



Corporate foresight and innovation management: A portfolio-approach in evaluating organizational development

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ABSTRACT

The transition from a traditional industry-driven economy to a knowledge-based economy requires new concepts and methods for companies to sustain competitive advantage. Here, academia has identified corporate foresight and innovation as key success factors. While, content-wise, the contribution of futures research methods to the innovation process has already been researched, this study strives to explore the status quo of organizational development stages of both concepts. To do so, we developed a portfolio-approach, the so-called 'Future-Fitness-Portfolio', which enables companies to qualitatively compare amongst others and identify organizational improvement potential. In addition, we conducted expert interviews to explore future organizational development trends in corporate foresight and innovation management. As our research revealed, five strategic clusters can be identified within the portfolio. Consequently, we propose specific strategies for each individual cluster. We conclude that there will be two main organizational development trends for corporate foresight and innovation management in the future: in traditional industries with conventional business models and long product-life-cycles, companies will follow a different development path than companies in dynamic industries with innovative business models and short product-life-cycles.

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1. Introduction

In the past decade, a new and unprecedented challenge for companies of all sizes has arisen, one that could mean life or death for a particular organization [1, p. 1]. With this weighty statement, Jonathan Spira heralds the beginning of a new era: the knowledge economy. Likewise, a recent McKinsey survey amongst executives on global trends and their impact on business strategies shows that the greater ease of obtaining information, and thus creating knowledge, is perceived as one of the most influential trends in the business world today [2, p. 17].¹ However, as Van Giessel and Boekholt [3, p. 2] point out, this paradigm shift from a traditional industry-driven economy to the new knowledge-based economy also implies sundry challenges for companies and their business environment. For example, Porter and Millar [4, p. 150] analyze the future competitive landscape for companies by stating that the 'information revolution' affects competition in three vital ways: it changes industry structure and, in doing so, alters the rules of competition; it creates competitive advantage by providing companies new ways to outperform their rivals; and it spawns completely new businesses, often from within a company's

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¹ 81% of the respondents answered the question on how important they expect the trend of obtaining information with greater ease and developing knowledge to be on global business during the next 5 years as very important or important.

existing operations. Accordingly, Drucker [5] summarizes the situation by claiming that “in the next 10 to 15 years, collecting outside information is going to be the next frontier” (p. 5).

But what is information? Recent surveys show that there is no consensus on a single, unified definition of information [6, p. 3510]. According to Zins [7, p. 447], data is conceived as the raw material for information, which again is conceived as the raw material for knowledge, the highest order construction. This understanding corresponds with the definition given by Drucker [8] who sees information as “data endowed with relevance and purpose” (p. 46). According to Drucker, converting data into information consequently requires knowledge.

Berkhout, Hartmann, van der Duin and Ortt [9, p. 391] go one step further and claim that in addition to capital, labour, and knowledge, creativity will become the fourth principle factor of production. However, the question remains what concepts and methods companies can employ to cope with challenges implied by the knowledge economy, or even gain a competitive edge. Academia has identified corporate foresight, a business-oriented form of futures research, combined with innovation management, as a way to face the demands of a knowledge economy [10, p. 339]. Johannessen, Olaisen and Olsen [11] argue that “knowledge is not objective facts, but a way of organising our experience” (p. 126). Hence, it is crucial for companies to establish systematic ways and methods of managing knowledge. Corporate foresight is one such method. Hines [12] summarizes that “strategic foresight can become a fundamental part of a learning organization, which is essential to success in today’s fast-changing environment” (p. 21).

On the other hand, innovation has become another hot topic at the beginning of the 21st century. It is at the center of attention at virtually any conference and headlines the front covers of many business magazines published in 2007. In an empirical study, the management consultancy Arthur D. Little [13, p. 2] shows that innovation is of ‘paramount importance’ for companies and policy makers due to the increasing importance of innovation as a result of quickly changing technologies and environments, shorter product-life-cycles and an increasing difficulty to differentiate from competitors. Customers are more sophisticated, segmented and demanding, and expect more in terms of customization, novelty, quality and price. As a consequence, the management of innovation, in order to systematically generate new ideas and to develop them into marketable goods and services, has become a key competitive factor in today’s business environments. Accordingly, many authors, including world-renowned strategist Michael Porter [14, pp. 6–7; 15, pp. 24–25], argue that innovation management is the right tool to cope with future challenges.

Thus, corporate foresight and its symbiotic relationship to innovation management figures as the focal point of this article. Despite their practical relevancy however, the question arises how futures research methods can contribute to the innovation process. In the following discussion, we give a short terminological background and list major publications in this field, including research scope and key findings.

2. Literature review on corporate foresight in the innovation process

The systematic examination of the future in the sense of modern futures research is not a recent phenomenon. It can be traced back to the end of World War II [16, p. 74; 17, pp. 252, 258–259; 18, p. 186]. As McHale [19, p. 9] points out, futures research per se emerged as a quasi-formal discipline. In this period, the United States started scientific analyses of trends and indicators of change in order to anticipate events [20, p. 1159]. During the 1950s, futures methodologies, such as the scenario or Delphi technique, were developed. In the late 1970s, Strategic Issue Management (SIM) emerged as a method to support the corporate planning process and to cope with uncertainty in the business environment [21,22]. The research strand centered around the works of Jane E. Dutton [23–28] in the U.S. and Franz Liebl [29–32] in the German literature concentrates on the systematic analysis and management of strategic issues, i.e. events, developments, or trends that might affect the firm’s future performance. Closely related, yet emanating from a more systems-driven understanding, are the research strands of ‘weak signals’ [33–35] and ‘environmental scanning’ [36–40].

