sjöstrand 1992).	43
Table 3.2	Some differences between the entrepreneurial and managerial view (based on www.effectuation.org/FAQ.htm#Process)	45
Table 3.3	The demands on the entrepreneur change from the early stages of the development of a business through to the later stages (Nyström 1996).	49
Table 3.4	Some differences between coaching and mentoring (from www.ucl.ac.uk/hr/od/coaching/differences.php)	52
Table 4.1	Three types of backgrounds for NPD projects causing different circumstances for the project work	65
Table 4.2	Attributes of two different organizational structures (Imperato and Harari 1996)	71
Table 7.1	Simple Pugh matrix used to find out which solution is the best	167
Table 7.2	The Pugh matrix in Table 7.1 extended with weight factors to get a more fine-tuned evaluation result	167
Table A.1	Some important differences in characteristics between the classic and complex view	240
Table A.2	Some important differences in characteristics between the classic (Newtonian) paradigm and the quantum view	241
Table A.3	Some important differences in characteristics between the classic (Newtonian) view and the chaos view	242