Professional MBA
Entrepreneurship & Innovation

New technology enabling corporate foresight

A Master's Thesis submitted for the degree of
"Master of Business Administration"

supervised by
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Vienna, 14.07.2019

Affidavit

I, **MAG. CHRISTIAN ECKERT**, hereby declare

1. that I am the sole author of the present Master's Thesis, "NEW TECHNOLOGY ENABLING CORPORATE FORESIGHT", 75 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and

2. that I have not prior to this date submitted the topic of this Master's Thesis or parts of it in any form for assessment as an examination paper, either in Austria or abroad.

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1. Abstract

The topic of this master thesis is corporate foresight with a focus on the multiple perspectives of a strategic foresight process within a company to create and maintain a high-quality forward view.

Especially in a fast-changing world with uncertainty and discontinuous change, the foresight process of identifying upcoming future impacts gets more and more attention. The aim of this thesis is to give an overview about foresight in general, to dive into the depth of corporate foresight and describing the foresight 2.0 systems and the related foresight support systems.

However, small to mid-size company's sometimes struggle with a clear approach on corporate foresight within the company, particularly when different departments have to align their forward view to create value out of the corporate foresight process.

The research questions focus on who does foresight, with which tools and which outcome within one company and how can new technologies support in this process. How this process works out in a mid-size company in the chemical industry is finally described, evaluated and critically discussed.

Keywords: foresight, corporate foresight, multiple perspectives, foresight tools, strategy process

Table of Contents

2. Table of figures

3. List of tables

1. Introduction

In this introducing chapter, a brief outline of the master thesis is drawn, followed by the problem formulation, the objectives of this master thesis and the derived research questions. The chapter ends with an explanation of the structure of the thesis.

This master thesis gives an overview about foresight in general, continuous with the more specific topic of corporate foresight and relating to this the main foresight tools. The main focus of this thesis is then an in-depth exposition of the multiple perspectives of a strategic foresight process within a company to create and maintain a high quality forward view. To complement corporate foresight, this master thesis gives some general information about foresight support systems, as well as describes the current evolution of foresight to foresight 2.0 systems and the related advantages.

1.1. Problem formulation

Nowadays, company's face more and more uncertainty with a world changing rapidly.

Companies need to identify, prepare for and finally to respond to uncertainty and discontinuous change. Therefore it is on the one hand necessary to adapt continuously to incremental change in order to keep one step ahead of competitors and on the other hand important to detect discontinuities early and manage radical changes in the company's internal structures, as well as in the corporate strategy and in the process of managing innovations. (Rohrbeck, 2011, p. 2)

Additionally, to make companies more successful and establish a sustainable long term above-average performance of companies, a structured foresight process within a company can make a significant contribution, especially by providing strategically relevant forecasting knowledge. (Martin, 1995, p. 142)

To improve the foresight process and to ensure a coherent forward view, several parties within a company should be involved and finally aligned. The exploration of new markets, new products and services require a close collaboration between Business Units and central support functions to see and go for opportunities as well as to react in time to upcoming threats.

In many company's the existing top down policy's and strategies have been successful in the past, but today the active involvement of all stakeholders to guide the policies and shape the strategies is necessary to build the foundation of a corporate change to support the creation of new strategic paths. (Rohrbeck, 2012, p. 442)

The aim of this thesis is to get an overview about the foresight process in companies in general and an insight, how this process is handled in an Austrian mid-size company in the chemical industry, which is currently in the middle of a transformation process from a conservative old fashioned industrial producer, to a modern product and service provider.

1.2.   Objective of the Master Thesis

At the end of this master thesis the reader will be able to understand foresight, knows the different kinds of forecasting methods and their advantages, and conceives how foresight support systems can help in the processes of communicating, analysing and making decisions in general. Furthermore, the reader gets inputs, how strategic foresight can be created and maintained to get a coherent and functional forward view and how value can be created within this process.

1.3.   Research questions:

The following research questions are concerned with the topic of strategic foresight and the different multiple perspectives within a company:

1. How is the foresight process organized in different departments within one company?

    - Who does foresight?

    - In which frequency are foresight related activities done?

    - Which foresight tools are used in this process?

2. What are the summarized outcomes of a foresight process?

    - How are the outcomes used in the department?

    - How are the outcomes used in the company?

    - How are the outcomes aligned between the different departments?

    - How does the company benefit from the foresight process?

3. How can new technologies enable and support in the corporate foresight process

    - Are there currently new technologies supporting the corporate foresight process? (foresight support systems)

    - Are there plans to use new technologies in the future to support the process?

1.4. Structure of the Master Thesis

In general, this master thesis can be divided into two main parts. The first part is the theoretical framework, giving the reader an overview about the basic terminology of foresight, corporate foresight and the foresight history. Based on that we describe the different kinds of forecasting methodologies currently used in companies and describe their main advantages. Afterwards a focus is to emphasise the value of corporate foresight and to give an overview of the foresight process from the inputs till the strategy output.

The core topic of this thesis is then an in-depth exposition of the multiple perspectives of a strategic foresight process within a company to create and maintain a high-quality forward view.

Finally, new approaches and technologies are added to our perspective of corporate foresight, describing not only the foresight support systems in detail, but also pointing out the changes caused by them.

The second part of the master thesis gives details on the interviews with experts within one Example Company. It describes in detail the results and the findings of the interviews and shows the different perspectives of the different departments regarding strategic foresight. Finally, the findings are systematically evaluated regarding the predefined research questions and concluded in a summary.

2. Literature review

In the following chapter the terminology of forecast and more specific corporate forecast is defined. After a brief retrospective view on foresight history, this chapter continues with a description of the main foresight methodologies and describes the integration of foresight activities into the strategy process of companies. The multiple perspectives of strategic foresight provide the theoretical base for the empirical part from chapter three onwards. The chapter further describes new technologies and approaches, which enable changes in the foresight process and points out the future of digital foresight systems.

2.1. Foresight, corporate foresight, foresight history

2.1.1. Foresight

In a short description foresight is "the ability to predict what will happen or be needed in the future." (Oxford English Dictionary, 2019)

Nevertheless, in general, Foresight can be described as two complementary capabilities: Insight into possible future affairs is the first one, describing the skill of drawing conclusions about all kinds of implications of recent trends, whereas prudence as the second capability is the preparation of responses that challenging implications possible require. Critically seen, these capabilities are often seen as intuitions or talents of gifted individuals, rather than structured and cultivated skills and practices, which can be cultivated. (Miles/Sarita/Sokolov, 2016, p. 3)

Going more into the detail, foresight is not only establishing a vision of the future, but also a process, which aims at present day decisions and

mobilising actions in a systematic, medium to long term vision building, future-intelligence-gathering and participatory way and can be described in six main core elements:

- Foresight as a systematic approach to future uncertainties, by using specific methods, like scenario building
- The pertinence of the outcome of the foresight depends on the engagement of various stakeholders
- Quality of the information and knowledge is crucial for the outcome of a specific foresight project and supports the understanding of the future through identification of trends and drivers
- A medium- and long-term perspective is used in typical foresight projects
- A focus on elements, which are assumed to have an impact on future activities, is mandatory, because the result and outcome of a foresight project must be relevant for decision making
- By establishing mental maps and visions, foresight studies also facilitate strategy development

(Rialland/Wold, 2009, p. 4)

These six core elements show in an obvious way, that foresight always contains a strategic element and therefore we want to elaborate on the definition of strategic foresight:

Strategic foresight often represents a coalescence between future methods and strategic management, by providing the ability to build a high quality, coherent and functional forward view and to utilize the gained insights in an organizationally useful way, like for instance in exploring new markets and products or shaping strategies for the future.

(Slaughter, 2002, p. 2)

2.1.2.   Corporate foresight

Corporate foresight focuses on future research in companies, and more specifically defines forecast as a general corporate function compared to strategic foresight, where the analytical focus is emphasizing the

organizational integration of the strategic decision process. (Becker, 2002, p. 7)

In general, a more generic definition, corporate foresight is the institutionalized generation of strategically relevant forecasting knowledge with the aim of establishing long-term above-average performance in firms (Martin, 1995, 142)

This generation of forecasting knowledge also supports the idea to see corporate foresight as a future intelligence gathering process, where it is used more and more in business context, providing valuable input not only for strategic planning, but also for research and development, the broad field of innovation, as well as all sorts of communications and corporate identity processes. Due to the fact, that the global knowledge economy is highly dynamic and competitive, the role of corporate foresight has become even more complex. (Daheim/Uerz, 2008, p. 321)

The long-term perspective and orientation of corporate foresight described above is necessary especially in industries with long product cycles, like the chemical industry, but the corporate foresight process should also provide proactive solutions for coping with uncertain situations in the business environment. So even if Foresight is used nowadays in companies for strategy and innovation as well as more and more as a tool for connecting the present with the future, showing the future of the company, corporate foresight is a force shaping the future and not only reacting to trends. (Daheim/Uerz, 2008, p. 322)

Additionally, to get a common understanding of corporate foresight under multiple perspectives, it is important to understand, that corporate foresight has a cross functional character, including strategic management, technology management as well as innovation management. (Rohrbeck, 2011, p. 11)

2.1.3.   Foresight history

Foresight and in the context of this master thesis more specific corporate foresight has a long history and a quick retrospective view will serve as a starting point to have a better understanding of the present and the future of corporate foresight.

In the 50s and 60s of the 20th century foresight began to emerge in the USA, especially in the defence and later in the energy industry. The application of foresight techniques was mainly used to optimize the planning for technology related investments. (Rialland/Wold, 2009, p. 4)

Framed under the perspective of a dominant logic starting from the 60s, corporate foresight was mainly an expert based foresight, where the underlying assumption was, that the future can be foreseen by collecting, combining and comparing the opinions of the future of several experts. (Daheim/Uerz, 2008, p. 331)

In the 1970s in Asia, Japan began to engage actively in foresight, focusing on technology projects and using mainly the Delphi methodology. (Rialland/Wold, 2009, p. 4)

During these days and with the further development of the computer, the model based foresight, which is characterised by suitable computer models and the use of data and mathematics, complemented the expert based foresight. (Daheim/Uerz, 2008, p. 331)

Quite late, in the 90s, countries in Western Europe started their foresight projects, with the focus on the one hand on science and technology and on the other hand primarily on the forecasting part rather than on the exploration of future opportunities. (Rialland/Wold, 2009, p. 4)

In these times the use of trend-based foresight increased distinctly, meaning, that companies can foresee the future by anticipating the impact of trends on markets and customers. Meanwhile the context-based, also called open foresight emerged as a next phase and is based on the assumption, that companies can not only foresee the future, but also shape those concepts and markets by anticipating through an open dialog all the

7

social, economic and technological forces and the interaction between them. (Daheim/Uerz, 2008, p. 331)

Below you can find a timeline showing the emerging corporate foresight waves, as well as a detailed description of the dominant corporate foresight paradigms
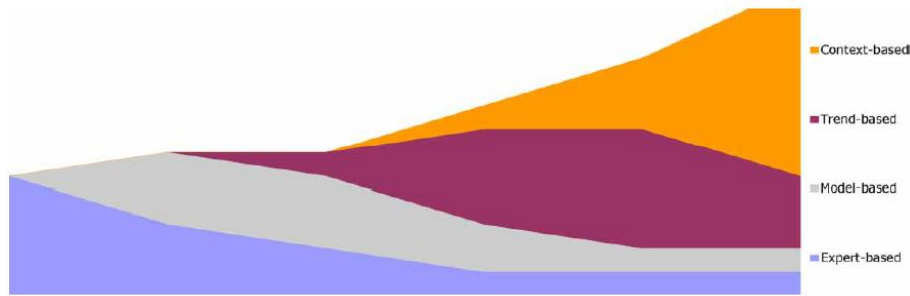
Figure 1: Corporate foresight waves and their key characteristics. (Daheim/Uerz, 2008, p. 330)

Dominant CF-paradigm	Expert-based foresight	Model-based foresight	Trend-based foresight	Context-based 'open' foresight
Assumption: Future can be …	Known by means of expertise	Calculated by means of models	Projected by means of (scanned) developments	Shaped by means of interaction
Key characteristics	Belief in Experts dominant, but: 1970s: Turn to the qualitative and wider environment	Quantitative and 'subjective' models Extrapolation	Trends Weak signals	Integrating 'soft' and 'hard' approaches Understanding & interpreting/ evaluating change
		Systems	Early warning	Opening up: Participation, interaction & process
	First opening towards 'soft sciences'	Dominated by 'hard science'	Mix of qualitative and quantitative	Action- and innovation-oriented
			Indicators	More attention on discontinuities
Perspective	Exploring change	Calculating change	Reacting to change	Understanding & anticipating/shaping change
Output	Delphis, roadmaps, scenarios	Models & matrixes	Trend-databases, monitoring systems	Scenarios; wild cards; action plans & innovation ideas

