

Heiko A. von der Gracht

The Future of Logistics

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**Einkauf, Logistik und
Supply Chain Management**

Herausgegeben von
Professor Dr. Christopher Jahns

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Heiko A. von der Gracht

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Scenarios for 2025

With a foreword by Prof. Dr. Christopher Jahns
and Prof. Dr. Inga-Lena Darkow

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Foreword

Peter F. Drucker, one of the world's most influential management gurus of all times, once said that "the best way to predict the future is to create it". In other words, those managers who systematically study the future have also the power to shape and influence the future. By the means of anticipation they can prepare for the expected as well as the unexpected which allows them to react more flexible and faster than competitors. Futures research, i.e. the interdisciplinary and systematic analysis of the future, has matured to both a theoretical-conceptual and application-oriented research discipline. In his dissertation, Dr. Heiko A. von der Gracht concentrates on its most prominent and powerful tool: the scenario technique.

The future of the logistics service industry is characterised by many upcoming challenges and opportunities. The industry experiences strong growth rates, but is also confronted with high complexity and dynamism. Intensifying globalisation, stronger competition, and higher customer demands are just some of the factors that lead to a more turbulent and uncertain environment. Against this background, there is a considerable need for futures orientation and innovation in logistics in order to establish flexibility, creativity, and the ability to adapt to changes quickly. The scenario technique is in fact one of the best tools to support decision making under uncertainty and can therefore be considered of high value for the logistics environment. Nevertheless, its proliferation among logistics service providers is low.

In his thesis, Dr. von der Gracht examines the current scenario planning practices of the logistics service industry in all its facets. In numerous expert interviews he reveals the status-quo, underlying causalities and motives, potentials and future relevance of the topic under consideration. Since scenarios turn out to be uncharted waters for most logistics executives, Dr. von der Gracht continues his work with a fantastic expert-based scenario study for the future of the logistics service industry 2025. In all his measures, he follows high scientific standards and strong methodological rigour and thereby assures the high quality of his research.

Given its pragmatic research nature, the thesis is of high value for both practice and science. The insights into the industry's scenario planning practice represent the first empirical data of its kind and form a valuable framework for future research. The scenarios provide executives with a sound planning basis for long-term decisions, illustrate the potentials and value of the scenario technique, and serve as a methodological guideline. Students and researchers will further find lots of helpful information on methods, procedures, and quality criteria of futures research – particularly on the innovative linkage of the Delphi survey technique and scenario planning.

Dr. Heiko A. von der Gracht showed that a high level of rigour in research is compatible with relevance for practice. Intensive cooperation within a scientific and corporate network revealed under his management valuable insights into a very "hot" topic for logistics and

supply chain managers. This effort is appreciated by his team, his supervisors and the logistics community. Dr. von der Gracht continues his work as head of the Center for Futures Studies in Logistics & SCM at Supply Management Institute (SMI) of the European Business School (EBS), Wiesbaden, Germany.

We wish you a pleasant reading and many useful insights into the future.

Univ.-Prof. Dr. Christopher Jahns

Prof. Dr. Inga-Lena Darkow

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The writing process of a doctoral dissertation is a very communicative process where the doctoral candidate meets many interesting people that influence his work in different ways. The ones that most supported me during my doctoral research shall be particularly appreciated here. First of all, I owe many thanks to my supervisors, Prof. Dr. Christopher Jahns and Prof. Dr. Ronald Gleich, for the professional support and assistance over the past three years of my doctoral studies at the Supply Management Institute (SMI) of the European Business School (EBS). I particularly thank Prof. Dr. Jahns for always supporting me both academically and personally and I am pleased that our collaboration will continue after my doctoral research time. In addition, I want to thank Prof. Dr. Ronald Gleich for his time and interest in my research and the willingness to be my second supervisor.

A unique characteristic of the SMI is its culture. Many of us have found friends for life – and so did I. I have to highlight here, how much I enjoyed the SMI team spirit and the warm atmosphere. I want to thank the whole SMI team for the great time we had during the last three years of my studies. I owe exceptional thanks to Prof. Dr. Inga-Lena Darkow and Prof. Dr. Stefan Walter from whom I learned so much personally and academically. Furthermore, my special appreciation goes to my colleagues and friends Dr. Andreas Potzner, Lars Eiermann, Gernot Kaiser, Gerhard Trautmann, Dr. Martin Lockström, Marco Linz, Stephan Schmidberger, and many more. I also want to thank my student assistants, particularly Victor Fischer and Caroline Hatlapa, for our fruitful conversations and brainstorming sessions on the future of logistics. Some of the great ideas were born during our discussions that helped to sharpen the plot of my scenarios.

It is without any doubt that my dissertation would not have been possible without my parents, Peter and Marianne, and my sister Britta. I thank you so much for your support and the many hours you listened to the things that I had on the mind. Similarly, I want to thank my love Corinna who assisted me with lots of love, patience, and advice.

Moreover, I want to thank all the logistics experts from the top 50 logistics service providers who participated in the scenario check and in the Delphi survey and thereby made this comprehensive research possible. Similarly, my appreciation goes to the 20 scenario experts that helped to investigate the underlying causalities for the scenario planning practice in the logistics service industry as well as the technique's potentials and future relevance.