Since the late 1980s the term ‘foresight’ has increasingly been used. It describes an inherent human activity used every day by individuals throughout society and business and draws on wider social networks than ‘futures studies’ [41, p. 31; 42, p. 20]. Cunha et al. [43, p. 942] view 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 futures research activities. The term stands for the analysis of long-term prospects in business environments, markets and new technologies, and their implications for corporate strategies and innovation [44, p. 279]. Hence, corporate foresight can be understood as an overarching futures orientation of an organization and is, therefore, considered a part of strategic (innovation) management [45, p. 960]. Futures researchers, such as Ratcliffe [46, p. 40] and Hines [12, p. 21], are of the opinion that an unconditioned futures orientation, paired with strong foresight capability and capacity, based on flexible and adaptable systems, is the secret to success for any company.

In addition, excellence in innovation management is increasingly being linked to a company’s capability in futures research. As former Siemens Chairman, von Pierer, liked to point out: “The surest way to predict the future is to create and shape it yourself. Accordingly, corporate foresight enables companies to deal with radical and incremental change in the internal and external environment of their organization. Likewise, corporate foresight is a concept that pays attention to the complexity and dynamics of future developments as well as their interdependencies. Therefore, it is best suited to support decisions in innovation management [47, p. 2].

In general, there are two different situations where corporate foresight can contribute to the innovation process: before the idea is born and when the idea is already established. In the first situation, corporate foresight is applied as a concept to

inspire and create new ideas for innovation [48, p. 97]. As von Reibnitz [49, p. 173] indicates, corporate foresight provides comprehensive insight into the future development of the environment, which in turn induces ideas for new products and services. In the second situation, corporate foresight can help to assess either the commercial and technological viability and/or to adjust or abandon the innovation process [48, p. 97]. In these situations, corporate foresight helps to cope with uncertainty [50, p. 222] by preventing companies from investing time, money and other resources in ideas that might not prove to be successful innovations in the future [48, p. 95].

In order to provide an overview of the different implementation possibilities and research foci of corporate foresight in the innovation process, Table 1 summarizes the major publications including their research scope and key findings.

Although, content-wise, the contribution of futures research methods to the innovation process and the strategic importance of both concepts in the knowledge economy have been investigated in numerous studies in the recent past, Van der Duin [60, p. 181] identifies several practice-oriented research gaps and, consequently, formulates an agenda for future research. Accordingly, one of his proposals is to investigate the strategic environment of corporate foresight and innovation

Table 1
Literature review on the contribution of corporate foresight to the innovation process.

Author(s)	Research scope	Key findings
Burmeister/Need/Beyers [51]	The concept of corporate foresight	There are five 'innovation parameters' in which corporate foresight can contribute to the innovation process: the anticipation of future demand, higher quality through better information, context-orientation, timing, and the identification of strategic innovation networks
Daheim/Uerz [52]	Corporate foresight in Europe	An empirical study amongst 152 large European companies shows that 57.5% of the respondents perceive corporate foresight as an improvement of the innovation process
Drew [53]	Application of scenario planning methods to (technological) innovation	Scenario techniques can be successfully applied to analyzing disruptive innovation (although not limited to them) and the changes they can cause in industry structures and firm capabilities
Fink/Schlake/Siebe [54]	Scenarios in innovation management	Based on four levels of corporate planning and three different 'thinking horizons', there are twelve 'innovation arenas' in which innovation management has to take place; innovation management as a combination of 'planning' and 'thinking'
Gruber/Venter [45]	Corporate foresight in German companies from a management perspective	Companies do not make use yet of the full range of large content- and process-related, organizational and personal possibilities of futures research; three typical patterns of corporate foresight can be identified
Kaivo-oja [55]	Role of foresight systems elements in relation to the innovation systems	Foresight and innovation systems can interact in different ways; foresight knowledge is not the only kind of knowledge needed for the innovation process; in different innovation models the strategic role of foresight knowledge is different
Neef/Daheim [56]	Current developments of corporate foresight in Europe	Corporate foresight has become more widespread, professional and diverse; to be successful, corporate foresight must be integrated into organizational processes, such as strategy and innovation, as well as become more visible
Pirttimäki [57]	Corporate foresight needs of industrial firms	Combining methods of product and service concept development with foresight methods can help to foresee innovations; corporate foresight can be utilized both in strategic planning and strategy implementation; a permanent foresight function should implement innovation foresight exercises
Roveda/Vecchiato [58]	Foresight and innovation in the context of industrial clusters	Whereas interactive workshops and expert panels are best suited to foster incremental innovations, scenarios and other 'vision-oriented' methodologies are more appropriate when radical innovations are needed
Ruff [44]	Practice of corporate foresight within a multinational automotive company	The strategic goal of innovation leadership requires an early detection of opportunities and risks; a future-oriented evaluation of innovation ideas follows five sequential steps: observation of future trends, trend impact analysis, idea generation, evaluation of innovations, and feasibility evaluation
Schulz-Montag/Müller-Stoffels [59]	Scenarios in innovation and strategy processes	A trend and scenario-based innovation process comprises five steps: trend analysis, projection of relevant futures (scenarios), generation of innovative ideas, evaluation and assessment of ideas, communication of ideas within the organization/idea transfer
Van der Duin [60]	Qualitative futures research for innovation	The level of integration of corporate foresight in the innovation process can vary between ad hoc, integration-method and full integration; the main function of futures research is to inspire and not to test the 'future-proofness' of ideas
Warnke/Heimeriks [61]	Technology foresight as an innovation policy instrument	There are four different ways how foresight can support innovation policy: as a systemic instrument fostering innovation capability, as an orientation towards societal needs, as an agenda-setting process, and as a provider of anticipatory intelligence for decision-making
Z_Punkt [62]	Practice, methods and perspectives of futures research in corporations	Systematic use of futures research methods in the strategic product planning process can increase the likelihood that today's investments result in tomorrow's innovations; in the near future, there will be an increasing importance in scenario-based innovation and product strategies

management. Though Gruber and Venter [45, pp. 962–963] research important strategic aspects such as organizational, process-related or HR-related implementation possibilities, their sole focus is on the concept of corporate foresight. Hence, knowledge remains incomplete regarding the empirical status quo of the organizational development mix of corporate foresight and innovation management.