Table 1: Corporate foresight waves and their key characteristics. (Daheim/Uerz, 2008, p. 330)

2.2. Exposition of different kinds of forecasting methodologies

Many multinational companies started already in the 60´s to engage in future studies, where they widely started to search for information about emerging drivers in the outside environment of companies to support the top management to define the future tasks of the company. Many different sets of future oriented methods have been developed and will be described in detail in this chapter. (Vecchiato/Roveda, 2009, p. 1530)

One possibility to give an overview of the methods, arranged according the two oppositions on the one axis between creativity and evidence and on the axis between expertise and interaction is the foresight diamond presented in 2008: (Popper, 2008, p. 66)
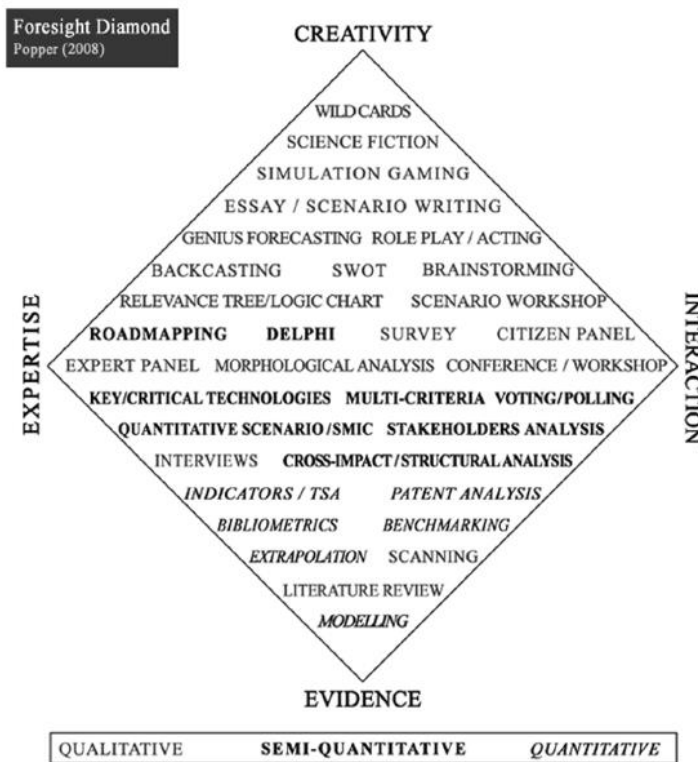
Figure 2: Foresight diamond

(Popper, 2008, p. 66)

But before we dive deeper into the forecasting methodologies it is important to work out the differences between forecasting and foresight, which is often mixed up.

Forecasting can be seen as a process to predict precisely, how the world might look like at some point in the future and forecasting methods are therefore tools to support this process. Foresight in comparison does not seek to predict the future but can be seen as a process to create sheared future visions, to focus to influence and also to shape the development of the future. (Miles/Sarita/Sokolov, 2016, p. 11)

2.2.1. Scenarios

Scenarios can neither be a forecast in the sense of a projection of the present nor is it a desired future vision, because both tend to conceal risks. Scenarios risk management is on the one hand possible and on the other hand scenarios offer answers to conceivable outcomes. From this perspective scenario is closely related to strategic planning. (Lindgren/Bandhold, 2009, p. 22)

Especially for medium to long term planning under uncertain conditions, as well as to sharpen strategies and keep going in the right direction even in unexpected conditions, scenario planning is a very effective tool. (Lindgren/Bandhold, 2009, p. 25)

Additionally, scenario planning helps to understand the logic of developments and clarifies the key factors, key players and the company's potential to exert an influence in the sense of an effective learning tool. (Lindgren/Bandhold, 2009, p. 26)

Uncertainty based future thinking, as which scenarios can be seen helps in particular in times with limited visibility, where traditional strategic planning methods are not sufficient, but the higher level of strategic thinking of scenarios supports the exploitation of opportunities and the dealing with challenges in business environments. (Lindgren/Bandhold, 2009, p. 27)
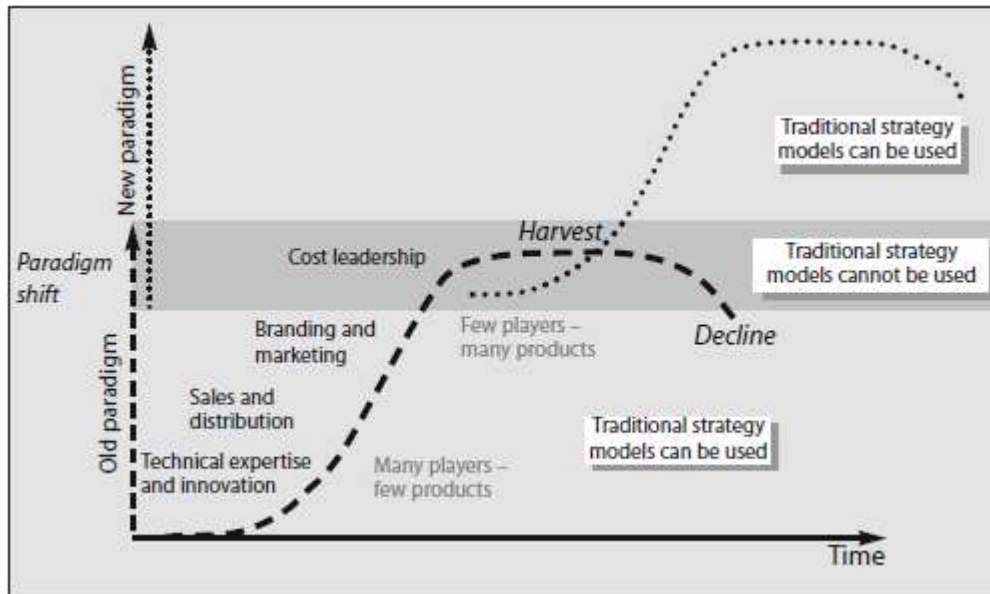
Figure 3: Scenarios dealing with non-linear change
(Lindgren/Bandhold, 2009, p. 29)

Advantages of scenarios:

- Visualization helps to understand and memorize them
- Open format trains divergent thinking
- Facilitate Complexity reduction
- Easy to share and to discuss

(Lindgren/Bandhold, 2009, p. 29)

2.2.2.   Delphi

The Delphi forecasting method, which was already used in the 1970s in Japan uses the method of surveys of expert views, knowledge, opinions or judgements, especially about uncertain future situations. In this way a large number of people can be involved with their particular views anonymous, without bringing them necessarily physically together. (Miles/Sarita/Sokolov, 2016, p. 95)

A main characteristic of Delphi surveys is the fact, that the whole process is designed to be reiterated, meaning, that the participants of the surveys receive back a feedback, which can also be the base for a second and a third round of questionnaires. (Miles/Sarita/Sokolov, 2016, p. 96)

Generally, a Delphi survey can be conducted in the following five steps:
- Preparation work for the Delphi survey
- Formulate the topic statement
- Work out the questionnaire and define the appropriate assessment criteria
- Carry out the survey
- Analysis and presentation of results

   (Miles/Sarita/Sokolov, 2016, p. 100)

The Delphi method has the following advantages:
- In general, Delphi is anonymous, facilitating, that experts express their views and opinions free of the influence of others
- Experts can calibrate and therefore optimize their responses, when they compare them with the feedback they receive, consisting of information on the distribution of answers of all survey participants.
- This calibration process provides all participants insights, if there is either a consensus or a disagreement, showing by implication, that some of the participants have probably better access to special information than the others. (Miles/Sarita/Sokolov, 2016, p. 96)
- The outreach of Delphi surveys can be much greater, especially with the use of the internet compared to conventional meetings
- The comparison of views and opinions and the following assessment of the forecast relevance is in Delphi surveys often more precise compared to qualitative statements resulting out of discussions.

   (Miles/Sarita/Sokolov, 2016, p. 97)

2.2.3.   Cross impact analysis

The cross-impact analysis emerged already in the 1960s in the USA and focuses mainly on expert views of interrelations between variables, which cannot be determined from pure logic. In the beginning it is very important to work out the links between each pair of variables in a systematic way. The number of variables is normally rather small compared to for instance

system mapping, due to the fact that an expert has to judge how the variables interact with each other. (Miles/Sarita/Sokolov, 2016, p. 188)

The advantages of the Cross-impact analysis are as follows:
- Cross impact analysis provides a comprehensive mapping of interrelationships offering an advantage compared to methods like Delphi, where individual developments are generally analyzed in isolation.
- This type of analysis provides furthermore in comparison to system mapping a much higher preciseness and works additionally with fewer variables.
- Cross impact analysis is an approach, which is already quite close to quantitative modelling approaches

(Miles/Sarita/Sokolov, 2016, p. 189)

2.2.4. Roadmaps

Roadmaps were developed in the late 1970s to align between innovation and technology. Later on many companies, especially manufacturing ones have used technology Roadmaps. (Willyard/McClees, 1987, p. 14)

But not only for technological management have Roadmaps proved to be useful, but also for operational and strategic decision making, by communicating visions, stimulating investigations and monitor the progress of action plans. (Miles/Sarita/Sokolov, 2016, p. 223)

Furthermore, Roadmaps reflect on a visual base different scenario and the resulting implications of events, supporting on the one hand an implicit fast and coordinated decision making process and on the other hand a stable, high quality of the decisions by providing clear action plans for specific situations and possible scenarios.

Crucial for Roadmaps is the practical knowledge and the quality of the inputs to the Roadmap algorithms, which can be achieved by providing a large empirical basis for theoretical study of Roadmaps principles. (Vishnevskiy/Karasev/Meissner, 2015, p. 434)
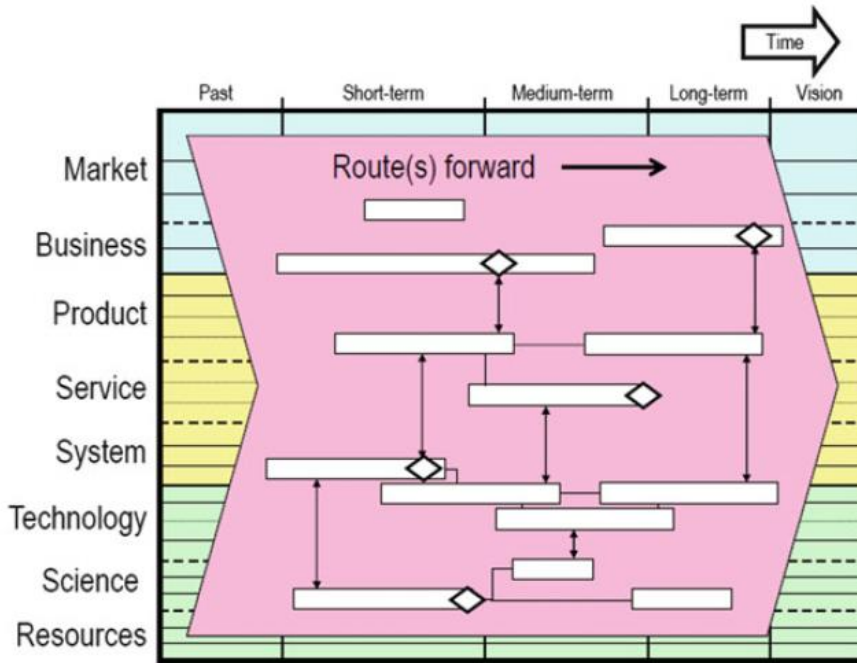
Figure 4: Example Roadmap

(Miles/Sarita/Sokolov, 2016, p. 227)

Layers	Labels
Layer 1	Markets, Customers, Competitors, Environment, Industry, Business, Trends, Drivers, Opportunities, Objectives, Visions, Strategy, . . .
Level 2	Products, Services, Applications, Capabilities, Performance, Features, Components, Families, Processes, Systems, Platforms, Requirements, Risks, . . .
Level 3	Technologies, Competencies, Knowledge, . . .
Level 4	Science, Research, Development, . . .
Level 5	Resources, Skills, Partnerships, Infrastructure, Supplier Facilities, Organisation, Standards, Finance, . . .