Finally, I hope that my ideas, visions, and thoughts within this thesis likewise contribute to logistics science and practice. I would be pleased, if this work helps to create awareness for scenario planning and its value in the logistics environment and if my scenarios introduce a vivid discussion about the long-term future of logistics.

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List of Abbreviations

3D	Three-dimensional
A.D.	Anno Domini
A-bombs	Atomic bombs
Aids	Acquired Immune Deficiency Syndrome
APMO	Average Percent of Majority Opinion
ARE	Bundesamt für Raumentwicklung [Swiss Federal Office for Spatial Planning]
ARV	Antiretroviral Medication
B.C.	before Christ
BASICS	Battelle Scenario Inputs to Corporate Strategies
BMBF	Bundesministerium für Bildung und Forschung [Federal Ministry of Education and Research]
BMVBS	Bundesministerium für Verkehr, Bau und Stadtentwicklung [Federal Ministry of Transport, Building, and Urban Affairs]
BMWI	Bundesministeriums für Wirtschaft und Technologie [Federal Ministry of Economics and Technology]
BRIC	Brazil, Russia, India, and China
BVL	Bundesvereinigung Logistik [German Council of Logistics]
CAI	Computer Assisted Instruction
CEO	Chief Executive Officer
CEP	Courier, Express, Parcel
CLS	Computerised Library Systems
CSCMP	Council of Supply Chain Management Professionals
CCS	Carbon dioxide Capture and Storage
D.A.	Dissertation Abstracts
DPWN	Deutsche Post World Net
DVZ	Deutsche Verkehrs-Zeitung
EBS	European Business School
E-Business	Electronic Business
EU	European Union
Fraunhofer ATL	Fraunhofer Arbeitsgruppe für Technologien der Logistik-Dienstleistungswirtschaft [Fraunhofer Center for Applied Research on Technologies for Logistics Service Industries]
Fraunhofer ISI	Fraunhofer Institut für System- und Innovationsforschung [Fraunhofer Institute for Systems and Innovation Research]
FTA	Future-Oriented Technology Analysis
G8	Group of Eight leading industrialised nations

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GBC	Global Business Coalition
GDP	Gross domestic product
GW	Giga Watt
HI Virus	Human Immunodeficiency Virus
HWWI	Hamburgisches WeltWirtschaftsInstitut [Hamburg Institute of International Economics]
ICC	Intraclass Correlation Coefficient
ICT	Information and Communication Technology
ifmo	Institut für Mobilitätsforschung [Institute for Mobility Research]
Ifo	Information und Forschung [Information and research]
IGN	National Geographic Institute of France
IQR	Interquartile Range
IT	Information Technology
ITER	International Thermonuclear Experimental Reactor
IW Consult	Institut der deutschen Wirtschaft Köln Consult
IZT	Institut für Zukunftsstudien und Technologiebewertung [Institute for Futures Studies and Technology Assessment]
LDC	Less Developed Countries
MIT	Massachusetts Institute of Technology
MRSC	Market Research Service Center
MS	Microsoft
NASA	National Aeronautics and Space Administration
OPEC	Organization of the Petroleum Exporting Countries
PC	Personal Computer
PEST	Political, Economic, Social, and Technological
Q	Question
R&D	Research and Development
RFID	Radio Frequency Identification
Rnd.	Round
ROCE	Return on Capital Employed
SARS	Severe Acute Respiratory Syndrome
SC	Supply Chain
SCI	Science Citation Index
SCM	Supply Chain Management
SD	Standard Deviation
SME	Small and Medium Enterprises
SMI	Supply Management Institute
SRI	Stanford Research Institute
SSCI	Social Sciences Citation Index

TU	Technische Universität [Technical university]
ÜEEG	(Überarbeitetes) Erneuerbare-Energien-Gesetz [Renewable Energy Sources Act]
UPS	United Parcel Service
WHO	World Health Organisation

1. Introduction

The aim of this chapter is to introduce the reader to the topic of scenario planning for logistics service providers. It starts with the explanation of the subject and background of the research. In the succeeding subchapters the objectives of the research and its methodology will be explained. The chapter concludes with an outline that illustrates the structure of the thesis.

1.1. Subject and Background

At the beginning of the 1970s, Prof. Horst Wagenführ created the neologism “Futurologistik” that should describe a new applied science which combines the characteristics of both futurology and logistics. Futurology had been defined earlier in 1943 by Ossip Flechtheim as the science of the future that systematically and critically examines futures questions. The logistics understanding, in turn, was military influenced in these times and primarily concerned supply and maintenance of goods. Consequently, Prof. Wagenführ (1970, p. 147) defined “futurologistics” as a supporting discipline of futurology for the realisation of previously set futures targets. Its major aim, parallel to the military understanding of logistics, had been described as the establishment of supply and infrastructure for futurology in terms of capital, personnel, and other means. Today, 37 years later, both issues shall be combined again in the scope of this thesis, but in a slightly different and inverse way. The research presented concerns, in a broader sense, the contribution of futurology to logistics.

The term “futurology” is considered antiquated today and has been displaced by terms such as “corporate foresight” in the business environment and “futures research” in the academic field. Although not universally recognised as a field, futures research has evolved into a “quasi-discipline” that utilises information from all other sciences to examine the future systematically. Companies that engage in such research activities are able to anticipate future changes and, therefore, to be more flexible in reaction. It helps them to develop future robust strategies and enables them to realise competitive advantages in our turbulent times today. Corporate planners, futurists, and futures consultants draw on all methodological techniques that allow enhancing anticipatory consciousness, but the most prominent and powerful tools are scenarios.