3. Nature of the research

In order to close this gap, our study used an explorative approach to research the relationship between corporate foresight and innovation management. It provides insights into today's developmental stages of corporate foresight and innovation management as well as future development trends in this field by means of a newly developed portfolio-approach. Hence, it is a first attempt to develop methodological and practical knowledge for managing corporate foresight and innovation in tomorrow's knowledge economy. The explorative research approach was chosen due to the novelty of the foresight–innovation-relationship as research subject. We used an extensive literature review and field research as a platform for theory development, in accordance with the process proposed by Eisenhardt [63] and Lievens et al. [64].

We propose specific strategies for companies according to their position in the portfolio and, supported by our literature review, we also theorize ways to achieve 'future-fitness'. An appropriate research framework has been developed prior to the field research. The research framework is based on the literature and a reanalysis of seven secondary-data case examples. Three of these case examples originate from van der Duin's [60, pp. 61–156] study on qualitative futures research for innovation and four from previous primary research.

In our field research, we generated additional primary data by means of semi-structured expert interviews in order to explore future development trends and success factors for corporate foresight and innovation management. For the identification of potential interview partners, we researched contributions of practitioners at futures research and/or innovation conferences and the members of an expert panel of a Delphi study on the future of futures studies [65]. In total, we identified nine companies as potential primary-data case examples. However, one of the selection criteria was a certain degree of sophistication in the corporate foresight or innovation process. Out of the total number of identified companies, two participated in our in-depth research and were later analyzed as primary-data case examples. Table 2 gives an overview of all case examples we analyzed in this study as well as their respective origin.

The analysis of the qualitative data from these case examples followed the general approach as described by Saunders et al. [66, p. 479]: categorization, unitizing data, recognizing relationships and developing categories, developing and testing propositions. Accordingly, our research objectives can be summarized as follows:

- Develop a framework to research the status quo of the organizational development of corporate foresight and innovation management.
- Research and evaluate the status quo of the development of corporate foresight and innovation management in companies across different industries.
- Identify strategic clusters of companies according to their corporate foresight and innovation management.
- Discuss future trends in the development of corporate foresight and innovation management.
- Derive appropriate strategies for each identified cluster.

4. Development of a research framework: the Future-Fitness-Portfolio

4.1. Motivation and nature of the research framework

Despite the illustration of the status quo of the organizational development stages of corporate foresight and innovation management at selected case examples, our framework should also allow the depiction of possible future development trends and the identification of appropriate strategic clusters. Consequently, we chose the form of a two-dimensional portfolio with corporate foresight and innovation management development stages at either one of the axes as our research

Table 2
Overview of the case examples analyzed in this study.

Industry	Research scope	Source
Airport operator	Organizational development stages of corporate foresight and innovation management	Primary data
Automotive	Qualitative futures research for innovation	Literature [60], primary data
Chemical	Scenario-driven innovation management	Primary data
High tech/electronics	Scenario-driven innovation management	Primary data
IT/software	Qualitative futures research for innovation	Literature [60]
Medical technology	Qualitative futures research for innovation	Literature [60]
Pharmaceutical	Organizational development stages of corporate foresight and innovation management	Primary data
Telecommunications	Scenario-driven innovation management	Primary data
Telecommunications	Qualitative futures research for innovation	Literature [60]

framework. This portfolio thus allows for comparing companies qualitatively amongst one another. At a recent conference, Cuhls and Johnston [67, p. 14] presented a similar portfolio-approach in comparing companies regarding future-oriented technology analysis. Hence, the framework developed in this study can be regarded as state-of-the-art in corporate foresight research.

In the following section, the so-called 'Future-Fitness-Portfolio' is presented and then used as the basis for our succeeding analyses. The first step was to operationalize the concepts of corporate foresight and innovation management. Operationalization in the context of our qualitative research refers to identifying distinct developmental stages and predefining an adequate set of dimensions. This is necessary to be able to apply case examples to this portfolio later in the research.

4.2. Operationalization of corporate foresight

In a recent article, Daheim and Uerz [52, p. 11] describe the evolution of corporate foresight in Europe and distinguish three distinct historical phases. Further, they introduce the concept of a fourth, currently emerging phase. Each of these phases represents a dominant logic or paradigm that is prevailing and is hence constitutional for the respective phase. Also, Daheim and Uerz distinguish each phase by a set of inherent characteristics that can be used as the basis for the respective dimensions of the portfolio. The phases construct an ordinal scale, as they represent historical development stages. In chronological order, they are:

- Expert-based foresight.
- Model-based foresight.
- Trend-based foresight.
- (Context-based) open foresight.

The first developmental stage of corporate foresight is expert-based foresight which emerged in the 1970s. According to this type of foresight, it is assumed that the future can be foreseen by means of expertise. Therefore, companies that use expert-based foresight will outsource most of their foresighting activities to experts, such as futures research institutes, in order for them to provide the relevant foresight knowledge. However, these companies tend to lose track of possible interdependencies amongst different relevant developments for the organization. The main methods used during expert-based foresight are Delphi studies, roadmaps, and scenarios [52, pp. 11–12].

The second phase of corporate foresight is called model-based foresight. In this phase, the perspective shifts towards a quantitative approach of futures research, with the underlying assumption that the future can be calculated by means of computer models based on large amounts of data. As with expert-based foresight, some of the foresighting activities are outsourced to knowledge providers and relevant application possibilities for the organization are lost [52, p. 12].

As a third phase, and presently the most common development stage of corporate foresight, Daheim and Uerz refer to trend-based foresight. They define this organizational stage as the approach of scanning developments and trends in the environment and their projection into the future. While this paradigm offers a high communicability of the foresight output, there is a danger that too much emphasis is placed on the scanning and monitoring process itself, thus limiting a company to adapting a reactive strategy.