Table 2: Example Layers of a Roadmap

(Miles/Sarita/Sokolov, 2016, p. 227)

The major benefits of Roadmaps:

- Support of Resource allocation planning
- Offering a mechanism to translate demands, futures and upcoming challenges into future products, services and markets and pursue them accordingly

- Provide a clear picture for involved parties and stakeholders, like suppliers, users developers and manufacturers resulting in enhanced communication
- Aligning decision making processes in research and industry by providing a cross-functional working environment

(Miles/Sarita/Sokolov, 2016, p. 224)

2.2.5. Horizontal scanning

Horizontal scanning can be seen as a subset of Environmental scanning, and is focusing on future orientation of trends, issues and uncertainties. (Miles/Sarita/Sokolov, 2016, p. 67)

The main scope of Horizontal scanning activities is as follows:

Trends

The identification of key trends is normally the starting point of a Horizontal scanning process. The main aspect of trends is the pervasiveness unaffected by the speed of change. (Saritas/Smith, 2011, p. 293)

Types of trends:

- Mega trends: Complex and systematic interactions between different factors
- Potential trends: Outcome of projects, actions or innovations, with a potential for growth in the future
- Branching trends: Group of trends linked to each other

(Miles/Sarita/Sokolov, 2016, p. 69)

Drivers of change

Drivers of change are major influences on a phenomenon, with a focus on those forces which amplify trends. (Miles/Sarita/Sokolov, 2016, p. 70)

Weak signals

With Weak signals we understand the first signs or indications of change in the future, which is related with innovation, technology or society, like paradigm shifts, discontinuities, or future trends. Important is to double-

15

check, if the Weak signal can be accepted as an evidence for change, or is a faulty signal. (Miles/Sarita/Sokolov, 2016, p. 72)

Wild Cards

Wild Cards can be defined as shocking or surprising developments or events, which have a very limited probability, that they will occur, but once the occur they substantially impact human conditions. (Petersen, 2000)

Discontinuities:

Discontinuities are fast, but significant shifts in traditional trajectories, which can be surprising or are expected long before they occur, but without knowing exactly how soon and fast this will happen.

On the one hand often new opportunities are created out of discontinuities, but on the other hand they also can be a danger, if people, technologies or processes cannot adapt to the new conditions. (Petersen, 2000)

2.3. Integration in the strategy process of companies

2.3.1. Foresight process from inputs till strategy

The foresight process in general can be divided into three main phases: (Horton, 1999, p. 9)

- Phase1: Collection and summary of the relevant environmental information, as well as the creation of future oriented knowledge
- Phase2: The core of the foresight process is the translation and interpretation of the knowledge input from phase 1 with the main target to foresee the impact of the input on the own future.
- Phase3: Set actions based on the assimilation and commitment of the own future impact understanding.

The following figure gives a detailed overview of the three phases:
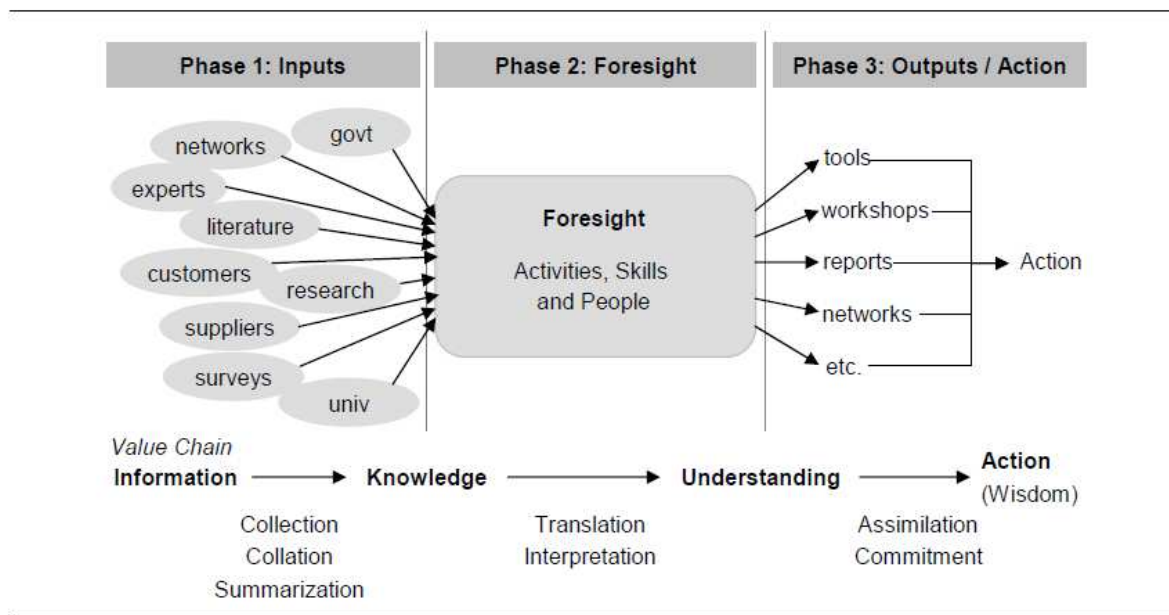

Figure 5: Generic foresight process

(Horton, 1999, p. 6)

The base foresight process, can now be extended on the one hand by adding explicit proper methods to the Foresight process and on the other hand by using the foresight process output as the main input for the implementation of actions in the strategic planning and strategy development process. (Voros, 2003, p. 13)

Process		Representative Methodologies
Inputs Strategic Intelligence	Look and see what's happening.	Strategic Intelligence Scanning, Delphi, Near-Future Context
Foresight Analysis	What seems to be happening?	Emerging Issues, Trends, Cross-impact Analysis
Interpretation	What's really happening?	Systems Thinking, Causal Layered Analysis
Prospection	What might happen?	Scenarios, Visioning, Normative methods, Backcasts
Outputs Expanded Perceptions of Strategic Options	What might we need to do?	Reports, Presentations, Workshops, Multimedia
Strategy Making Strategy Development Strategic Planning	What will we do? How will we do it?	Strategy Development & Strategic Planning Tools

Figure 6: Extended foresight process
(Voros, 2003, p. 14)

2.3.2. Value of corporate foresight

To create value from the coporate foresight process it is absolutely necessary to have not only a value chain of information and knowledge, but especially an understanding of them. Furthermore it is mandatory, that coporates get throught the whole process till the end to be able to set the required actions and benefit from going through the process as well as from the results obtained. Additionally it is highly recommended, that organizations do the foresight process on their own and do not rely on outsiders, who can only support temporarily or add value as catalysts. (Horton, 1999, p. 9)

To do a proper assessment of the value creation from corporate foresight, in general many different kinds of return of investment have to be considered: Creating and absorbe new knowledge, support the decision making, design and build new products, enhancing strategic planning, as

18

well as acquiring the necessary strategic ressources ot produce appropriate responses to change. (Rohrbeck, 2012, p. 440)

Especially from the strategic management perspective and also in markets and with high uncertainity the process logic of dynamic capabilities and the knowledge based view provide a proper tool to describe the value creation of coporate foresight (Rohrbeck, 2012, p. 440)
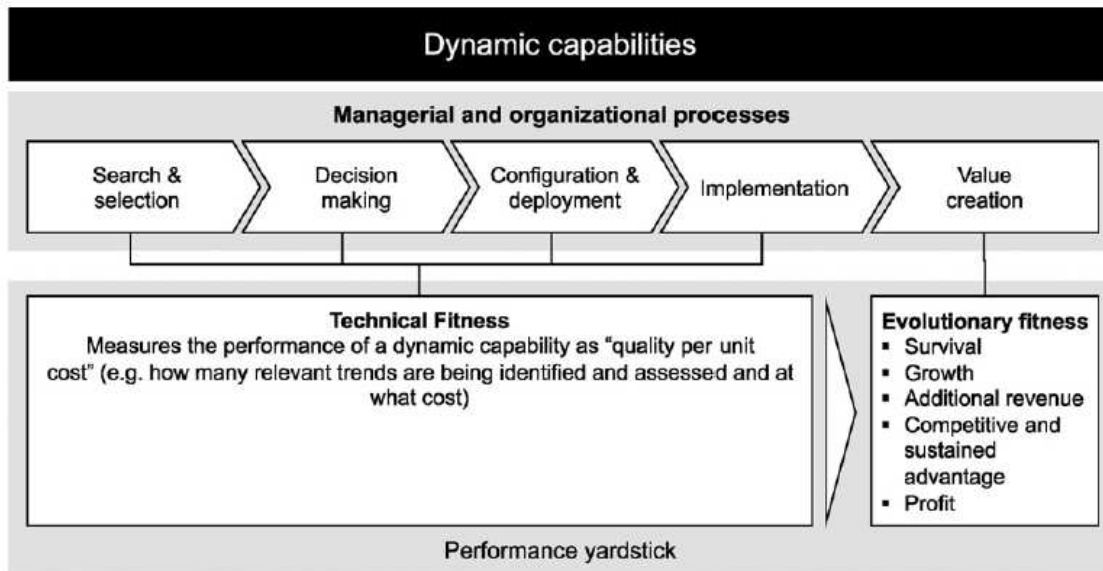
Figure 7: Process model of dynamic capabilities
(Helfat, 2008)

Derived from the process model of dynamic capabilities nine potential value creations can be identified:

Firstly, corporate foresight creates value by ensuring that corporates see and meet threats and additionally go for opportunities. Therefore, they identify the relevant change coming from the environment, start based on that innovation initiatives and challenge the whole innovation development. Secondly the corporate foresight activities have an impact on strategic discussions, by driving and orchestrating them to force the stakeholders to actively join this process and build the foundation for a corporate change on a strategic level. In detail all stakeholders do not only challenge, but change existing mental models, as well as support the creation of new strategic paths enabling strategic change.

Finally, the whole foresight process identifies necessary resources to generate a competitive advantage under changing environmental conditions. The value creation is not only the search for resources, but also the process of develop them internally or acquire them externally. (Rohrbeck, 2012, p. 442)

2.4. Multiple perspectives of strategic foresight

In many companies, strategic foresight (in this context used in a synonymous way to corporate foresight) is usually not pooled in one department. Often the responsibilities of Foresighting is divided and can be found in departments, such as corporate development, marketing and sales, research and development or even in the controlling department. Those departments add their perspectives and fuse the future methods with those of strategic management to create a high-quality forward view, which is coherent and functional and use the resulting insights within the organization. (Slaughter, 1998, p. 382)

To be able to be successful companies must modify their standard past-orientation with inputs from the current environment and bring these past and present factors together into a coherent relationship with the forward view. This forward view offers completely new and often unconventional possibilities, like for instance, insights into new industries, building the grounds for new businesses or offering new ways of solving old problems. (Slaughter, 1998, p. 383)
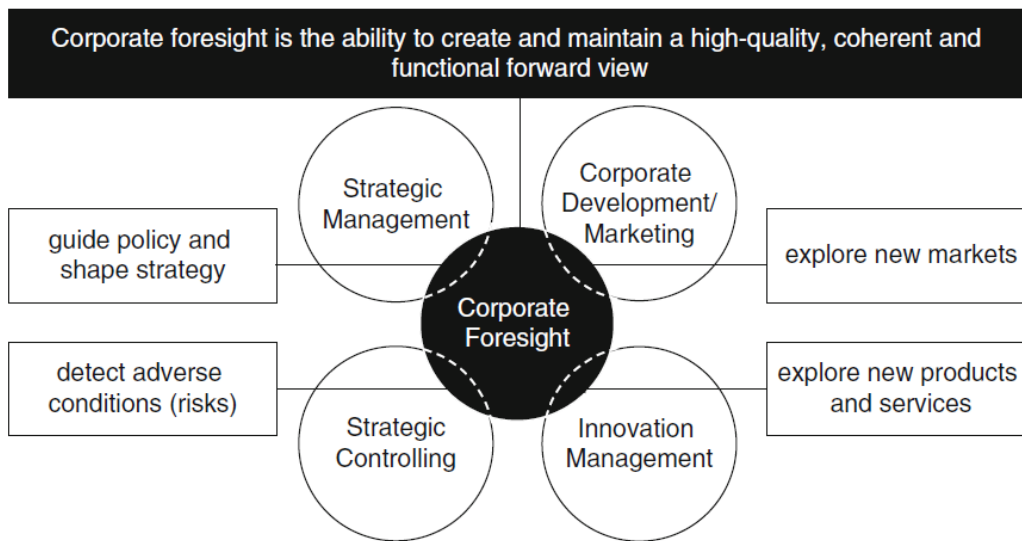
Figure 8: Multiple perspectives of corporate foresight
(Rohrbeck, 2011, p. 12)