Scenario planning had been developed in the 1950s at U.S. RAND Corporation in order to cope with uncertainties by systematically picturing and rehearsing future situations. It was initially used in the military context in the U.S. Air Force, but disseminated later, in the early 1970s, into business. A pioneer in scenario planning was Royal Dutch Shell, that successfully foresaw many incidents, e.g. the energy crises of 1973 and 1979, and therefore animated many others to engage similarly in such planning practices. Today, the application fields are wide-ranging due to the technique’s action flexibility, but it is most often used for long-range planning purposes. Due to the frequent usage in common language, the term “scenario” has been subject to much confusion. In a strict and classical sense scenarios describe internally

consistent, plausible, and challenging narrative descriptions of possible situations in the future, based on a complex network of influence factors (Gausemeier, Fink, & Schlake, 1998, p. 114; van der Heijden, 2005, p. 114). Scenario planning, in turn, has to be considered a combination of scenario development for strategic purposes and strategic planning based on the outcome of the scenario phase (Bishop, Hines, & Collins, 2007, p. 6; Lindgren & Bandhold, 2003, p. 27). Its major contributions include thinking in alternatives, enhancing a planners' perception, and offering a structure for dealing with uncertainty.

In the recent past, an increasing number of authors have elaborated the value of scenario planning for logistics primarily due to changes in the environment and its overall growing impact (see e.g. Blaas & Pschera, 2006, p. 120; Burbank & Ways, 2004, p. 11; Drew & Smith, 1998, p. 679; Göpfert, 2006a, p. 85; Klement, 2007, pp. 215-216; Shapiro, 2004, p. 14; Sodhi, 2003, p. 69; Spekman & Davis, 2004, p. 428). As a matter of fact, logistics has undergone several development steps in the past 50 years and has evolved from a classical supply function into a boundary-spanning, global, strategically relevant discipline. Experts prognosticate prosperous times for both the European and the German logistics industry in general, but particularly for the logistics service industry (Klaus & Kille, 2007). Nevertheless, the latter is also confronted with many challenges, such as intensifying globalisation, stronger competition, higher customer demands, more complexity and dynamism, higher risks, expected technological changes, outsourcing, and the consolidation of the industry. The interplay of all these factors has led to a more turbulent and uncertain environment, in which classical planning tools, such as trend extrapolation, are increasingly found inappropriate. Given all these circumstances, one might theorise that scenario planning is best suited for logistics service providers to establish flexibility and the ability to adapt to changes quickly. There are, however, indications that such planning practices are not widespread among logistics service providers, which raises the question in how far and why this is so.

1.2. Objectives of the Thesis

Scenario planning is a methodology that is successfully applied in many industries, such as pharmaceuticals, automotive, and the energy sector. Numerous success stories report how companies effectively managed to cope with competitive, volatile, and uncertain environments by investing in such planning practices. Various empirical studies additionally indicate that there is a growing number of companies engaging in scenario planning. The existing body of literature is rich and experiences a tremendous increase in publications particularly in the recent past. However, contrary to these general developments, there seems to be a backward picture for scenario planning in logistics science and practice.

Although there is a rich body of literature on scenario planning in general, such issues are rarely discussed in logistics science. The overall number of publications actually dealing with scenarios and logistics is very limited. Even more conspicuous is that among the few publications, academic examinations are clearly underrepresented. Most of the literature

sources address practice oriented scenario studies that rarely concern methodological issues of their research. In addition, there is a clear dominance of quantitative research that adopts a macro-economic perspective and focuses on single logistics functions, such as transport or infrastructure. However, scenario studies that picture industry scenarios while considering a more modern holistic perspective of logistics are hardly found.

Similar circumstances concern scenario planning in logistics practice. There are actually no statistics available on such planning practices in the logistics field. Several managers and researchers have stressed the need for futures orientation and innovation in logistics. In particular the value of scenario planning has been addressed, but empirical studies on its proliferation among the logistics service industry have so far not been conducted. It is, however, a fact that there is almost no documentary evidence that relates scenario planning activities to logistics service providers. As a consequence, there seems to be a discrepancy between the need for such planning practices as highlighted by many people and the actual practices within the logistics environment. Empirical research projects in the related fields, i.e. risk management, innovation management, and strategic logistics management, support this assumption.

Given the identified research gaps in logistics science and practice, the overall mission of this thesis is to examine the field of scenario planning for logistics service providers in all its facets. Its two objectives have been formulated as follows:

1. *To determine the current scenario planning practices in the logistics service industry*
2. *To conduct a qualitative scenario study for the logistics service industry considering a holistic logistics perspective*

Both objectives have several further dimensions. In the scope of the first objective, it is intended not only to describe the current planning practices, but also to examine the underlying causalities for the situation on hand. The second objective, in turn, not only relates to the development of future scenarios, but also to an illustration of the scenario technique's possibilities, thereby addressing the methodological gap.

1.3. Research Methodology

In accordance with the two research objectives a research methodology has been designed that is divided into two major research phases. Research phase I refers to the first objective and therefore concerns the current planning practices in the logistics service industry while research phase II, in turn, is related to the second objective and comprises a scenario study on the future of the logistics service industry. The author developed the research framework following a research philosophy of pragmatism as well as methodological triangulation in order to capture multidimensional insights in the topic and to assure valid and reliable research results.