While Daheim and Uerz argue that all of the above approaches to corporate foresight limit a company to a so-called coping or reactive strategy, the next, currently emerging, corporate foresight development stage aims in a different direction. Many recent academic articles on futures research maintain the position that the future can by no means be grasped (i.e. calculated or projected) and thus different approaches are needed in order to anticipate the future, rather than to react to it. Consequently, Daheim and Uerz [52] introduce a concept of corporate foresight which is based on an open and interactive perspective and focuses on the communication process rather than on methodology. It is called context-based, open foresight and "pays tribute to the increased socio-cultural and socio-technical dynamic resulting from the emergence of the networked society, where almost everything is interconnected and the separation of spheres of life, such as technology, economics, politics and culture, has come to an end" (p. 13). Open foresight is characterized by transparency, methodological hybridity, context orientation and participation, and is "set to diffuse into decision-making and blend into it instead of just preparing it" (p. 13).

In our research, these four phases serve as the distinct organizational development stages of corporate foresight and thus as the abscissa of the Future-Fitness-Portfolio. However, appropriate dimensions for each of the development stages need to be defined.

4.3. Qualitative corporate foresight dimensions

Daheim and Uerz already provide specific characteristics for each of the above historical phases, but not all of them are suitable as dimensions for a qualitative comparison in a portfolio, since they are not homogenous for all phases. We chose the following dimensions A.1–A.5, based on Daheim and Uerz's article, in order to identify a company's specific corporate foresight development stage.

Table 3
Operationalization model of corporate foresight.

Dimension	Expert-based foresight	Model-based foresight	Trend-based foresight	Open foresight	Weighting
A.1 Dominant paradigm	The future can be known by means of expertise	The future can be known by means of (computer) models	The future can be projected by means of (scanned) developments	The future can be shaped by means of interaction	35%
A.2 Perspective	Exploring change	Calculating change	Reacting to change	Understanding and anticipating/shaping change	25%
A.3 Foresight process	Collect and compare the opinions of (numerous) experts	Use quantitative models to estimate the future (e.g. extrapolation)	Analyze weak signals and early warnings and project them in trends	Open dialogue (with focus on the communication and discussion process); continuous, does not end when hard objective of a project have been achieved	20%
A.4 Outsiders	Outsiders (experts) are responsible for both contents and outcomes of the foresight process	Outsiders generate foresight knowledge (throughout the foresight process)	Some of foresighting activity is outsourced to outsiders (e.g. trend scouts)	Strong collaboration with all relevant stakeholders (in- and outside)	10%
A.5 Output	Delphis, roadmaps, scenarios	Models, matrices	Trend-databases, monitoring systems	Scenarios, wild cards, action plans, innovation ideas	10%

A1 The dominant paradigm behind an organization's corporate foresight.

A2 The perspective (i.e. rationale) of foresight activities.

A3 The foresight process itself.

A4 The role of outsiders in the foresight process.

A5 The actual output of the foresight activities.

As such, these dimensions are relatively meaningless and need to be defined with qualitative values in order to compare different case examples in terms of their corporate foresight development stage. The assigned qualitative values of the operationalization model can be visualized as a 6×5 matrix in Table 3. Also, all dimensions have to be weighted by their explanatory power for the actual development stage. The time horizon of an organization's innovation management, for example, does not have the same explanatory weight for its classification on the ordinate of the Future-Fitness-Portfolio as does the dominant paradigm behind it. This is a crucial step, as it affects the actual position of case studies in the portfolio and thus the validity of the portfolio itself. The weights we assigned, however, are the result of our subjective assessment of the constituent character of the individual dimensions of corporate foresight. The weighting can be individually customized to different application scenarios. Daheim and Uerz [52, p. 10] for example claim that the dominant paradigm in a development stage has a particularly high explanatory power which they characterize as being 'typical' for any given phase of corporate foresight.

4.4. Operationalization of innovation management

Although some authors argue in favor of five different innovation management generations [68, pp. 12–15], in this article, the evolution of innovation management is separated into four different phases representing the ordinate of our framework [9, p. 390; 60, pp. 52–53; 69, pp. 305–308]:

- Technology-based innovation.
- Demand-oriented innovation.
- Hybrid innovation.
- Open network innovation.

The first generation of innovation management emerged in the 1950s during times of rapid industrial and technological expansion and is thus referred to as technology-based innovation. This type of innovation management assumes that technological development lies at the center of innovation. The more R&D is put into an innovation process at the beginning, the more successful the products are that eventually develop [68, p. 8]. Therefore, R&D departments are fairly free to investigate any subject and are fully funded by corporate budgets [60, p. 52]. Companies which presently fulfill the characteristics of the first generation of innovation management develop technologies through R&D and then 'push' them onto the market. Hence, this approach is also commonly known as 'technology-push' and it implies that the nature of the innovation process resembles a linear process, with R&D at its end. Generally, such technology-based innovation management aims to produce radical innovations.

In contrast, the second generation of innovation management follows a market-oriented approach and emerged in the mid 1960s as a consequence of an economic slowdown and a resulting increase in competition [60, p. 52]. Customer demands and market dynamics are at the center of attention for innovation managers. Appropriately, the innovation process is essentially the reverse of the first generation innovation process [9, p. 392]. This approach is commonly known as 'market-pull'. Due to the market-oriented perspective, innovations in this generation shift from radical to incremental changes of existing products, according to customer feedback. Thus, demand-oriented innovation projects are much shorter in length.