Figure 8 summarizes, that corporate foresight forward view is the link of multiple perspectives of different departments within a company and the corporate foresight outcomes:

- Strategic management can use scenario building techniques resulting in near-future environment insights providing the possibility to explore a variety of strategies under different assumptions and conditions. (Slaughter, 1998, p. 383)
- Strategic controlling can detect adverse conditions and therefore precisely identify future risks (Rohrbeck, 2011, p. 12)
- Corporate development and marketing can identify new customer groups and enhancing the understanding of customer needs, as well as explore new markets and improve the understanding of how current markets work (Rohrbeck/Schwarz, 2013, p. 15)
- Innovation management can explore new products and services by identifying opportunities as well as threats regarding the company's product and technology portfolio. (Rohrbeck/Schwarz, 2013, p. 15)

2.5. Changes caused and enabled by new technologies

The usage of new technology, in general of information and communication technology (ICT) to support foresight activities is increasing distinctly. (Von der Gracht, Heiko A./Banuls/Turoff et al, 2015, p. 1) Since many years well known foresight methodologies, like for instance Delphi Analysis, have benefited from the advantages of the internet (Gordon/Pease, 2006, p.321) and data mining is just one of the keywords related to big data obtaining and analysis. (Chan/Franklin, 2011, p. 190) All in all foresight capabilities profit a lot from ICT-based applications, which will gain in importance in the upcoming years. (Rohrbeck, 2011)

To support the understanding of the new technologies and more detailed the ICT technology we first start with a general description of the most important ones:

2.5.1. New technologies – definition

- ICT is the abbreviation of information and communication technology and describes any product or service that stores, retrieves, manipulates, processes, transmits, or receives information electronically in a digital form. Artificial Intelligence, Internet of Things, Big data analytics and block chain are key emerging technologies, which can be summarized as ICT technologies. (Birudavolu, 2019, p. 3)

- Data mining and big data analytics, are used to uncover patterns from seemingly unrelated bits of data (Von der Gracht, Heiko A./Banuls/Turoff et al, 2015, p. 2)

- Web 2.0 tools describe socio-technical changes in the usage of the Internet, in which its possibilities are consistently used and further developed. It represents an evolutionary stage with regard to the offer and the use of the World Wide Web, in which the focus is no longer on the mere dissemination of information or product sales by

website operators, but the participation of users on the Web and the generation of additional benefits. (Gabler Wirtschaftslexikon, 2019)

2.5.2. Foresight support systems

Foresight support systems can be defined in general as computer-based systems, which support on the one hand communication in general, as well as the analysis of statistical and qualitative data and on the other hand decision modelling and the rules of the order in the whole (corporate) foresight process. (Von der Gracht, Heiko A./Banuls/Turoff et al, 2015, p. 2)

The demand regarding systems supporting foresight is that they provide a platform for information creation, exchange, analysis, collaboration and assessment to support a solution-oriented foresight process. The following table shows a starting point of a possible classification of foresight support systems: (Von der Gracht, Heiko A./Banuls/Turoff et al, 2015, p. 2)
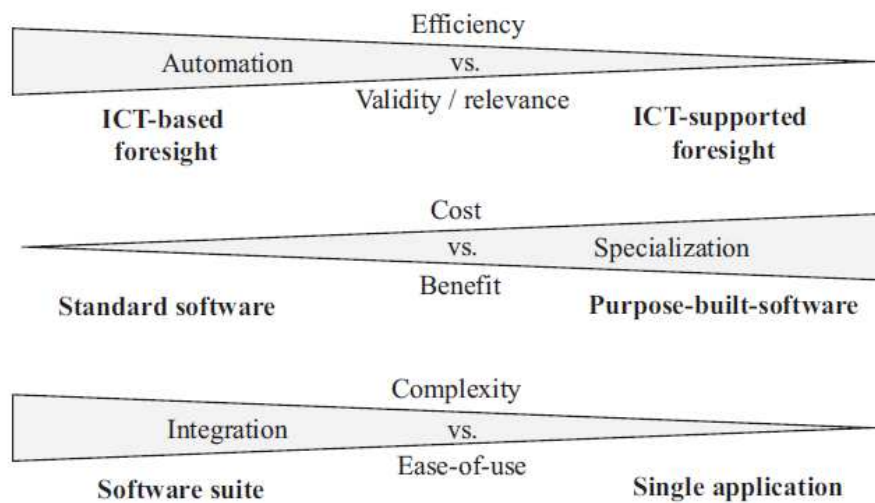
Figure 9: Classification criteria of foresight support systems
(Von der Gracht, Heiko A./Banuls/Turoff et al, 2015, p. 2)

2.5.3. Changes caused by foresight support systems

New technologies provide new possibilities can support and to some extend automatize the forecasting process. The following examples show first support approaches:

Big data and web 2.0.: Based on a rapid IT development the possibilities to analyse big amounts of data more in detail offers new possibilities and

insights for forecasting analysts, especially in terms of combining qualitative and quantitative data. Furthermore web 2.0 tools promote cross-disciplinary learning by matching both techniques. (Von der Gracht, Heiko A./Banuls/Turoff et al, 2015, p. 1)

Scenarios: Foresight support systems offer possibilities in reducing the time of scenario construction by prioritizing scenarios according to their significance for a specific decision resulting in the same ranking of decision possibilities compared to a large set of different scenarios. (Comes/Wijngaards/van de Walle, 2015, p. 29)

Combination of Delphi with prediction market: The electronic combination of the Delphi methodology and the prediction of markets in one foresight support system enables to provide not only a market forecast, but also delivers a whole forecast distribution. (Prokesch/Von der Gracht, Heiko A./Wohlenberg, 2015, p. 47)

Data mining: Different kinds of web- and datamining techniques can be used nowadays to analyses Web forums, where you can find quite objective decision making data from users with common interests. (Von der Gracht, Heiko A./Banuls/Turoff et al, 2015, p. 3)

Weak signals & innovation: New foresight support systems are used in companies to interlink foresight activities directly with innovation management processes. These systems can support in the scanning of weak signals on change, collecting market ideas for possible innovations and integrate these information's in an innovation management workflow. (Rohrbeck/Thom/Arnold, 2015, p. 115)

Internet as a collaboration platform: Classical techniques, like the Delphi or scenario methodology benefit a lot from the possibilities of the collaboration possibilities the internet can provide through involving knowledgeable people around the world with the common goal to share contexts. (Linstone, 2011, p. 1718)

2.6.   Foresight 2.0: Future of digital foresight systems

Foresight support systems provide new possibilities and approaches to the foresight and corporate foresight process in general. The term foresight 2.0 is a new way to describe the qualitative and quantitative changes appearing in the process, when they are built on an infinite accessible large-scale infrastructure. (Schatzmann/Schäfer/Eichelbaum, 2013, p. 1)

Traditionally foresight was mainly expert based in a closed loop, while foresight 2.0 offers new ways of collaborating and communicating and creates new potentials especially for open innovation processes. (Schatzmann/Schäfer/Eichelbaum, 2013, p. 4)

The main advantage of increased communication between experts and other, often external stakeholders is, that too homogenous future images can be avoided, and predetermined goals can be handled in a more flexible way. All these processes can be adapted to an open foresight process, which is in general based on interaction and participation during the description of all the possible steps during the process be it wildcards and scenarios or future strategies. (Schatzmann/Schäfer/Eichelbaum, 2013, p. 4)

Foresight 2.0 and the possibilities occurring from web 2.0 platforms and technologies adds another important aspect to corporate foresight. Big internet companies generate enormous amounts of quantitative data to generate predictive analysis on short and medium term changes and future developments. (Schatzmann/Schäfer/Eichelbaum, 2013, p. 5)

The following advantages of the foresight 2.0 can be summarized:
- The amount of future impact factors increases distinctly, which can be scanned and assed
- The diversity of views and perspectives is growing
- Foresight 2.0 offers the possibility to reduce complexity and to identify the relevant factors
- Transparency in terms of traceability increases
- Foresight 2.0 offers a scalability optimization method
- Ability of real-time data collection

The following disadvantages of foresight 2.0 can be mentioned:
- Anonymity of online correspondence reduces socialising aspects of classical foresight processes
- Foresight 2.0 is still lacking a fundamental academic research base, due to it´s infancy.

(Schatzmann/Schäfer/Eichelbaum, 2013, p. 6)

Foresight 2.0, has currently a high potential to enable broad public discussions, involve high numbers of stakeholders and enable therefore efficient, rapid and especially transparent foresight resulting in dynamic and real-time information flows. (Schatzmann/Schäfer/Eichelbaum, 2013, p. 12)

Some of the most promising foresight 2.0 applications can be named as follows:
- Databases and Wikis, which facilitates not only a structured collection, but also a discussion of forecasts and predictions
- Social rating systems, which sort out irrelevant data and offer the possibility of a perfect scalability of the number of participants
- Collaborative scenarios, which reduce complexity by bundling assumptions
- Prediction markets, with a high accuracy of predicting events on short perspective.

(Schatzmann/Schäfer/Eichelbaum, 2013, p. 13)

Foresight 2.0 applications have a high potential for Future research, especially, when it comes to combining multiple approaches into a holistic process. (Schatzmann/Schäfer/Eichelbaum, 2013, p. 12)

Merging developments from fields, like artificial intelligence, text and data mining, simulation, pattern recognition and decision support technologies, will support to further develop those systems and provide accessible global

knowledge. Foresight support systems are additionally expected, to be supported by common data repositories, and have a modular architecture allowing the implementation of the most popular functionalities in an inter-operational context. Systems in the foresight support are on the one hand getting more and more important, but on the other hand, we shouldn´t forget about the consideration of personal value and the learning experience of the employees, as well as their accountability of their value contribution. (Von der Gracht, Heiko A./Banuls/Turoff et al, 2015, p. 4)

3. Methodology

The literature review has helped to get a common understanding of corporate foresight, its relevant tools and an overview about the multiple perspectives of strategic foresight to create a high-quality forward view. The following chapter with expert interviews now addresses the topics of corporate foresight in an Austrian mid-size company, within the chemical industry.

The main target of the interviews is to get a full picture of the evaluated company and it´s current "ability to create and maintain a high-quality, coherent and functional forward view" (Slaughter, 1998, p. 382) and additionally to experience the respective contributions of the different departments.

To follow the multiple perspectives description of Rohrbeck & Gemünden (Rohrbeck, 2011, p. 12) the selection of the interview partners was based on their role within the company to represent all involved departments in the process of generating a company forward view.

Therefore, all experts are employees of the respective company and they give their opinion on the current foresight process and their perspective in their relevant field of expertise:

Number	Date	Name	Function
1	19th of June	Albrecht Dürrer	Head of Innovation Semperform
2	19th of June	Andreas Glanner	Head of Sales Semperit Engineered Solutions
3	19th of June	Rene Baumgartner	Head of Sales Europe – Semperform Handrails
4	25th of June	Reza Beglari	Head of Innovation Process and Intellectual Property
5	26th of June	Johann Diwald	Director of Finance, Sempertrans & Semperform

| 6 | 27th of June | Christoph Sturm | Head of Business Development – Group Mixing |
| 7 | 27th of June | Robert Stajic | Director Corporate Development and Transformation |

Table 3: List of interviewed experts

3.1. Qualitative research methodology

The experts have been chosen by their knowledge concerning this subject and their responsibility within the company.

To ensure the necessary focus of the interview, the interviews have been conducted on the base of a questionnaire, which was based on the research questions. Nevertheless, the experts have been encouraged to talk in an open and freeway, without being disturbed too much.

In total seven interviews were held in June 2019. All conversations have been recorded and transcribed afterwards. Due to the fact, that all interview partners speak German as their first language, all the interviews were done in German and all relevant parts of the interview were translated into English.

Before the official start of the interview, all experts introduced themselves and gave their outspoken consent to record and transcribe the interviews.