Research phase I follows a sequential triangulation approach, where the quantitative comes before the qualitative research and where the latter is given more weight. The quantitative part can be characterised as being descriptive-deductive research. Based on a literature review, four propositions will be derived, that are subsequently tested in form of a structured survey among logistics service providers. Thus, it provides an internal perspective and helps to *describe* the current scenario planning practices.

The qualitative part can be characterised as being explanatory-inductive research. A descriptive framework will be developed, that exists of additional four propositions. Based on this framework, semi-structured expert interviews among scenario consultancies will be conducted, that help to *explain* the identified scenario planning situation in the logistics service industry. Thus, the research provides an external perspective on the issue under consideration.

Research phase II contains elements of both deductive and inductive research and *explores* the long-term probable and surprising future of the logistics service industry in a two-round expert-based scenario study. It will be interlinked with research phase I at several points.

1.4. Outline of the Thesis

The doctoral thesis is divided into 9 chapters (see Figure 1 on page 7). Chapter 2 forms the first of three theoretical passages in this thesis. It presents the theoretical foundations of futures research and therefore forms the broader framework in which the content of the succeeding two theoretical chapters has to be considered. Chapter 2 will start with a brief review of the evolution of futures research while paying attention to the changing paradigm of the future during different epochs. It will then proceed with a clarification of futures terminology and the current state of the discipline in order to establish a common understanding of the technical language used. Afterwards, chapter 2.4 will introduce the reader to the fundamentals of futures research, i.e. people's motives, benefits, and potentials, rationales and tasks, as well as methodological issues. In the context of the latter, the bridge will be build to the succeeding two chapters on the Delphi technique and scenario planning. The chapter 2 concludes with theoretic-conceptual contributions of five distinct theories to futures research and by that elaborates further on its scientific component.

Chapter 3 is dedicated to the Delphi technique, one of the most prominent tools of futures research, in order to lay the theoretical fundament for its later usage in the course of a scenario study. The chapter starts with a brief review of the technique's historical roots. Afterwards a definition and the fundamental rationales are provided. Especially the latter are of great importance for the reader to understand the technique's value for futures research. In chapter 3.3 different Delphi variants are presented. Among others three main types are distinguished, of which one is later applied in research phase II. The following subchapter discusses application areas of Delphi studies and provides statistics on its proliferation in science and practice. It will thereby illustrate that Delphi can be considered a widely used,

scientifically accepted research methodology. Chapter 3.5 concentrates on design aspects of Delphi studies. This subchapter was given particular weight, since it forms the fundament for a significant part of the research methodology in chapter 6. In addition, it may serve as a methodological guideline for future researchers and practitioners who intend to implement expert consultation in scenario research in a similar way. The subchapter 3.6 will review how consensus measurement is organised in Delphi research. The results will be used to define suitable measurement criteria and analysis strategies for research phase II (see chapter 6.4.5). Chapter 3.7 will finalise the fundamentals of Delphi by elaborating on quality criteria. The chapter will be of particular value for the critical reflection on the research methodology of research phase II in chapter 8.4.2.

Chapter 4 represents the last of three theoretical chapters within this thesis and addresses fundamentals of scenario planning. It starts with a review of the origins and current state. This will include statistical figures on the scenario technique's proliferation in science and practice. Afterwards, chapter 4.2 will discuss terminological basics which will be frequently used throughout all subsequent chapters. It is therefore imperative that the reader is knowledgeable about them. Chapter 4.3 illustrates the value of scenario planning in business practice and therefore also justifies the value of research phase II. After general considerations of the technique's contribution, chapter 4.3.2 will concentrate on empirical evidence of the planning-performance relationship in general and scenario planning in particular. Chapter 4 ends with methodological issues of scenario planning. The author will present a classification scheme of scenario studies, an overview over some prominent scenario approaches, a generic scenario process, as well as some common pitfalls.

Chapter 5 comprises the literature review that forms the fundament for the design of the research phases I and II. It is divided into three subchapters, of which the first refers to the need for futures orientation and innovation in logistics. It will start with a brief introduction of logistics and then proceeds with current figures and trends of the logistics industry, in particular the logistics service industry. Chapter 5.1 will end with a discussion of identified documentary evidence of scenario planning activities among a few large logistics service providers. Chapter 5.2 focuses on strategic logistics management. It includes, among others, definitions and a description of the strategic logistics planning process. The described facts are, where possible, supported by empirical evidences. Chapter 5.3 includes the summarising analysis of the current literature on scenarios and logistics. The review results are presented in tabular form, classified by publication type, focus, and content.

Chapter 6 describes the research design and methodology. It starts with an explanation of the scope of the thesis and proceeds then with an illustration of the overall research design in which the research is classified, and the fundamental characteristics of the two research phases are explained. Chapter 6.3 subsequently outlines the design of research phase I in detail. This includes the description of its first quantitative part, the "scenario check", and its

second qualitative part, the interviews with scenario experts. Eight propositions are presented, that will be tested and discussed in chapter 7. Chapter 6.3 pays particular attention to the respective sampling procedures and survey processes. Chapter 6.4 concerns the research phase II, i.e. the scenario study. Its first two subchapters elaborate on the aim and scope of the study, whereas chapter 6.4.3 describes the futures methodology in more detail. This will include the justification for the development of expert-based scenarios for the probable and surprising future. Chapter 6.4.4 illustrates the scenario development process and how the Delphi technique is implemented in the research. The subsequent chapter 6.4.5 concerns the survey characteristics and has therefore a strong reference to chapters 3.5 and 3.6 on Delphi design aspects and consensus measurement.