In a third generation, which emerged in the early 1970s, the two earlier generations of technology-based and demand-oriented innovation are combined into a hybrid innovation model. Consequently, innovations in this phase result from technological development and R&D on the one hand, and demand-side factors on the other hand. Also, the innovation process is not linear with either R&D or the market at its front end, but rather includes several forward and backward loops including feedback chains and other forms of interaction. Furthermore, innovation management is partially tied to the overall corporate strategy of an organization because the importance of constantly innovating products, services, and processes in a highly competitive business environment has been recognized [60, p. 52; 9, p. 392].

For modern innovation management, Ortt and Smits [69, p. 305] analyze four consequences from global mega-trends and thus argue in favor of a fourth generation. According to Ortt and Smits, these consequences induce the end of the linear model, the rise of the systems approach, the inherent uncertainty of a business environment and a consequent need for learning, as well as the need for innovations to become more entrepreneurial. Following these consequences, many researchers have contributed various fourth generation innovation management models.² However, as a last developmental stage in our portfolio and as the basis for the operationalization of fourth-generation innovation management, we have chosen Chesbrough's concept of open innovation [70, p. 37]. The concept created quite a stir in the business world and is commonly accepted as state-of-the-art innovation management [71, pp. 1–2; 72, pp. 1–3]. The open innovation model proposes that companies commercialize external and internal ideas by developing outside and in-house pathways to the market [70, pp. 36–37]. Various relevant stakeholders of a company, such as (lead) customers or suppliers, are integrated into the innovation process: from idea generation at the so-called fuzzy front-end, to actual technological development and marketing. Hence, the innovation process of an open innovation architecture is network-based, rather than linear [72, pp. 1–2]. Consequently, the fourth developmental stage of innovation management in the Future-Fitness-Portfolio is labeled open network innovation.

Although the term 'generation' implies a strict chronological separation, companies today may utilize any of the innovation management approaches. The classification is used as the basis to compare companies' status quo in innovation management and thus as the ordinate of the Future-Fitness-Portfolio. However, appropriate dimensions for each of the development stages need to be defined.

4.5. Qualitative innovation management dimensions

We chose the following dimensions B.1–B.8 as the result of the above literature research on the evolution of innovation management. These dimensions are a collection of characteristics describing the generations in the different literature sources, and thus serve as indicators for a company's specific innovation management development stage.

- B.1 The dominant paradigm underlying an organization's innovation management.
- B.2 The innovation process itself.
- B.3 The use of process management techniques in innovation management.
- B.4 The time horizon and scope of an organization's innovation management.
- B.5 The types of innovations.
- B.6 The organizational implementation of the innovation management.
- B.7 The link of innovation management to (corporate) strategy.
- B.8 The average product-life-cycle in the respective industry.

These dimensions together draw a concrete picture of a company's innovation management and a developmental stage can be assigned. Similar to the operationalization of corporate foresight, each dimension is weighted by its explanatory power for the innovation management generation and is the result of our subjective assessment (Table 4).

In this study, primarily products and services are viewed as innovations, although, as Porter and Millar [4, p. 150] point out in their analysis of future competitive landscapes, innovative business models can also be a source of competitive advantages. Nevertheless, chapter 6.2 accounts for different business models by looking at how they affect the way in which companies will create 'future-fitness'.

It has to be noted, however, that the various stages of corporate foresight or innovation management are not always mutually exclusive. In fact, a company might have an innovation management that is strategically highly recognized (i.e. representing an open innovation approach) but has a time horizon of more than 5 years, thus representing the technology-push

² See for example Berkhout et al. [9, pp. 393–402] and their Cyclic Innovation Model or Zhao [73, pp. 36–38] and his 5S framework for entrepreneurial innovation management.

Table 4
Operationalization model of innovation management.

Dimension	Technology-based innovation	Demand-oriented innovation	Hybrid innovation	Open network innovation	Weighting
B.1 Dominant paradigm	Technology-push	Market-pull	Hybrid form of technology-push and market-pull	Cooperative innovation	20%
B.2 Innovation process	Linear process with markets at the end of the pipeline (inside-out)	Linear process with R&D at the end of the pipeline (outside-in)	Can contain various forward and backward loops and other types of interaction (e.g. feedback paths)	Network structures with strong outside integration; replacement of the linear model with a cyclic approach	20%
B.3 Process management	No process management	Little emphasis on process management	Strong emphasis on process management	Process management is a key element for our innovation management	15%
B.4 Time horizon	Long-term (5 years and more)	Short-term (3–4 years), attempts to shorten the time-to-market	Short term (2–3 years)	Decreasing product life cycles require an even shorter time-to-market (1–2 years)	10%
B.5 Type of innovations	Mostly radical innovations	Mostly incremental innovations (optimization)	Both radical and incremental	Both radical and incremental innovations (intensive collaboration with external knowledge sources)	10%
B.6 Organizational implementation	Large and autonomous corporate R&D programs (similar scientific research in universities)	Formalized and centralized R&D with occasional staff functionality	Small, flexible projects; higher integration with other parts and functions of an organization	Organized in multidisciplinary project teams with both internal and external	10%
B.7 Strategic implementation	No (specific) strategic goals	Weak ties with business strategy	Innovation projects are linked to R&D and company goals	Innovation is recognized as a key element for competitiveness and therefore strongly tied to corporate strategy	10%
B.8 Product-life-cycle	Long	Medium/Short	Short	Very short	5%

stage. Nevertheless, as outlined in more detail below, we used semantic scales to identify, which developmental stage most represents the status quo of corporate foresight and innovation management at the researched companies.

4.6. Introducing the Future-Fitness-Portfolio

Having operationalized the concepts of corporate foresight and innovation management, they can now be illustrated in the form of a 4×4 matrix. Fig. 1 depicts the basic architecture of the Future-Fitness-Portfolio. It comprises 16 generic fields, of which each implies a different answer to the question: ‘How fit is the company for the future?’