3.2. Interview structure:

The interview was conducted as a semi-structured interview and therefore the interview was divided into two different phases

- Administrative part:
  - o Explanation of the purpose of the interview and clarification of the topic under discussion
  - o In depth explanation of the format, as well as the approximate length of the interview

- o Assurance of confidentiality and the mandatory request regarding permission to record the interview digital to transcribe it later

- Interview phase:
  - o Definition of the relevant terms to set a common line of understanding
  - o Lead through the questionnaire with a semi structured approach
- Conclusion phase

4. Findings

Within this chapter the main findings from the empirical research in an Austrian mid-size company is presented in the following way:

- Corporate development-sales is done decentralized in the operating Business Units, with the focus of figuring out customer needs in existing and new markets and how to explore them. All the gained inputs are shred within the Business Unit to work on products and services to satisfy those needs.
- Innovation management is part of the Business Units, as well as a supporting centralised department with the main goal to work on new opportunities, especially from the technological point of view
- Strategic controlling is involved especially in the strategy development process
- Strategic management is done in the centralized corporate development department, supporting the board of directors to elaborate different strategy scenarios.

The main insights of each area are presented within their own sub-chapters in the sequence of the questionnaire.

4.1. Corporate development - sales

In the assed company, the forward view to explore new markets is mainly organized within the Business Units itself, since the respective customers of these Business Units operate in different industries.

4.1.1. Foresight process - activities

Many middle and long-term forecasts are based on forecasts provided by customers, who forward relevant market trends from their industries:

Glanner: „Grundsätzlich ist es so, dass wir viele Informationen über den Markt hereinbekommen, sprich unsere Kunden teilen uns Markttrends mit oder Entwicklungen im jeweiligen Marktsegment." (Glanner 2019)

Glanner: "Basically, we get a lot of information about the market, i.e. our customers inform us about market trends or developments in the respective market segment." (Glanner 2019, translated from German)

Another valuable source of information are Megatrends, which influence especially products in the building industry:

Baumgartner: „Dementsprechend versuchen wir aber auch mit externer Hilfe Megatrends die sich in der Welt und in den verschiedenen Märkten, die absehbar sind, zu erkennen und auf Basis dieser Megatrends Produkte und Services zu entwickeln, damit wir in diese Richtung gehen." (Baumgartner 2019)

"Accordingly, we are also trying to identify megatrends that are foreseeable in the world and in the various markets with external help and to develop products and services on the basis of these

megatrends so that we can move in this direction." (Baumgartner 2019, translated from German)

Especially for technical products it is very important to exchange information on a regular base with experts in the same industry and upcoming new technical standards are then defined in code committee meetings of these experts. This means the experts define the broad boarders of the upcoming, permitted bounds of future products in this field:

Glanner: „Wir sind in diversen Gremien vertreten, die in den jeweiligen Bereichen aktiv sind und dort sind vorwiegend unsere Entwickler vor Ort. Das heißt, wir kriegen auf der einen Seite vom kommerziellen Umfeld einen Input als auch über die Gremien über technische Entwicklungen und Neuerungen einen Input.
Und über diese zwei Kanäle bilden wir dann eben unsere Vorausschau." (Glanner 2019)

"We are represented in various committees which are active in the respective areas and here predominantly our developers join. This means, that we get input from the commercial environment on the one hand and from the committees on technical developments and innovations on the other.
And through these two channels we then form our foresight" (Glanner 2019, translated from German)

The scope of the foresight activities in the assessed company is mainly defined by the top management with a midterm strategy 2024 and/or influenced by the respective industry of the Business Unit:

Baumgartner: „Das heißt, der Prozess wird vorausschauend dann schon top down gestaltet die individuelle Ausgestaltung vom Produkt

hängt dann in der Abteilung, hier gilt es zu definieren wie man bis 2024 dorthin kommt wo man hinmöchte." (Baumgartner 2019)

Baumgartner: "This means that the foresight process is designed already top down, the individual design of the product is defined in the department, here it is necessary to define how we get there till 2024." (Baumgartner 2019, translated from German)

The used foresight methods in the corporate development sales area of the company is mainly dominated by trends within the industries, but also using environmental scanning methods and support by external experts:

Baumgartner: "Die globalen Megatrends, die uns betreffen sind hier einfach nachzuvollziehen. Es ist bei uns spezifisch. Urbanisierung, Digitalisierung und auch das ganze Thema mit Green, grüne Produkte, Green Marketing und so weiter auf die man sehr leicht kommen kann, weil auch die Datenlage dazu gegeben ist.
Bei solchen Grundsatzentscheidungen geben wir diese Analysen außer Haus … Unternehmensberater haben in so einer globalen Sicht die besten Daten und die besten Erfahrungswerte aus meiner Sicht. (Baumgartner 2019)

Baumgartner: „The global megatrends that affect us are easy to understand here. It's specific to us. Urbanization, digitalization and the whole topic with green, green products, green marketing and so on, to which everyone can come very easily, because also the data situation is quite good.
If such fundamental decisions are made, we outsource these analyses ... to management consultants, who provide a global view, have the best data and the best empirical values from my point of view. (Baumgartner 2019, translated from German)

4.1.2. Outcomes of the foresight process

The insights gained from the foresight activities are often the starting point for further product development steps within the Business Units. Currently these insights are not really shared within the company in a standardized way:

Glanner: „Ich würde sagen ein Megatrend bei Urbanisierung ist definitiv Emissionen und Immissionen in unserem speziellen Fall geht es hier um Geräuschentwicklung. Ein absoluter Megatrend, der den nächsten zehn Jahre europaweit oder auch weltweit stattfinden wird ist, wie kann man Geräusche reduziert. Speziell in urbanen Räumen. Das haben wir uns zum Anlass genommen unsere Produkte in Hinblick auf die Geräuschentwicklung zu optimieren und sind aktiv in diese Märkte hineingegangen. Haben uns Entwicklungspartner gesucht, nationale Organisationen. Aktuell arbeiten wir auch mit einer Universität zusammen, wenn es darum geht Geräuschentwicklung durch Maßnahmen. zu reduzieren.
Austausch auf Konzernebene: Gute Frage und ich musste leider mit leider sehr wenig bis gar nicht beantworten. Es gibt im Konzern keine Corporate Stelle, wo sich die Abteilungen zu diesen Themen austauschen." (Glanner 2019)

Glanner: I would say a megatrend in urbanization is emissions and immissions in our case it is about noise. An absolute megatrend that will take place over the next ten years throughout Europe or worldwide is how to reduce noise. Especially in urban areas. We have taken this as an opportunity to optimize our products regarding noise development and have actively entered these markets. Looking for development partners, national organizations. Currently we are also working together with a university when it comes to reducing noise generation through measures...

Exchange at group level: Good question and unfortunately, I have to answer with very little or even not at all. There is no corporate office in the whole group where the departments exchange information on these topics." (Glanner 2019, translated from German)

4.1.3.   New technologies used in the foresight process

Currently no new technologies support the foresight process in the area of corporate development-sales. The main reason therefore seems to be the lack of knowledge in this field:

Baumgartner: „Aus heutiger Sicht kann ich mir nicht vorstellen, dass wir in den nächsten Jahren fähig sind in diese Richtung zu gehen, weil wir intern das Knowhow nicht haben. Es wird kein Weg vorbeiführen, dass man sich externe Hilfe sucht in diesen Bereichen." (Baumgartner 2019)

Baumgartner: „From today's point of view I cannot imagine that we will be able to go in this direction in the next few years because we do not have the internal know-how. There will be no way to avoid seeking external help in these areas." (Baumgartner 2019, translated from German)

4.2.   Innovation management:

The innovation process in the assessed company is organized in two different departments. On the one hand, the company has an innovation department, providing support in the innovation process for the operating Business Units. On the other hand, the Business Units have recently installed R&D departments focusing mainly on product innovation.

4.2.1. Foresight process – activities

One main source used for receiving data about future developments in all the industries, where the company is selling its products are patent researches of competitors as well as customers:

Dürrer: „Hauptsächlich machen wir das über Patentrecherchen, wir screenen die Patente unserer Mitbewerber bzw. Patente unserer Kunden, die ja die Zukunft relativ gut abbilden. Und wir kennen dadurch in welche Richtung unsere Kunden ihre Produkte entwickeln." (Dürrer 2019)

Dürrer: "Mainly we do this via patent searches, we screen the patents of our competitors or the patents of our customers which represent the future relatively well. And we know in which direction our customers develop their products." (Dürrer 2019, Translated from German)

A very important aspect in this B2B business area, is also the close collaboration with customers, who offer insights in their current research fields:

Dürrer: „Der zweite Punkt ist auf jeden Fall Gespräche mit unseren Kunden. Wir haben die Möglichkeit in den Testzentrum die neuen Entwicklungen uns anzusehen und da sehen wir natürlich auch in welche Richtung es geht." (Dürrer 2019)

Dürrer: "The second point is in any case discussions with our customers. We have the opportunity to have a look at the new developments in the test center and of course we see in which direction they are going." (Dürrer 2019, translated from German)

Based on that, putting more emphasize on the technology side, the company works with environmental scanning methods to detect upcoming technology trends and to evaluate the possible impact on the company and on the specific industry:

> Beglari: „Technology Analysen das machen wir schon, dass wir uns dann einzelne Technologien raus nehmen die dann wirklich in der Tiefe uns anschauen und vor allem mit einem klaren Fokus auf, wie könnte diese Technologie unser Unternehmen unsere Branche verändern." (Beglari 2019)

> Beglari: "Technology analysis that's what we do, we take out individual technologies, have a close look at them with a clear focus on how this technology could change our company's industry." (Beglari 2019, translated from German).

Additionally, to support the company starts currently to use technology field researches:

> Beglari: „Ein Tool das wir gerade erst an starten, ist die Technologiefeldrecherche, wird das genannt, das man sich für eine Business Unit mal prinzipiell anschaut welche Technologien liegen denn da vor uns, die uns eventuell betreffen könnten." (Beglari 2019)

> Beglari: "A tool, that we are just starting is the technology field research, it is called, that you look for a Business Unit, in principle which technologies are there in front of us, which could possibly affect us." (Beglari 2019, translated from German)

More generally used is the method of horizontal scanning and trend scouting described with the example of sustainability:

Beglari: „Dann gibt es natürlich auf der Meta-Ebene das Thema Trends: Megatrends, Globaltrends. Ein sehr oft verwendetes Beispiel Nachhaltigkeit. Die Frage wie und in welchen Ausprägungen kann uns das Thema Nachhaltigkeit treffen." (Beglari 2019)

Beglari: "Then, of course, there is the topic of trends at the meta-level: megatrends, global trends. A very often used example is sustainability. The question of how and to what extent sustainability can affect us." (Beglari 2019, translated from German)

For detailed analysis, especially for relevant trends the next evaluation steps are workshops together with experts or respectively with customers. Another possibility is to change the perspective and to get a feeling of the customer's perception by using customer journey´s as a tool:

Beglari: „…und dann kann man wirklich innerhalb von Trends Themen, die man dann identifiziert hat noch in die Tiefe gehen, ganz punktuell in die Tiefe. Da gibt es ein breites Portfolio an Tools, das können Experten Workshops sein, das sind Kundenworkshops, das haben wir schon mehrfach gemacht zum Beispiel. Das ist eine Customer Journey, um sich dann wirklich in die Schuhe des Kunden zu versetzen, wenn es um Business Modelle geht, gibt es Blue Ocean zum Beispiel ein beliebtes Tool da sind wir sehr selektiv und ich würde sagen auch noch sehr hemdsärmelig unterwegs." (Beglari 2019)

Beglari: "…and then you can really within trends topics that you have identified go in depth, quite selectively in depth. There is a broad portfolio of tools, these can be expert workshops, customer workshops, and we have done this several times, for example. This is a customer Journey, in order to really put oneself in the shoes of the customer when it comes to business models there is Blue Ocean for example a popular tool we are very selective and I would say also

very shirt-sleeved on the way." (Beglari 2019, translated from German)

4.2.2. Outcomes of the foresight process

The main reason for the company to implement a corporate foresight process from the perspective of the innovation department has been mainly to support the innovation strategy and to define the guard rails for the next five, ten or even fifteen years, which will be complemented with an innovation roadmap defining the details:

Beglari: „Das geht einher mit dem Anspruch eine Innovation Strategie zu haben. Die Innovation hat den Auftrag über das tägliche Geschäft hinaus in die Zukunft zu schauen. Und das ist dann natürlich ein zentrales Element die Innovationsstrategie, die man in einem Unternehmen die Leitplanken festlegt ist essenziell und soll möglichst weit, fünf, zehn 15 Jahre in die Zukunft schauen. Diffuser werdend, aber es ist so und sie ist nicht in Stein gemeißelt und sie kann man immer wieder weiterentwickeln. Es ist grundlegend die Richtung vorgeben. Und zwischen diesen Leitplanken ist jetzt noch Platz, der gefüllt werden soll und das ist dann üblicherweise eine Innovation Roadmap. Wenn man dann konkreter sagt auf unserem Weg zwischen diesen Leitplanken sind dann folgende Projekte, Themen, Ziele und die dann auch noch festgelegt werden. Das setzt voraus, dass man in die Zukunft schaut. Jetzt kann man sagen: Okay ich kenne die Zukunft selbst, oder man bedient sich etablierter Methoden auch wenn man das nur nutzt wie eine Taschenlampe mit einem Spotlight mal bestimmte Aspekte näher anzuschauen." (Beglari 2019)