Chapter 7 presents the results of research phase I on current scenario planning practices in the logistics service industry. While chapter 7.1 refers to the scenario check, chapter 7.2 concerns the interviews with scenario experts. Both chapters start with an analysis of the response and subsequently present their findings. The structure of the subchapters is geared towards the eight propositions formulated in chapter 6. Where possible, the author included comparisons of his findings with other secondary data in order to cross-validate. Chapter 7.3 builds the bridge between the two parts of research phase I and includes an overall conclusion of the triangulation approach with respect to content and methodology.

Chapter 8 presents the results of research phase II, i.e. of the expert-based scenario study on the future of the logistics service industry 2025. It starts with a response analysis of the Delphi survey. Chapter 8.2 subsequently proceeds with the findings of the probable future of the industry. This includes a comparative illustration of all future projections, several quantitative and qualitative in-depth analyses of the Delphi data, and the picturing of a highly probable future based on experts' estimations. Chapter 8.3 refers to discontinuities and the surprising future. Based on the Delphi data, eight extreme scenarios will be developed as well as three wildcard scenarios. All scenarios consist of a general descriptive part and a transfer part with implications for the logistics service industry. Chapter 8.4 ends the presentation of the findings with a critical reflection. It will among others summarise five dominant themes of the probable future. In the discussions on methodology in chapter 8.4.2 strong reference is made to chapter 3.7 on quality criteria in Delphi studies. In order to check for concurrent validity, the findings will be compared with another futures study in this field.

Chapter 9 concerns the overall summary and conclusions of this thesis. In chapter 9.1 the research is summarised. This includes a brief description of the methodology, the results of the literature review, and the findings of the two research phases. Special attention is paid to interrelationships between all the findings in order to capture a holistic picture of the topic under consideration as defined in the overall mission of the thesis. The chapters 9.2 and 9.3 discuss theoretical and managerial contributions. The thesis ends with limitations and future research, summarised in 12 points.

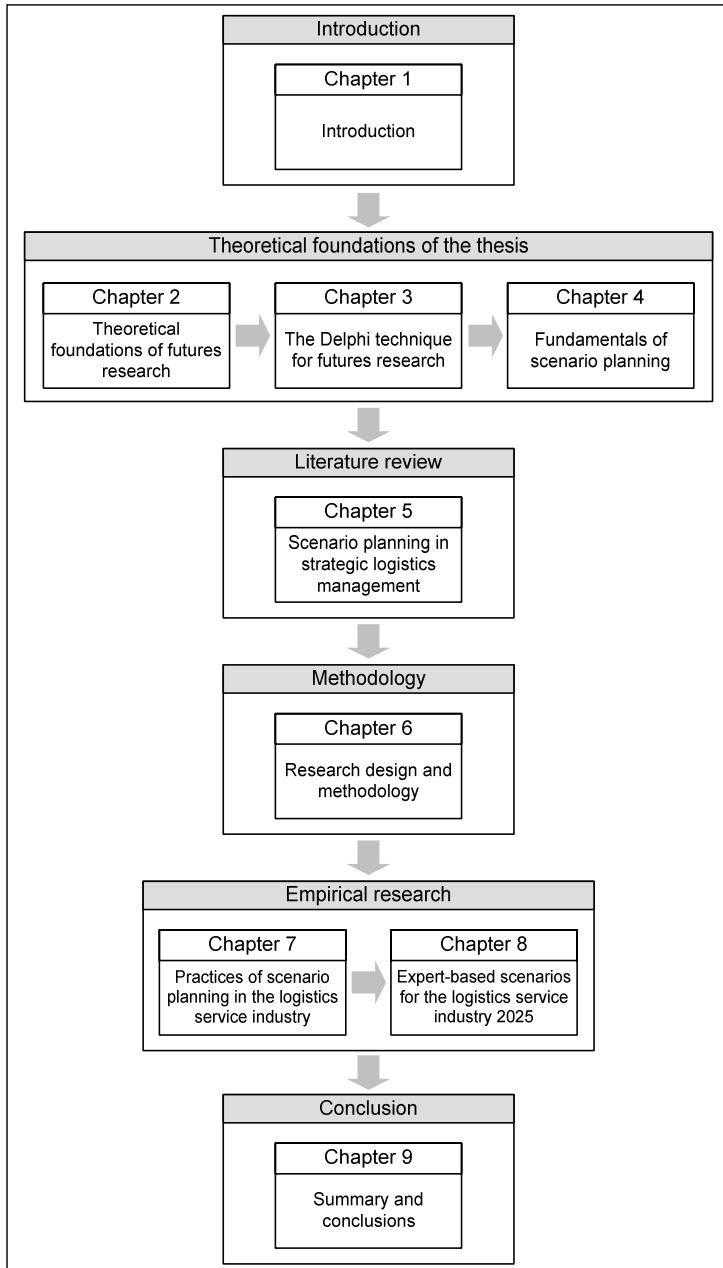


Figure 1 Thesis Outline

2. Theoretical Foundations of Futures Research

This chapter forms the first of three theoretical passages in this thesis. It introduces the reader to the fundamentals of futures research. The chapters 3 and 4 will expand on this content and discuss the two most prominent tools of futures research in more detail, since these will be also applied within the research of this thesis later on.