5. Case examples: how ‘future-fit’ are they?

5.1. Reanalyzing secondary data and generating primary data

In order to analyze how ‘future-fit’ our selected case examples are, we used semantic scales to determine their position in the Future-Fitness-Portfolio. For each dimension of both corporate foresight and innovation management, we identified at which developmental stage the researched companies were by analyzing literature, company profiles and previous research notes for secondary data and by means of a specific questionnaire for primary data. In order to generate what we call a ‘Compound Average Corporate Foresight Index’ and a ‘Compound Average Innovation Management Index’, we indexed the development stages from 1 to 4, multiplied the development index of each dimension with its respective weight and summed-up the individual products. Thereby, we were able to determine a discrete position in the portfolio for all companies, which was no longer limited to the 16 generic fields of the Future-Fitness-Portfolio. In addition, we assumed a constant distance between the different development stages (i.e. linear development indices 1–4). For the primary data, we set up a specific questionnaire which was structured according to the operationalization models of corporate foresight and innovation management. For each dimension, we let the interviewee choose which qualitative value most represented their situation in corporate foresight and innovation management. Based on the responses, we positioned the primary-data case examples in the Future-Fitness-Portfolio.

5.2. Positioning the case examples in the Future-Fitness-Portfolio

During the reanalysis of the secondary data and the generation of primary data, we determined that the companies form distinct groups according to their position in the Future-Fitness-Portfolio. Consequently, we developed strategic clusters on how ‘fit’ these companies are for the future (see Fig. 2).

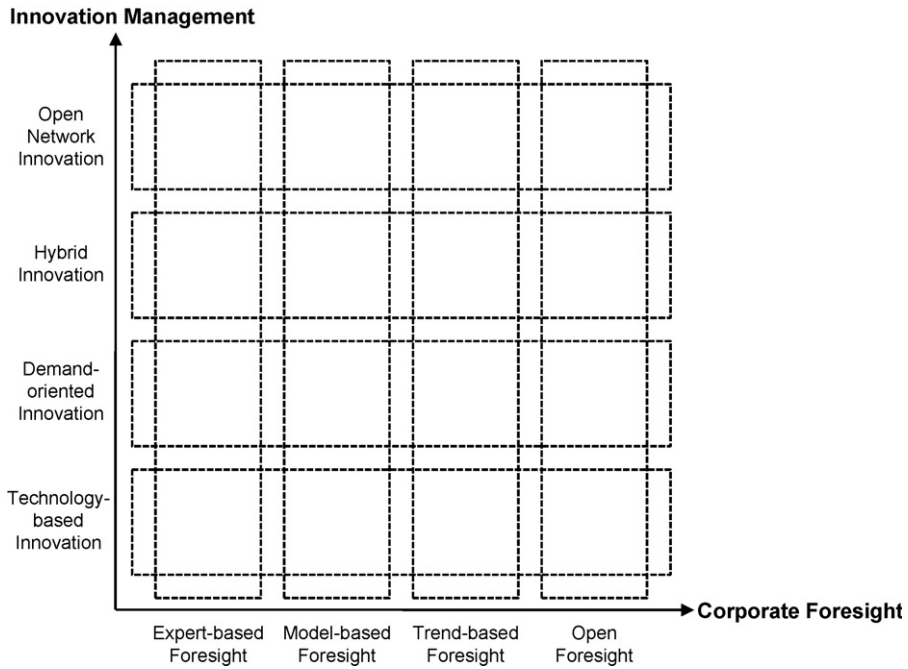


Fig. 1. Architecture of the Future-Fitness-Portfolio

As outlined before, a combination of well-developed corporate foresight and innovation management can be seen as a key to success in the knowledge economy. Hence, we defined the ‘future-fittest’ as the first strategic cluster in the top right of the portfolio. These companies follow both an open foresight and an open network innovation approach. However, none of the nine researched case examples fell into this strategic cluster. On the contrary, companies which have not yet reached a certain development stage in either of the two concepts, we clustered as ‘beginners’. Despite an assumed optimal position in the top right corner of the portfolio (‘future-fittest’), we also argue that companies with a very high development stage in either corporate foresight or innovation management have a distinct competitive advantage. Accordingly, we constructed

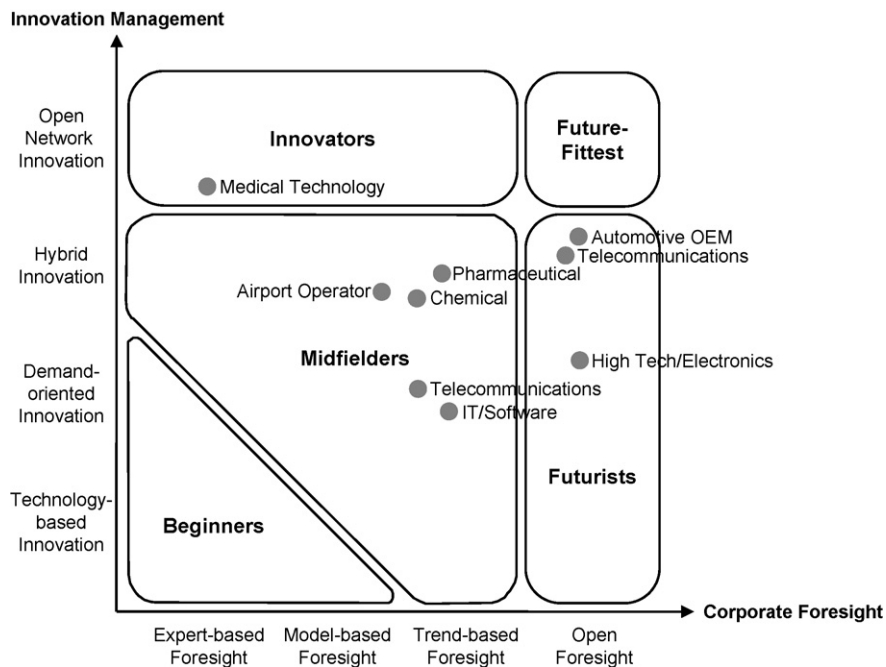


Fig. 2. Strategic clusters in the Future-Fitness-Portfolio

the clusters of 'futurists' and 'innovators'. In our analysis, one medical technology company could be classified as an 'innovator'. This company has institutionally integrated all relevant stakeholders in its innovation process by means of 'clinical networks' and 'medical advisory boards'. This integration clearly resembles the concept of open network innovation and, thus, fourth generation innovation management. On the other hand, three of the nine case examples were characterized as 'futurists'. Two of the examined companies, an automotive and a telecommunications company, came short of being 'future-fittest' only because they did not fully institutionalize integration of outsiders in the innovation process. The fifth and largest strategic cluster comprises 'midfielders'. These are companies which have already implemented corporate foresight and innovation management to some extent but still show considerable improvement potential.