Beglari: "This goes hand in hand with the claim to have an innovation strategy. Innovation has the task to look beyond the daily business into the future. And of course, this is a central element of the innovation strategy which is essential in a company and should look

as far as possible, five, ten, 15 years into the future. However, it is becoming more and more diffuse and it is not set in stone and can be further developed again and again. It is fundamental to set the direction. And between these guard rails there is still room to be filled and that is usually an innovation roadmap. If you then say more concretely on our way between these guard rails, then the following projects, topics, goals and which will then also be defined. That presupposes that we look to the future. Now you can say: Okay I know the future myself, or you can use established methods even if you just use it like a torch with a spotlight to take a closer look at certain aspects." (Beglari 2019, translated from German)

The evaluated company is quite at the beginning of using the mentioned tools and plans in the future to re-evaluate the strategy in general, as well as the roadmap on a yearly base:

Beglari: „Wir beginnen damit ja gerade. Prinzipiell sollte man einmal im Jahr generell die Strategie, und die Roadmap einer Überprüfung unterziehen Es muss jetzt nicht ein fundamentales alles auf den Kopf stellen sein, aber sich die Zeit zu nehmen und zu hinterfragen ist das noch so wie wir uns das vor einem Jahr vorgestellt haben oder gibt es doch irgendwo Anzeichen die erkennen lassen, dass wir hier ganz neue oder vielleicht noch nicht bekannte Einflussfaktoren haben werden." (Beglari 2019)

Beglari: "We're just getting started. In principle the strategy and the roadmap need to be reviewed on a yearly base. It is not necessary to turn everything upside down now, but to take the time and question is the situation still like we imagined it a year ago or are there signs somewhere that we will have completely new or perhaps not yet known influencing factors." (Beglari 2019, translated from German)

Inputs from outside of the company are currently already used for technical topics, like for instance collaborations with universities. In the future the company will optimize this process by doing it in a more structured way:

Beglari: „Ich glaube das ist ein wichtiger Punkt, vor allem im Innovationsbereich gibt es Spezialisten in Bereichen wo es primär darum geht Themen abzuarbeiten, die außerhalb des Ökosystems des eigenen Unternehmen liegen. So haben wir unsere internen Experten und unsere angeschlossenen Experten und die mit uns mehr oder weniger stark verbundenen universitären und außeruniversitären Forschungseinrichtungen. Und selbst wenn wir alles das zusammennehmen, dann muss man sagen wahrscheinlich liegen weit über 90 Prozent des Wissens und des Knowhows in einem Raum, der für uns nicht direkt zugänglich ist. Schon zugänglich, wenn wir selbst recherchieren beginnen aber da werden wir verstärkt Experten zu Hilfe nehmen die genau darauf ausgerichtet sind, Stichwort Open Innovation, hier Dinge zu finden die außerhalb von unserer Industrie und unserem Ökosystem liegen." (Beglari 2019)

Beglari: „I think this is an important point, especially in the innovation area there are specialists in areas where it is primarily a matter of working through topics that lie outside the ecosystem of their own company. So, we have our internal experts and our associated experts, the university and non-university research institutions that are more or less closely associated with us. And even if we put all this together, it must be said that we probably have well over 90 percent of the knowledge and know-how in a room that is not directly accessible to us. Already accessible when we start researching by ourselves, but there we will increasingly use experts who are geared towards finding things outside our industry and ecosystem. "(Beglari 2019, translated from German).

Other external stakeholders, who are indirectly supporting the foresight process, are innovation experts from other industries, talking about trends in innovation circles:

Dürrer: „Und jetzt gibt es eine Möglichkeit diese Megatrends besser abschätzen zu können. Ein Thema ist in diesen Innovationszirkeln partizipieren zu können, das heißt mit Externen reden, die in der Industrie sind bzw. die ähnliche Schritte schon gehabt haben. Man merkt wie viel Wissen dadurch schon nach einem Treffen zurückgegeben wird. Das wäre natürlich eine Herausforderung das regelmäßig, sprich Teil mehrerer Zirkel zu sein, wo man sich unterschiedliche Standpunkte anhören kann." (Dürrer 2019)

Dürrer: "And now there is a way to better estimate these megatrends. To be able to participate in these innovation circles, that means to talk to external people who are in the industry or who have already taken similar steps. You can see how much knowledge is given back after a meeting. That would of course be a goal to be part of several circles where you can listen to different points of view." (Dürrer 2019, translated from German)

The gained foresight knowledge and Know How is shared in a limited way with other departments. Especially the Innovation department collaborates closely with the operating Business Units and therefore shares the foresight process outcomes:

Beglari: „Für den dafür bestimmten Kreis an Kollegen ja, noch einmal das entsteht nicht im luftleeren Raum. Das heißt auch, dass ist entstanden in Zusammenarbeit mit den Kollegen in den Abteilungen. Wir haben jetzt nicht den Anspruch hier besser als die Kollegen, die Fachexperten, die Internen zu wissen wie die Prozesse ablaufen. Wir

sehen uns nur die Möglichkeiten einer Technologie an, besprechen das dann mit Abteilungen und schauen ob das dann wirklich ein Vorteil wäre. Und so arbeiten wir dann die Anwendungsfälle heraus zusammen mit den Abteilungen. Das Ganze wird dann geteilt auf strategischer und auf operativer Ebene aber hauptsächlich auf strategischer Ebene. Solange es noch keine gangbaren Anwendungsfälle gibt." (Beglari 2019)

Beglari: "For the circle of colleagues intended for this purpose, yes, once again this does not happen in a vacuum. That also means that it was created in cooperation with the colleagues in the departments. We don't claim to know the internal processes better than our colleagues, the technical experts. We just look at the possibilities of a technology and discuss it with the departments. And see if that would really be an advantage. And so, we work out the use cases together with the departments. The whole thing is then shared on a strategic and operational level, but mainly on a strategic level. As long as there are no viable use cases." (Beglari 2019, translated from German)

One main advantage of a structured foresight process is to generate awareness for the topic by bringing together all the expert knowledge in one place:

Beglari: „Ich glaube, was die Metaebene anbelangt ist mal Bewusstsein schaffen für Themen ganz wichtig. Viele haben das vielleicht im Hinterkopf, sehen das allein. Wenn wir dann dokumentieren, protokollieren, Workshops zu bestimmten Themen dann ganz konkret zusammengefasst und dann so konkret zusammengefasst liest man das nochmal durch und denkt sich da tut sich ja wirklich was in dem Bereich. Jeder weiß ein bisschen was. Auf dieser Roadmap oder Technology Landscape das sind dann so dunkle Flecken, die sind mehr oder weniger sehr diffus und sind nicht

festgepinnt. Und damit wirft man Licht auf Einzelne, betrachtet sie ordentlich und pinnt sie dann fest und dann ist es für alle irgendwie verbildlicht, da ist etwas. Damit sollten wir uns beschäftigen und wenn es einmal festgepinnt ist, dann beschäftigt man sich auch in regelmäßigen Abständen damit." (Beglari 2019)

Beglari: "I think, as far as the Meta level is concerned, creating awareness is very important for topics. Many people may have that in mind when they look at it. When we then document, workshops on certain topics are then recorded in a very concrete way and then summarized in such a way that you read it through again and think about it. Something is really happening in this area. Everyone knows a little of something. On this roadmap or technology landscape these are dark spots, which are more or less very diffuse and are not pinned down. And with this process you throw light on single views and pin them down and then it is somehow pictorialized for everyone, there is something. That's what we should deal with and once it's pinned down, we should also deal with it in regular intervals." (Beglari 2019, translated from German)

Additionally, to the internal awareness creation, the consideration of competitors, as well as customers and other indicators are valuable inputs in the foresight process and bring huge benefits for the company from a long term perspective:

Beglari: „Der Anspruch von uns ist natürlich vorne zu sein, also der Erste zu sein. Und dazu ist ein wichtiges Instrument zu wissen, wo sind denn Mitbewerber, aber nicht nur Mitbewerber, wo sind denn unsere Kunden im Gedankenprozess? Wie weit haben die schon Themen erschlossen und wie weit ist dort schon die Awareness da um dann mit neuen Produkten, Services, Businessmodellen vielleicht auf Resonanz zu stoßen gehört genauso dazu und Foresight soll dann

mehrere Schritte weitergehen. Auf Basis von heutiger Information und auf Basis von, was hat denn die Zukunftsforschung, oder was sagen denn alle Indikators in Industrien, die uns vielleicht traditionell ein bisschen voraus sind." (Beglari 2019)

Beglari: "Our claim is of course to be at the forefront, to be the first. And it is an important instrument to know, where are competitors, but not only competitors, where are our customers in the thought process? How far have they already developed topics and how far is the awareness there and then with new products, services, business models perhaps to meet with resonance belongs just as well and foresight should then go several steps further. Based on today's information and on the basis of what does foresight have, or what do all indicators say in industries that are perhaps traditionally a bit ahead of us." (Beglari 2019, translated from German)

A clear and structured foresight process also supports in aligning the organization on the long-term targets, even when they must think in scenarios:

Beglari: „Prinzipiell ist es ein, aus Innovationssicht extrem wichtiges Instrument ganz wichtig, dass man möglichst strukturiert und systematisch auch in die Zukunft arbeiten kann. Je klarer der Blick in die Zukunft ist, auch wenn es dann noch Szenarien gibt, desto leichter kann ich auch letzten Endes eine Organisation einnorden und auf ein ganz klares konkretes Ziel hinarbeiten lassen." (Beglari 2019)

Beglari: "In principle, it is an extremely important instrument from an innovation point of view that one can work as structured and systematic as possible into the future. The clearer the view into the future is, even if there are still scenarios, the easier it is for me to

classify an organization and work towards a very clear concrete goal."
(Beglari 2019, translated from German)

4.2.3.   New technologies used in the foresight process

The usage of new technologies to support the foresight process in the company is currently planned, especially in patent monitoring tools:

Beglari: „Also, Maschinelearning, künstliche Intelligenz ist ja in aller Munde und was man zum Beispiel sieht, dass die ersten Patent Monitoring Tools künstliche Intelligenz verwenden, um die wichtigsten Inhalte zu extrahieren. Aus einer sehr breiten Datenbasis da geht es jetzt nicht nur um Big Data, sondern wirklich um die Analyse. Und wie kann ich Maschinen das machen lassen. Ich kann mir vorstellen, dass wir dann Tools einsetzen, die dann diese Technologie einsetzen für Corporate foresight." (Beglari 2019)

Beglari: „So, Maschinelearning, artificial intelligence is on everyone's lips and what you see, for example, is that the first patent monitoring tools use artificial intelligence to extract the most important content. From a very broad database it is now not only about big data but really about the analysis. And how can I have machines do that? I can imagine that we will then use tools, that use this technology for corporate foresight." (Beglari 2019, translated from German)

4.3.   Strategic controlling:

4.3.1.   Foresight process - activities

In this assessed company the controlling department has a coordination role in the strategy process in general and supports the Foresight within this process by identifying future risks as precise as possible:

Diwald: „Wenn wir in dem Bereich Controlling über mittel und langfristige Prognosen sprechen reden wir derzeit über einen

Zeitraum von fünf Jahren im Sinne einer strategischen Planung oder Mittelfristplanung. Das ist für mich mittelfristig, langfristig wäre deutlich länger. Diesen Zeitraum beschäftigt man sich über geplante oder erwartete Marktentwicklungen, über Märkte, die man bedient, über Konkurrenten, über Produkte und Innovationen im Sinne der Top Line, überlegt sich auch welche Kostenerhöhungen oder Kostenveränderungen kann man erwarten. Im Sinne von Inflation! Dort wo momentan keine Prognose oder keine vollständige Prognose möglich ist, ist im Materialbereich, was entscheidend für die Profitabilität ist." (Diwald 2019)