2.1. The Evolution of Futures Research

Thinking about the future is not a recent phenomenon of humankind. It has been a central aspect of life since the beginning of civilisation. Solely the attitudes toward the future have changed in history as regards the way people look at the future and how contemporary values affect future perspectives (Masini, 2006, p. 1158). As McHale (1978, p. 5) highlights, conjecture, speculation, and exploration of future events have always been prime features of the human condition. Foresight, the act of looking forward, is widely recognised as a major source of wisdom, competitive advantage, and cultural renewal (Chia, 2004, p. 21). Anticipation of the future has strongly influenced people's decisions and behaviour. It is well-known that the more instability and social change people faced, the more prominent the belief in anticipation of the future and predictions was. However, the modern paradigm of the future significantly differs from that of the past centuries. In today's futures studies, concepts, theories, methods, epistemologies, and substantive principles do exist (Bell, 2002b, p. 241). According to Göpfert (2006c, p. 3) it has matured to both a theoretical-conceptual and application-oriented research discipline. Slaughter (2002, p. 349) even speaks of futures studies as a globe-spanning metadiscipline.

Many examples of the examination of the future can already be found in classical mythology. A prominent example would be that of Cassandra, Trojan princess and daughter of Priam, who foresaw the fall of Troy (Strathern, 2007, pp. 14-15). Apollo promised her the power of prophecy if she would accept him as a lover. She took the gift, but rejected Apollo. As a consequence, the God changed her blessing to a curse, causing that her prophecies should never be believed. As we know today, the Delphic Oracle began its predictions around 800 B.C. Many political leaders as e.g. King Croesus of Lydia and Alexander the Great asked the oracle for advice before major decisions were made (Minois, 1998, pp. 74-76). The Greek and Middle Eastern prophetic traditions can actually be seen as the beginning of great foresight.

Also in mediaeval times and in the Renaissance, prophets and seers anticipated times of crisis and future events. It is evident that the development of scientific control evidence came from the Renaissance leading to a perception of the future as being logically and demonstrably knowable (Flechtheim, 1945, p. 460; McHale, 1978, p. 6). One of the most prominent examples of that epoch would be Nostradamus, who in 1555 published his famous book "Les Propheties", in which he compiled his collection of major, long-term predictions. The paradigm of the future changed again in the course of the following epochs. The Reformation

was characterised by a view towards materiality and more conscious control over social futures, whereas the 18th century with its utopian writers and philosophers is considered to be the formal origin of our contemporary sense of the future (Clarke, 1970c, p. 69; Cornish, 1977, pp. 54-55). The futures paradigm of the late 19th and early 20th century was influenced by famous science-fiction novels, which shaped our conceptual orientations to the future (Clarke, 1970a, p. 171, 1970b, pp. 269-270; Cornish, 1977, pp. 62-63; McHale, 1978, p. 8). Best known are the French author Jules Verne and the British writer H. G. Wells, who published his book “Anticipations – An Experiment in Prophecy” in 1901. Filippo Tommaso Marinetti can actually be seen as the founder of the futurist movement of the early 20th century (M. Clark, 1978, p. 322). He is supposed to be the first to use the term “futurism” in his contribution of the Futurist Manifesto, first published in the Paris newspaper *Le Figaro* on 20th February 1909. Later on, in 1918, he founded the Futurist Political Party.

The systematic examination of the future in the sense of modern futures research can be traced back to the end of World War II (Clarke, 1978, p. 74, 1979, pp. 252, 258-259; Cornish, 2004, p. 186). As McHale (1978, p. 9) points out, futures research per se emerged as a quasiformal discipline. In this period the United States started scientific analyses of trends and indicators of change in order to anticipate events (Masini, 2006, p. 1159). In 1946 the RAND Corporation was founded, which was a joint project between the U.S. Air Force and the Douglas Aircraft Company. Its mission was to further promote scientific, educational, and charitable purposes, all for the public welfare and security of the United States of America. Various analytical techniques were invented at RAND Corporation, of which the two most prominent ones are the Delphi technique and the scenario technique (Cornish, 1977, p. 85). In the following years the examination of the future turned out to be a more sophisticated systematic field, where a significant number of academics and other professionals worked on. In Europe, France took a pioneering role concerning futures studies. In 1964 Bertrand de Jouvenel published his famous book “*L’Art de la Conjecture*”, in which he addressed the philosophical and sociological dimensions of futures studies (Cornish, 1995, p. 368). Besides France, further pioneering nations in futures studies were the Netherlands, Sweden, and Switzerland.