Fig. 2 depicts the researched case examples and strategic clusters in the Future-Fitness-Portfolio.

6. An experts' view on the Future-Fitness-Portfolio

After positioning the case examples in the portfolio, we conducted two expert interviews with representatives of an airport operator and a pharmaceutical company. The interviews were held via telephone, tape-recorded and approximately one hour in length. The purpose of the interviews was to discuss possible limitations of our framework as to influential factors on a company's optimal position in the Future-Fitness-Portfolio. Further, general development trends such as the organizational implementation of a mix of corporate foresight and innovation management were discussed during the interviews.

6.1. *Discussing influential factors on a company's future-fitness position*

We identified three main influential factors, namely a company's specific industry, its organizational structure, and the general comprehension of corporate foresight.

Especially the type of industry and its specific characteristics have a strong influence on a company's position in the Future-Fitness-Portfolio. This becomes obvious, if one takes the examples of a pharmaceutical company on the one hand and an automotive OEM on the other hand. The pharmaceutical industry is historically highly regulated making it almost impossible for its participants to collaborate with customers (i.e. patients or doctors) or with other relevant stakeholders such as health insurance companies. The question arises, whether under these conditions a pharmaceutical company can even achieve an entirely open foresight or innovation environment. If not, the optimal portfolio position for a pharmaceutical company would differ from the generic 'Future-Fittest' cluster in our framework. On the contrary, cooperative development and other forms of interlocking business relationships have a long tradition in the automotive industry. Toyota and its Keiretsu system is a prominent example of how suppliers are systematically and strategically integrated in product development processes. Thus, an OEM has a greater potential for developing an open innovation or open foresight approach.

As a second influential factor, we identified a corporation's organizational structure. Not all business units or departments of an organization necessarily need an open knowledge environment to the same extent. For example, in fundamental research, any organization would benefit from open structures whereas in market development units, excessive interaction with outsiders might even hinder effective business processes. This distinction further gains importance when a company needs to act in a situation where margins are small. Here, open structures could even be exposed to failure. Consequently, an open foresight and open innovation management approach does not always represent a company's optimal position in the Future-Fitness-Portfolio.

Also, the comprehension of what corporate foresight is and how it can be used has an influence on a company's portfolio position. Several tasks of corporate foresight might be separately organized in various departments rather than in a single futures research unit. The dissent in terminology and understanding goes as far as to the discussion whether corporate foresight is a general mindset, a theoretical concept or a practical toolbox. Although academia already provides a substantiated terminology for corporate foresight and innovation management, comprehension gaps in the practical world are yet to overcome.

6.2. *Identifying future development trends*

In addition to discussing the company-specific drivers that determine the positions in the Future-Fitness-Portfolio, the expert interviews revealed future development trends in the organizational implementation of corporate foresight and innovation management at the researched companies in particular and in different industries in general. Several guideline questions were provided prior to the interview to ensure a standardized set of answers.

We theorized two dominant development paths (see Fig. 3): in traditional industries with conventional business models and long product-life-cycles, companies follow development path A, whereas companies in dynamic industries with innovative business models and short product-life-cycles follow development path B.

As delineated above, one explanation for the variance in development paths lies in the influencing factors of the portfolio positions: industry, organizational setup, and understanding. In addition, the average innovation cycle of an industry can be used to explain the different development paths. In industries where innovations are brought from idea generation to market success within a few months, it is more important to anticipate the right ideas early than to implement a sophisticated process management for innovations. Also, in dynamic industries where the rules of competition are not fixed but constantly

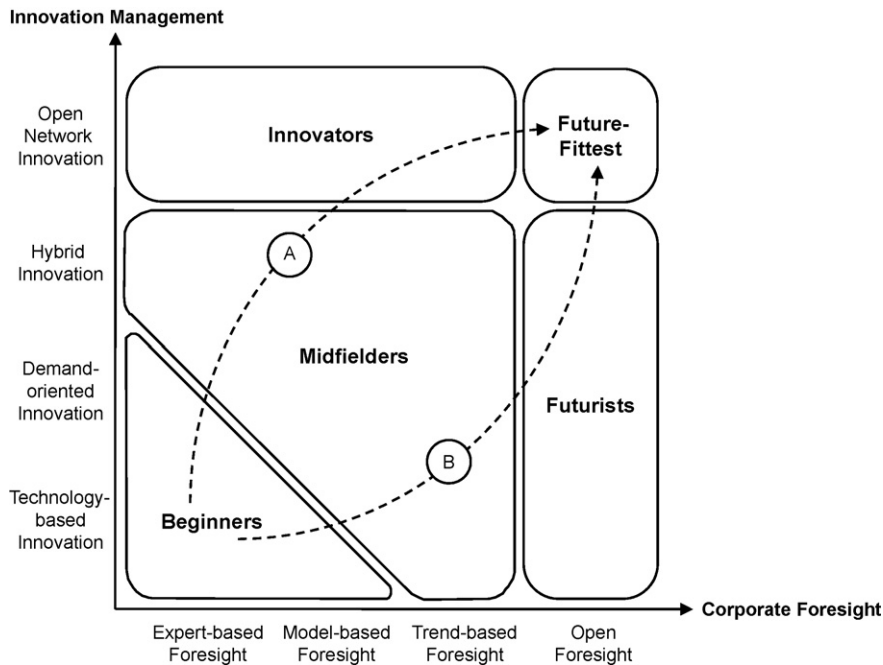


Fig. 3. Dominant development paths in the Future-Fitness-Portfolio

changing, a systematic look into the future can help to set up innovative business models that provide a competitive edge in the future.