Diwald: „When we talk about medium and long-term foresight in the area of controlling, we are currently talking about a period of five years in terms of strategic planning or medium-term planning. For me, that's medium-term, long-term would be much longer. In this period you think about planned or expected market developments, for markets you serve, about competitors, about products and innovations in the sense of the Topline, considers itself also which cost increases or cost changes one can expect. In the sense of inflation. Where currently no foresight or no complete foresight is possible, this is in the materials sector, which is crucial for profitability." (Diwald 2019, translated from German)

Beside the high volatility of the raw materials the currency can be a major risk for the company, but this is currently not really considered evaluated in a foresight process or considered in the long-term strategic planning:

Diwald: „Nicht berücksichtigt werden Einflussfaktoren von Währungen, was auch immer der Klassiker ist für Prognose Modelle. Das wird daher nicht berücksichtigt, weil die Arbeitshypothese, die ist, dass hier doch gleich, wie auf der Rohstoffseite von einem gewissen natürlichen Hedge ausgegangen wird, weil es auch nicht so übermäßig

ist. Darüber hinaus werden jetzt keine langfristigen potenziellen Megatrends direkt in der Planung verarbeitet, können aber sehr wohl über die Schiene Innovationen. bzw. auch über die Markteinschätzung was der zugängliche Markt ist und wie kann sich diese verändern werden, berücksichtigt werden." (Diwald 2019)

Diwald: "Not considered are influencing factors of currencies, whatever the standard for forecast models. This is therefore not considered, because the working hypothesis is that on the commodities side, a certain natural hedge is assumed, because it is not so relevant. In addition, no long-term potential megatrends are now directly processed in the planning but can very well be taken into account via innovations or also via the market assessment of what is the accessible market and how these can change." (Diwald 2019, translated from German)

The support from external stakeholders is also seen as a constant evaluation process of inputs from customers, universities and competitors:

Diwald: „Man kann vieles berücksichtigen, wie das Knowhow über die Märkte. Man kann hier sicher überlegen auch mit Kunden zusammenzuarbeiten, um deren Meinung einzuholen. Diverse Studien, eventuell in größeren Innovationsbereichen auch mit Universitäten. Nachdem die Industrien in der wir arbeiten eigentlich relativ old fashioned ist, glaube ich, dass das mehr auf humaner Ebene unterwegs sein wird mit Kundenkontakt und Einschätzungen der Mitbewerber und Wettbewerberanalysen und ähnlichen Dingen. Nachdem unsere Wettbewerber oder geschätzten Mitbewerber, wenn's auch von den Informationen her nicht so aufgestellt sind, dass wir es eins zu eins mit unseren Produkten vergleichen können ist es natürlich immer eine gewisse Schwierigkeit hier Benchmarks zu

setzen, um diese Richtung auch anders betrachten zu können."
(Diwald 2019)

Diwald: "There is a lot, which can be done, like the know-how about the markets. You can certainly consider working with customers to get their opinion. Various studies, possibly in larger innovation areas also with universities. Since the industries in which we work are relatively old fashioned, I believe that this will be more on a humane level with customer contact and competitors' assessments and competitor analyses and similar things. Since our competitors or valued competitors, even if they are not positioned in such a way that we can compare them one-to-one with our products, it is of course always similar. A certain difficulty to set benchmarks here, to be able to look at this direction differently." (Diwald 2019, translated from German)

4.3.2.   Outcomes of the foresight process

To share these information's and outcomes of the foresight process with other departments is not only possible, but even more mandatory, because everyone should be involved in the process of strategy development:

Diwald: „Das ist ganz wichtig eine Strategie oder Mittelfristplanung zu machen ist kein Controlling Thema. Das Controlling ist hier natürlich federführend die Informationen in Zahlen zu übersetzen, quer zu checken und so auch transparent zu machen was das bedeutet. Auch natürlich in Szenarien zu denken und zu übersetzen. Aber ein mittel bis langfristiger Plan, der zur Umsetzung kommen soll, muss auch vom gesamten Management-Team und der Ebene darunter entwickelt, verstanden und mitgetragen werden, sonst wird es nie operationalisiert." (Diwald 2019)

Diwald: „This is very important to make a strategy or medium-term planning is not a controlling topic. Controlling is, of course, in charge of translating the information into figures, cross-checking and thus making transparent what that means. And of course, to think and translate in scenarios, but a medium to long-term plan that will be implemented should be developed as well as must also be understood and supported by the entire management team and the level below, otherwise it will never be operationalized." (Diwald 2019, translated from German)

In general, to be able to benefit from the corporate foresight process it is very important to use it in a target-oriented way with a realistic approach:

Diwald: „Ich glaube, dass das Thema Corporate foresight ein wichtiges Thema ist, das je nach Industrie und Größe des Bereiches sehr zielgerichtet eingesetzt werden soll, wenn nicht theoretische schöne Modelle zu entwickeln, die von der Anwendung bzw. Verwendung im jeweiligen Bereich zu abgehoben sind. Das muss dann schon mit Leben gefüllt werden und deswegen auch das Thema auf unterschiedlichen Flughöhen in unterschiedlichen Bereichen einfach gezielt einsetzen. Einmal mehr, einmal weniger, aber dann kann es schon ein sehr hilfreiches Thema sein." (Diwald 2019)

Diwald: "I believe that the topic corporate foresight is an important topic that depending on the industry and the size of the area should be used very purposefully, if not to develop theoretical beautiful models that are too different from the application or use in the respective area. This must be filled with life and therefore the topic has to be applied at different altitudes in different areas. Once more, once less, but then it can be a very helpful topic." (Diwald 2019, translated from German)

4.3.3. New technologies used in the foresight process

New technologies are currently not used in the area of strategic controlling and the involved processes:

Diwald: „Weil auch in einer perfekten Landschaft die Datenpunkte vorwärts gerichtet wahrscheinlich überschaubar sein werden. Weil es vielmehr um Informationen, über Marktentwicklung geht, Einschätzung über Innovationen geht, Einschätzung über Megatrends geht. Nachdem dies vorwärtsgerichtet ist und in den IST Daten nicht vorhanden ist, ist das daher zum Teil ja aber, aber große Datenmengen lösen das Problem nicht, dass man in der strategischen Planung sehr gesamtheitlich denken muss. Meines Erachtens mit großen Datenmengen kann man die Basis dafür legen aber. automatisierte Programme die dann über Algorithmen und selbst lernend die Zukunft vorhersagen, sehe ich in unserer Industrie nicht." (Diwald 2019)

Diwald: „Because even in a perfect landscape the data points directed forward will probably be manageable. Because it's more about information, about market development, assessment of innovations, assessment of megatrends. Since this is forward-looking and does not exist in the IST data, this is partly yes, but large amounts of data do not solve the problem of having to think very holistically in strategic planning. In my opinion, however, the basis for this can be laid with large amounts of data. Automated programs that then predict the future using algorithms and self-learning, I do not see in our industry." (Diwald 2019, translated from German)

4.4. Strategic Management:

The strategic Management perspective is mainly carried out in the area of corporate development. All necessary tasks and the final strategy are worked out and aligned in this department.

4.4.1. Foresight process - activities

Corporate foresight serves in general as a useful tool to support strategic decisions, as well as ensuring competitiveness and strengthening the learning and innovation capacity of enterprises:

Sturm: „Das Thema Corporate foresight würde ich irgendwie grob als Trend und Zukunftsforschung einordnen und da glaube ich muss man unterscheiden zwischen einem Foresight, der zur Stützung von strategischen Entscheidungen dient, langfristige Sicherung der Wettbewerbsfähigkeit und einer Stärkung der Lern- und Innovationsfähigkeit in Unternehmen." (Sturm 2019)

Sturm: "I would roughly classify the topic Corporate foresight as trend and future research and I think one has to distinguish between a foresight, which serves to support strategic decisions, long-term securing of the competitiveness and a strengthening of the learning and innovation ability in companies." (Sturm 2019, translated from German)

A very important base is to get data from various databases and perform the necessary analysis steps. From these insights, the company derives the future picture and determine the assumptions for the strategy planning:

Stajic: „Wir schauen natürlich auf den Markt, Führen hier gezielte Market-Insights Analysen durch, Wachstum, allgemeines

wirtschaftliches Wachstum und dann natürlich runtergebrochen auf bestimmte Industrien mit denen wir uns beschäftigen oder in die wir eigentlich hineinliefern, schauen da, gibt es viele Reports und auch viele andere Unternehmen, die da Research anwenden. Diese lesen wir, bearbeiten sie und leiten daraus unsere eigene Meinung ab, wie die Zukunft sich bewegt. Basierend auf dem setzen wir dann Annahmen für unseren Planung." (Stajic 2019)

Stajic: "We naturally look at the market. Here we conduct targeted market insights analyses, growth general economic growth and then of course broken down to certain industries we deal with or in which we deliver, have a look there, if there are many reports and also many other companies that use research. So, we read them, process them and derive our own opinion on how the future will move. Based on this, we then make assumptions for our planning." (Stajic 2019, translated from German)

Generally, the foresight process in the Corporate Development department is focusing mainly on a macro level from which strategic fields of action can be derived:

Sturm: „Für uns ist das Thema vom Prozess wahrscheinlich etwas unterbelichtet, hier glaube ich vor allem weil die Themen Methoden und Prozesskompetenz nicht so weit gegeben ist, im Kontext des Corporate Development und der Strategieentwicklung fokussiert sich die Firma hauptsächlich auf, sagen wir mal eine Makroebene, aus der sich strategische Handlungsfelder ableiten lassen. Zum Beispiel schauen wir in sehr regelmäßigen Abständen, was sind wir nennen das Megatrends, die quasi unser momentanes Produktportfolio betreffen werden." (Sturm 2019)

Sturm: "For us, the topic of the process is probably somewhat underexposed, here I believe primarily because the topics of methods and process competence is not given so far in the context of corporate development and strategy development, the company focuses mainly on say a macro level from which strategic fields of action can be derived. For example, we look at what we call megatrends that will affect our current product portfolio at very regular intervals. "(Sturm 2019, translated from German)

Megatrends are on the long-term the starting point for the strategy development within the company:

Sturm: „Aber die Strategie folgt, der Strategieprozess hat an erster Stelle schon immer den Versuch der Identifikation von Megatrends, dem sich der Rest der Strategie auch zwangsläufig unterwerfen muss. Man kann da nichts machen, um gegen diese Trends zu arbeiten, weil die Urbanisierung werden wir nicht aufhalten." (Sturm 2019)

Sturm: "But the strategy follows, the strategy process has always first and foremost the attempt to identify megatrends to which the rest of the strategy must inevitably submit. There's nothing you can do to work against these trends, because we won't stop urbanization." (Sturm 2019, translated from German)

The middle to long-term planning horizon is normally maximum five years, some selective technology scouting processes are up to ten years:

Stajic: „Immer maximal fünf Jahre. Alles darüber hinaus ist viel zu weit weg und ist eigentlich nicht mehr planbar in dem Sinn. Für unsere Industrie jetzt vielleicht nicht so relevant.
Die ganzen Bestrebungen CO2 uns auch treffen werden, ist aber momentan nicht im Fokus aber wird definitiv bald ein Thema sein. Es

gibt ja auch Technologien, die jetzt auf den Markt kommen die eine riesen Bedrohung für uns sind. Nicht in den nächsten fünf Jahren aber definitiv in den nächsten zehn Jahren, zu dem gehört natürlich der neue 3-D-Druck.

Solche Trends analysieren wir schon, aber es fließt noch in keine Planung ein." (Stajic 2019)

Stajic: "Always a maximum of five years. Everything beyond that is far too far away and can no longer be planned in that sense. Perhaps not so relevant for our industry now.

All the efforts CO2 will also affect us but is currently not in the focus but will definitely soon be an issue. There are also technologies that are now coming onto the market that pose a huge threat to us. Not in the next five years but definitely in the next ten years, which of course includes the new 3-D printing.

We're already analyzing such trends, but they're not yet included in any planning." (Stajic 2019, translated from German)

The experience the company and especially the corporate development department has gained from the foresight process are not always a success story:

Sturm: „Das was wir als Megatrend identifiziert hätten eine deutliche Richtung aufweist heißt das nicht, dass die Firma automatisch in der Lage ist davon zu profitieren und auch diesem Trend zu unterliegen.