After an initial “boom” in futures studies or, in other words, futures research, the developments stagnated during the 1970s up to the 1990s. This can be ascribed to a change of mind as regards the applied techniques, which were primarily of quantitative nature. Their fundamental assumption of stability in time was no longer found to be realistic and sufficient (Göpfert, 2006c, p. 3). In recent times, things have changed again. Futures studies has indeed become more qualitatively oriented (Göpfert, 2006c, p. 8). As van der Duin (2006) reports, there has been “a transition of a hard, isolated, and conscious set of distinct activities and methods of technology forecasting, towards a softer, integrated, and communicating process” (p. 34). In addition, higher competition, dynamics, and complexity have led to more companies trying to systematically prepare for the future. The increasing complexity and the

acceleration of change decrease the time that companies have in order to make decisions. By the application of futures methodologies, such as the scenario technique, companies are able to systematically explore, create, and test both possible and desirable futures to improve decisions (Glenn, 2003b, p. 3).

2.2. The Dissent in Futures Terminology

Foresight, futurism, futurology, futures research, and futures studies are just some of the synonyms that are used today and that show that a clear distinction between terms of this field is quite difficult. Up to now, no consensus concerning terminology has been reached (Bell, 2003, p. 70; Glenn, 2003b, p. 3). The use of terms differs by region, and it is further influenced by cultural developments as well as temporary fashions. Often, expressions are interchangeable in use. The term “futurology” was actually coined and defined by Flechtheim (1971) as “the systematically and critically dealing with futures questions” (p. 13). He stated that historical, sociological, philosophical, psychological, political, and economical knowledge can be used to yield insights into the future and to present a meaningful synopsis of the future (Flechtheim, 1945, p. 461). Bertrand de Jouvenel (1967, p. 32) criticised that the term “futurology” could imply that it is a science, which, to his mind, it is not. He proposed the term “futuribles” instead, which distinguishes a future state made plausible or imaginable by new developments (de Jouvenel, 1967, pp. 33-35). Despite this criticism a number of futurists, especially in Europe, had accepted futurology as a reasonable descriptive for the futures field (Cornish, 1977, p. 255). However, both the terms “futurology” and “futuribles” were solely limited to Western Europe and they have actually never been widely used in the United States (Bell, 2003, p. 69). Futuristics has been defined as “the field of study that seeks to identify, analyse, and evaluate possible future changes in human life and the world” (Cornish, 1977, p. 258). The term may have been preferred by some futurists because it is less confusing than double-word terms and it implies no limitation to scientific activities. However, McHale (1978, p. 9) remarked that futurology, futuribles, and futuristics were often interchangeable in use, especially in Europe.

In 1975 the World Future Society polled its member on their preferred term for the field. As Cornish (1977, pp. 256-257) reports, only the two terms “futures studies” and “futures research” received a net positive response. The other terms in order of preference were: futures analysis, futuristics, forecasting, futurology, prognostics, futurics, and futuribles. McHale (1978, p. 9) constituted that prognostics was the preferred term in Russia and Eastern Europe, whereas futures research had been more prominent in the United States. Even prospective studies or prospective was used by some futurists for the field. Glenn (2003b, p. 6) and Bell (2003, p. 68) concordantly report that the latter terms are still existent in Europe and Francophone Africa, and they imply the study of the future to develop a strategic attitude of the mind with a long-range view of creating a desirable future.

“Futurist” is the predominant term for the persons that work with the future. According to Marien (2002, p. 271), most futurists would describe their activity as exploring probable, possible, and preferable futures, as well as identifying present trends. The word originates from the term futurism that was coined by Filippo Tommaso Marinetti in 1909. Although the term “futurism” is regarded as old-fashioned for the field, the term “futurist” is widely accepted. It has displaced the term “futurologist” over time.

Recent research on futures terminology has been conducted by Marien (2002). He identified 115 terms that are used in connection with futures thinking today. The author comes to the conclusion that some of the terms are interchangeable and others reflect slight difference. However, predicting, foresight, visioning, and scenario construction are some of the more common terms at the moment (Marien, 2002, p. 270). Especially foresight is widely accepted by the community. It is an inherent human activity used every day by individuals throughout society and business (Loveridge & Street, 2005, p. 31). The term has been increasingly used since the late 1980s and it draws on wider social networks than has been the case with “futures studies” (Eurofound, 2003, p. 20). Cunha et al. (2006) see foresight less as a technical and analytic process, but as “a human process permeated by a dialectic between the need to know and the fear of knowing” (p. 942). Corporate foresight has become the prevalent term used by many companies for their research activities on the future. It stands for the analysis of the long-term prospects of business environments, markets, and new technologies, and their implications for corporate strategies and innovation (Ruff, 2006, p. 279).

2.3. Futures Studies – A Discipline or not?

There is currently a controversial discussion whether futures studies can be regarded as a discipline or a field at all. Bell (2003, p. 59) constitutes that the first steps toward the creation of futures studies as a distinct field have already been taken. According to him, the existing controversies do not mean that it is not a field. The ongoing discussion even underlines that its members constitute a disputatious community (Bell, 2002b, p. 235). The detractors of this thesis criticise that futures studies is too fragmented to be a field, as it covers a wide range of subject matters. To them it is solely an area of study with some characteristic features and a domain of competence of its own (Mannermaa, 1998, p. 427). However, the counterparty argues that this fragmentation also exists in other recognised disciplines today. They refer to an analogy to history as a field. Bell (2003, p. 67) points out that history is similar to futures studies, since it ranges over a diverse subject matter, though focussed on the past rather than the future. Additional comparisons are made with area studies, since it is similar, but focused on time rather than space (Bell, 2002a, p. 439). Due to its diversity and its fuzzy boundaries some members of the community prefer the terms “multifield” or “transdisciplinary field” (Bell, 2003, p. 71; Marien, 2002, p. 269). Similar discussions also concern related terminology. There is, for example, currently a debate on whether futures research has to be considered a science or not (Bell, 2003, pp. 165-189; Niiniluoto, 2001). Futures research is