Fig. 3 illustrates the two development paths identified in this study.

7. Discussion

7.1. Limitations of the study and implications for future researchers

In one of the secondary-data case examples, an interviewee noted an advanced ‘sedimentation’ of futures research and innovation management methods, meaning that they are the output of years of scientific research and thus have somewhat lost their ‘up-to-dateness’. Hence, it can be proposed that a methods-oriented research approach to corporate foresight and innovation management will provide additional accessibility of these concepts to the corporate world.

Due to the explorative nature of this research first results were revealed to give preliminary insights into the relationship between corporate foresight and innovation management. However, there are several limitations implied by the chosen research design. First, as regards the Future-Fitness-Portfolio, the distances between the individual development stages in each dimension are assumed to be constant. This rather rigid assumption is again made with respect to the overall design of our research: to generate methodological knowledge for managing the organizational development of corporate foresight and innovation management in the knowledge economy. However, future research on the ‘distance’ between the different development stages can provide additional valuable insights for the field of corporate foresight and innovation management. Second, from a scientific viewpoint, it is questionable whether two expert interviews are sufficient to draw conclusions about the integrity of the research framework from a holistic, cross-industry perspective. More expert opinions on the manageability of the framework, the derived strategies and other influencing factors such as a firm’s industry context would provide additional insights and thus a greater understanding of the development of corporate foresight and innovation management. A third limitation of our research is its sole focus on qualitative analysis. It might also be beneficial to approach the concepts of corporate foresight and innovation management and their relationship from a quantitative angle.³ Hence, this study implicates the necessity for future researchers to:

- Apply additional case examples to the Future-Fitness-Portfolio in order to confirm its validity in terms of operationalization and structure. Here, alternative methods such as qualitative pattern recognition might help to sharpen the operationalization models of corporate foresight and innovation management.
- Apply additional case examples to the Future-Fitness-Portfolio in order to confirm the validity of the different clusters and the derived strategies.

³ Van der Duin [60, p. 181] also suggests a quantitative approach for future research on corporate foresight in the innovation process.

- Apply additional case examples to the Future-Fitness-Portfolio to generate knowledge regarding industry-specific corporate foresight and innovation management approaches. A research focus on the incumbents of the respective industries might shed light on how industry contexts affect the way firms implement corporate foresight and innovation management.
- Collect more expert opinions on future development trends in the portfolio.
- Develop quantitative models that compare developmental stages of corporate foresight and innovation management and the interrelationship of both concepts.
- One of the challenges we faced in the course of this study was to label the axes of the framework in a way that allows for a consistent understanding of our research objectives amongst all participants. It can be argued that both corporate foresight and innovation management are to date not yet perceived in their plurality in the practical world and, hence, more work in this area is needed.
- As emphasized at the beginning of the article, the need to research corporate foresight and innovation management is greater than ever and the above-formulated implications provide additional approaches for future research in this field.

7.2. Implications for managers

This study not only serves the academic purpose of developing knowledge regarding corporate foresight and innovation management but also aims to illustrate practical, management-oriented aspects of the concepts.

One such aspect is the segmentation of positions within the Future-Fitness-Portfolio into different strategic clusters. Each cluster is characterized by individual strengths and weaknesses on the basis of which we propose the following individual strategies:

- *For beginners*: Companies that fall into this cluster need to develop both innovation management and corporate foresight concepts in order to be competitive in tomorrow's knowledge economy. Depending on the type of industry either development path A or B may be advisable. It is further suggested that the development along the axes should be evolutionary rather than radically due to organizational learning.
- *For midfielders*: Companies that fall into this cluster already deal with both innovation management and corporate foresight. Still, these companies need to continuously improve those skills towards an open (network) approach to fully exploit their potentials.
- *For futurists*: Companies regarded as futurists need to improve their innovation management skills in order to become 'future-fittest'. They can significantly benefit from institutionalizing innovation management and integrating their foresight activities afterwards.
- *For innovators*: Companies regarded as innovators need to improve their foresighting skills in order to evolve into 'future-fittest'. By doing so, they will gain a distinct competitive advantage in tomorrow's knowledge economy.
- *For 'future-fittest'*: Companies which are already in the 'future-fittest' cluster need to maintain their position by continuing to follow an open (network) approach to both innovation management and corporate foresight. It is important that they do not become complacent and rely on their current competitive advantages since imitators can catch up quickly.

In our empirical research, both experts pointed at the influential factors 'industry', 'organizational setup', and specific 'understanding' of the concepts. They have a high influence on what determines a company's best 'fitness strategy'. As outlined before, companies in traditional industries with conventional business models and long product-life-cycles are likely follow a different path towards future fitness than companies in dynamic industries with innovative business models and short product-life-cycles. Nevertheless, the above-formulated strategies provide managers with a good reference point for analyzing and improving their individual corporate foresight and innovation management situation.

7.3. Concluding remarks and outlook

As shown, a dynamic competitive landscape calls for new management methods and concepts. With corporate foresight and innovation management, companies can prepare for increasing competition in advance. There are already first approaches to implement the two concepts in different organizational contexts. However, it is crucial for companies to constantly reflect their status quo and identify possible improvement potential. Only organizations which are 'fit' in corporate foresight and innovation management are well prepared to face the diverse challenges of the future.

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