Warum erzähle ich das Ganze, die Geschichte wenn sie sich die Firmen Jahresabschlüsse anschauen zeigt, dass nur weil dieser Megatrend existiert und wahrscheinlich auch mit hoher Wahrscheinlichkeit auch richtig ist, heißt das nicht dass das Geschäft davon direkt profitieren muss zwangsläufig nur weil man in einem Segment arbeitet wo es einen Trend gibt der positiv in unsere Richtung arbeitet, heißt das nicht dass ein Geschäft automatisch davon profitiert sondern man

muss eben auch die Operationalisierung der Strategie sinnvoll hinbekommen." (Sturm 2019)

Sturm: "What we have identified as a megatrend has a clear direction does not mean that the company is automatically in a position to profit from it and is also subject to this trend.

Why do I tell the whole story, when you look at the companies' financial statements it shows that only because this megatrend exists and probably is right, doesn't mean that the business has to profit directly from it only because you are working in a segment where there is a positive trend in our direction, it doesn't mean that a business automatically benefits from it but you also have to get the operationalization of the strategy done."(Sturm 2019, translated from German)

External stakeholders are used in the corporate development department, but mainly on close topics to the daily business and not really in the sense of corporate foresight:

Sturm: „Die Einbindung von Experten und Beratern wird für fachspezifische Themen hauptsächlich verwendet die aber immer relativ nah am oder meistens nah am Tagesgeschäft sind.

Szenario Bewertungen von der Gesamtstrategie erstrecken sich meistens erst auf den nachgelagerten Pfad in der Strategie, wenn es darum geht, dass das in Projekte heruntergebrochen wird und dann die Szenarien höchstens sind dieses Projekt funktioniert oder funktioniert nicht." (Sturm 2019)

Sturm: "The involvement of experts and consultants is mainly used for subject-specific topics which are, however, always relatively close to or mostly close to day-to-day business.

Scenario assessments of the overall strategy usually only extend to the downstream path in the strategy when it comes to breaking it down into projects and then the scenarios are at most this project is working or not working." (Sturm 2019, translated from German)

To merge all the available data and to use the available access to external databases is one of the biggest challenges currently within the company:

Sturm: „Ich glaube das Unternehmen hat Daten genug und Informationen zu wenig. Die Daten sind durchaus vorhanden aber Daten erst in sinnvoller Form sind Informationen und wir haben sicherlich durch Datenbank Zugänge Research Reports, viele Möglichkeiten wirklich auch auf gute Prognosen für die Mal für eine mögliche Zukunftsentwicklung zu zugreifen, aber nutzen das wahrscheinlich nicht." (Sturm 2019)

Sturm: "I think the company has enough data and too little information. The data is quite available but data only in meaningful form are information and we certainly have through database accesses research reports, many opportunities really also to access good forecasts for times for a possible future development, but probably do not take advantage of that." (Sturm 2019, translated from German)

4.4.2.   Outcomes of the foresight process

All the relevant results of the foresight process, but also here especially the outcome of the strategy process is normally shared with the Top-Management and the company puts also a focus on communicating them to everyone working in the company.

Stajic: „Ja natürlich, es sind hier auch die Segmente inkludiert, es gibt regelmäßige Updates für das sogenannte Management Forum. Das sind die 25 Top-Manager des Unternehmens. In dem Moment wo auch

die Strategie verabschiedet wird, wird es einen kompletten Kommunikationsplan geben und die Strategie wird nie umsetzbar sein, wenn der oder die an der Produktionsmaschine nicht versteht was er zu tun hat." (Stajic 2019)

Stajic: „Yes, of course, the segments are also included here, there are regular updates for the so-called Management Forum. These are the 25 top managers of the company. The moment the strategy is adopted, there will be a complete communication plan and the strategy will never be implementable if the production machine does not understand what he has to do." (Stajic 2019, translated from German)

The benefits of the foresight process in the department are on the one hand described as the base for the strategy process, but also an important tool to justify the defined strategy within the company:

Sturm: „Das hilft grundsätzlich, wenn man grundlegende Treiber im Unternehmen außer Streit stellt. Dass man sagt: Okay es gibt die folgenden fünf, sechs Megatrends, die unsere Geschäfte betreffen und denen wir global auch irgendwo unterworfen sind. Es sei denn wir sind so groß, dass wir den Trend irgendwo selbst beherrschen und beeinflussen. Das sehe ich als Hauptvorteil, dass man nicht jeden Monat in jedem Meeting aufs Neue diskutieren muss warum die Strategie so ist wie sie ist, sondern dass man quasi einen Aufbau Block, wenn man sich das als Pyramide vorstellt wo ganz unten das Fundament ist. Es gibt auf der Welt diese und jene Trends und diese und jene Zukunft ist die an die wir glauben und daraus richtet sich dann in einer inneren Logik die Strategie richtet sich dann daran aus, weil wir ich in jeder Diskussion erneut erst einmal Zeit darauf verschwenden muss zu sagen: Woran glaube ich dass die makroökonomische Reise die Reise hingeht." (Sturm 2019)

Sturm: "This basically helps if you put basic drivers in the company out of dispute. That you say: Okay, there are the following five, six megatrends that affect our business and to which we are subject globally somewhere. Unless we are so big that we control and influence the trend ourselves somewhere. I see this as the main advantage that you don't have to discuss every month in every meeting why the strategy is the way it is, but that you have to build a block if you think of it as a pyramid where the foundation is at the bottom. There are these and those trends in the world and this and that future is the one we believe in and then in an inner logic the strategy is aligned to it because in every discussion I have to waste time again to say: What do I believe the macroeconomic journey is going to be." (Sturm 2019, translated from German)

4.4.3.   New technologies used in the foresight process

The usage of new technologies is very limited currently in the company due to the ongoing restructuring process:

Stajic: „Nicht in diesem Unternehmen, bei uns es ja eher um die Lösung der Hausaufgaben. Das ist definitiv etwas was für die nächsten zwei drei Jahre, wo wir uns hin entwickeln müssen, aber da sind wir bei weitem noch nicht, auch weil wir die Systeme noch nicht im Haus haben, das wir die Daten in einem Cube haben. Das ist derzeit ein Zusammenklauben von Snapshots." (Stajic 2019)

Stajic: "Not with this company, but with us it's more about solving the homework. That is something for the next two to three years, where we have to develop, but we are far from there yet, not least because we do not yet have the systems in house, because we have the data in a cube. At the moment this is a gathering together of Snapshots. "(Stajic 2019, translated from German)

59

5. Discussion of the findings

5.1.　Foresight process

In general, the corporate foresight process within the evaluated company is done in a selective way. Overall the foresight process is quite at a starting point and every department within the company works with a limited amount of foresight tools, has its own understanding of what corporate foresight means for them and uses the results mainly on their own.

If we interpret the results of the empirical research by using the Generic foresight process tool (Horton, 1999, p. 6) we can see clearly, that the departments within the company separately use different methods of collecting information and building up knowledge as described below, but have some weak points in the foresight process of translating and interpreting this knowledge to gain a common understanding. Finally, the derivation of clear actions is definitely capable of improvement.

One main trigger for foresight activities is the strategy process influencing the focus of the operating segments for the next five years and therefore also defining the fields of exploration for new markets, as well as products and services. Additionally, more and more foresight tools are used in the innovation department to support the innovation strategy and to define the research and development guard rails for the next ten to fifteen years.

Within the company nearly all departments are on the one hand aware of upcoming megatrends influencing the business and on the other hand partially evaluating technology trends, which could influence the company's business in general and in a disruptive way, like for instance the mentioned 3D printing. Beside those horizontals scanning methods few and far between the company has started to use Roadmaps for picturing and aligning innovation processes and scenarios in connection with the strategy process.

Nearly all the interviewed experts in the company emphasized, how important the close collaboration with customers is, to gain insights from their current research fields and also intensify the exchange of information in a structured way across different industries. External expert inputs are an additional source of collecting information to complete the foresight picture. During the interviews it became clearly, that the departments use different, often unstructured approaches in their foresight activities.

Furthermore, to be even more successful in the future, the standard-past-orientation, which is still predominating in the company has to modified with inputs from the current environment to fuse the past-and present-factors together into one coherent forward view, where the company has not yet been fully successful. (Slaughter, 1998, p. 383)

5.2.   Outcomes of the foresight process

Generally, the foresight process and the outcomes of this process are seen in the company as an essential part of the strategy development, to derive the future picture and determine the assumptions for the strategy planning, which is currently in the focus of the company during its ongoing transformation process.
Especially this stakeholder enforcement, to actively join the alignment process and support in building the foundation for a corporate change on a strategic level, creates value in the company. (Rohrbeck, 2012, p. 442)

The interviewed experts emphasised additionally the importance of getting inputs for the innovation roadmap as well as the necessity to estimate the main risks, like raw material developments and currency influences.

Beside the strategy development, the foresight activities help to prioritise the product development projects, which are currently organised in the operating business units and have where it became quite obvious, that there is room for improvement to strengthen the support from the central innovation department, but also to intensify the alignment between the operating units.

To meet risks and to go for opportunities as well as the launch of the below mentioned new innovation initiatives are another value creation factor. ((Rohrbeck, 2012, p. 442)

Interestingly the central functions, like the innovation department, who has defined the innovation strategy as well as the corporate development department, who is the main promoter of the strategy development emphasize the clear and structured communication of their foresight activities, whereas the operating business units underline the importance to improve the alignment and communication. From this point of view the evaluated company has not yet reached the ability to create a coherent and functional forward view.

Even, if the foresight activities vary a lot within the company, all the departments have benefited from this foresight processes. One main advantage of a clear forward view, which was mentioned, is the ability to be the first to bring a new solution to the market and to conquer additional existing or new market niches.

A structured foresight process also creates awareness of future developments and is a chance to bring together and streamline all the expert knowledge in one place. An unexpected input, which was mentioned by two experts, was that the foresight process, especially the trend foresight is also used to justify the defined strategy within the company.

Overall nearly all experts emphasized, that it is very important, especially for a small to mid-sized company to use the foresight tools in a target-oriented way with a realistic approach.

5.3.   New technology supporting the foresight process

Overall, there are currently no standardized foresight support systems used in the evaluated company. The main reason therefore is the novelty of the foresight process itself and additionally also the lack of knowledge, where foresight support systems could improve the process.

Nevertheless, two examples show, that foresight support systems can help to improve the process quality even with limited resources. On the one hand the process of collecting data through various data sources has already started and new technologies, like artificial intelligence could support in translating the available data into valuable information, and on the other hand the established process of patent monitoring is expected to be supported by automated patent monitoring tools on the short-term.

6. Conclusion

6.1. Summary

Initially, the goal of this master thesis was to provide an overview about foresight and corporate foresight in general and to focus on new technologies and how they enable and enhance the corporate foresight process. During the time of writing this master thesis the focus became more precise to an in-depth analysis of the different perspectives of a strategic foresight process within a company and how this process works out in a mid-size company in the chemical industry.

The corporate foresight topic was elaborated by doing a literature research and elaborate a common view on the terminology of foresight and corporate foresight, as well as the history of foresight in general (chapter 2.1)

The importance of searching emerging drivers in the outside environment and the advantages of different foresight activity tools (chapter 2.2.) found the base to describe the whole foresight process from inputs till the final strategy. The transformation from a value chain of information to a deeper understanding to be able to derive necessary actions and to benefit from this process finally describes the value of the corporate foresight process (chapter 2.3).

The detailed description of the multiple perspectives in a corporate foresight process within one company in chapter 2.4 has shown, that this forward view is the link of multiple perspectives of different departments and this model also served as the base model for the qualitative research.

New technologies offer new possibilities of increasing the quality of foresight activities in general and offer possibilities to combine qualitative and quantitative test methods. (chapter 2.5).

Foresight 2.0 summarizes the upcoming tools to create new ways of collaborating and communicating and to accompany the transformation to open innovation processes. (chapter 2.6)

Two steps back, in chapter 3, seven experts from one company describe their individual way in doing corporate foresight in various way and also describe their different approaches, used tools, outcomes, benefits and more or less their limitations in aligning their views to one coherent forward view in the company (chapter 4,5)

6.2.   Limitations

The interviews gave a very good overview, what are the methods currently used in a foresight process within a company and every expert, who was interviewed emphasized how important the forward view in a company in general is.

Nevertheless, the company is currently quite on a starting point of a structured corporate foresight process in general and this topic has not enough focus at the moment from top management. Interviewing experts from different companies would for sure bring additional insights, especially experts from companies, who use these tools in a structured way for several years already. Additionally, expert interviews from research institutes or universities could complement the current knowledge of foresight in general. The usage of new technologies in the field of corporate foresight is for sure the next game changer, but currently the available data of company using these systems is quite limited and was therefore no focus of this master thesis.

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