said to be more decision-oriented, whereas futures studies is more subject- or question-oriented (Glenn, 2003b, p. 8). However, the term actually implicates a scientific activity. According to Mannermaa (1998, p. 427), there is an empirical element insofar as the future is examined on the basis of theoretical and empirical research. Blass (2003, p. 1053) regards futures research as postmodern research, while also being interpretive and scientific. Nevertheless, it is often argued that futures research is not a science because controlled experiments like in physics and chemistry are not possible (Glenn, 2003b, pp. 6-7). At present state, it is not universally recognised as an academic field yet, but, according to Glenn (2003b, p. 7), that is likely to change over the next years. Futures research will due to its scientific notion be the preferred term within this thesis.

2.4. Fundamentals of Futures Research

Futures thinking is an activity that in some form takes place everywhere in our today's world. It is prevalent in governments, industries, non-profit organisation, and in our normal life. It helps us to improve the quality of our decision making and our lives on a personal, organisational, social, and global level (Hines, 2002, p. 339). Futures research refers to the systematic examination of the future. In this context it utilises information from all of the other sciences (Glenn, 2003b, p. 7). That is why some regard it as a metadiscipline. The study of the future is part of modern humanism, both philosophical and scientific (Bell, 2003, p. 5). It is done by individuals called futurists as well as companies or institutions. It may be someone's profession or passion and also just a methodology for decision making in business. The most general purpose of futures studies can be described as to maintain or improve the freedom and welfare of humankind (Bell, 2003, p. 73). According to Masini (2006, p. 1162), people examine the future in order to better understand the changing interrelations between man, society, and the environment. People want to discover or invent, examine, evaluate, and propose possible, probable, and preferable futures (Bell, 2003, p. 73). For this reason futures research draws on whatever methodological techniques may be available in existing disciplines if they are relevant to the futures investigation at hand (Bell, 2003, p. 242). The techniques may have different approaches, but all of them aim at enhancing anticipatory consciousness. Van der Duin (2006, pp. 13-15) summarises three important motives for organisations to look to the future:

1. Increasing dynamics
2. Anticipation as a strategic weapon
3. Change towards a demand-driven business

Companies that systematically conduct futures research are likely to realise time advantages, because they can react more flexibly on future changes. They are able to develop certain strategies based on their gathered knowledge of possible futures and the fundamental dynamics of developments. This strategic preparation enables them to realise competitive

advantages (Glenn, 2003b, p. 4; Hamel & Prahalad, 1994; Porter, 1985, pp. 447-448). The results of futures research, consequently, support strategic planning.

According to Bell (2003, pp. 75-97), there are nine distinct tasks of futures research. To him, it encompasses the examination of possible and probable futures as well as of images of the future. Moreover, such activities comprise the study of its knowledge and ethical foundations. Futurists may also interpret the past and orientate to the present. They may even integrate knowledge and values for designing social action or increase democratic participation in imaging and designing the future. At last, it may be a futurist's task to communicate and advocate a particular image of the future. In fact, futures research does not imply any restriction as regards the scope of examination. It means any exploration of what might happen or what we might want to happen. People engage in futures research to identify and describe current forces that should be understood in order to make more intelligent decisions (Glenn, 2003b, p. 8). Compared to futures studies, it implies a more systematic and scientific activity. This is why the term is more frequently used in academia. Since the research is not limited in its scope, it can even regard small-scale and near future issues as objects. The key objective can be described as the generation of knowledge for an active shaping of the future. Göpfert (2006c, pp. 6-7) summarises five fundamental characteristics of futures research. First of all, the future is not predictable. Second, the focus lies on the examination of the development process of an object. Third, it implies thinking in alternative futures, which supplements the first characteristic. This is even the reason why futurists prefer to use the plural "futures". Fourth, futures research is universal in its objects, since it can be applied to anything. Fifth, it can be classified as being multidisciplinary in the sense of a methods science similar to statistics.

In fact, the success of futures research is empirically verifiable. Research of the Ifo Institute for Economic Research in Munich, Germany, had already proven in 1970 that the increase in sales or the turnover of private companies was generally higher, the more long-range planning the companies conducted (Wagenführ, 1970, p. 107). However, the value of futures research is less in forecasting accuracy, than in usefulness in planning and opening minds for new possibilities (Glenn, 2003b, p. 4).

The two most prominent tools of the futures field are the Delphi technique and the scenario technique. Both are best suited to examine long forecast horizons (Gordon, 1992b, p. 34). The Delphi technique is a special form of a written expert consultation, whereas the scenario technique is a systematic approach to develop internally consistent and plausible descriptions of the future. Both methodologies are often combined in research since expert-based scenarios are considered to be more profound. Wilson (1978, p. 226) stresses that the best that futures research can do is to explore alternative possible futures. To him, scenarios are admirably suited for such an exploration. As Bell (2003, p. 316) constitutes, they can even be a good way of summarising the results of futures research. Scenarios enable strategists to look further