

MASTER

How to rejuvenate the business?

measuring sensing capability in high-technology marketing & sales organizations

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Frankfurt am Main, July 2008

How to Rejuvenate the Business?

Measuring Sensing Capability in High-Technology Marketing & Sales Organizations

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In Innovation Management


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Executive Summary

This paper presents a theoretical framework that is developed in case study research. Academic concepts like ambidexterity (*balancing exploration & exploitation*), Dynamic Capabilities, corporate entrepreneurship and marketing-orientation, are used to design a measurement model for measuring the *sensing capability* for high-technology organizations.

This study contributes to academics and practice by:

- (1) Applying extensive literature review to improve understanding of Dynamic Capabilities and the value for high-tech organizations (*chapters 4 & 5*).
- (2) Designing a conceptual model for measuring the sensing capability embedded in management practices (*chapter 6*).
- (3) Developing a 'Toolbox' which offers design propositions for improving the sensing capability (*chapter 7*).
- (4) Testing the proposed model based on empirical study (*chapter 8*)

The research question of this study is initiated from the practical need to improve the receptivity of the organization:

How can a successful international high-technology Marketing & Sales organization become more receptive to new opportunities and threats and contribute to new business development, in order to prevent stagnation in the global marketplace?

Dynamic Capabilities

The concept of Dynamic Capabilities (DC's) is an academic concept which is considered as extremely important for commercial organizations in order to survive in the long run. High-tech marketing and sales organizations fulfill an important role in sensing changes in the exogenous environment, since they are the main connection between the global enterprise and the unpredictable and dynamic market. *Dynamic Capabilities are defined as a firm's behavioral orientation constantly to integrate, renew, and recreate its resources and capabilities, and most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage* (Wang & Ahmed, 2007). Dynamic Capabilities (1) evolve from learning mechanisms, (2) are different from ad-hoc problem solving capabilities, are (3) repetitive, (4) higher-order processes and do not include (5) firm performance.

Three core processes as building blocks for DC's are defined: (1) sensing, (2) seizing, and (3) managing opportunities and threats.

Measuring Dynamic Capabilities

DC's should ultimately be embedded in the management practices of the organization. Without structural embeddings, an enterprise is not able to have DC's in place. This research proposes to link three core processes, (1) sensing, (2) seizing, and (3) managing to three types of management practices defined by Bloom *et al.* (2007): (1) operation management, (2) performance management, and (3) people management. *Figure A* depicts this conceptual research model. This model focuses on the first core process: the *sensing capability*.

Operationalization of the sensing capability, embedded in the management practices, results in 14 constructs.

Technology sensing (A1), customer sensing (A2), competitor intelligence (A3), value chain analysis (A4) and partners (A5), form the constructs for measuring the sensing capability captured in operation management.

Balanced targets (B1), interconnected targets (B2), target time horizon (B3) and stretching targets (B4) are the four constructs under performance management.

People management includes recruitment (C1), assessment (C2), people development (C3), teamwork (C4) and empowerment (C5) (Figure A).

Measurement Model

The 14 constructs are measured by interviews and other case study material. A scoring grid is developed which ranks from 1 to 5. With score 1 the sensing capability is not embedded in the construct. With a score 5 is the construct aligned with optimal sensing capability. When different interviews are composed it is possible to calculate a value and depict it in a spider diagram. An example is given in figure B.

Added Value

First of all, this model proposes (1) a practical solution to measure the sensing capability of the organization, (2) enables benchmarking with other departments, business units, and companies. It, (3) offers a clear graphical representation of strengths and weaknesses in the sensing capability.

Second, chapter 7 proposes a toolbox with a selection of key design propositions to improve the sensing capability on the individual constructs.

Third, chapter 8 presents the empirical results including customized recommendations to improve the sensing capability.

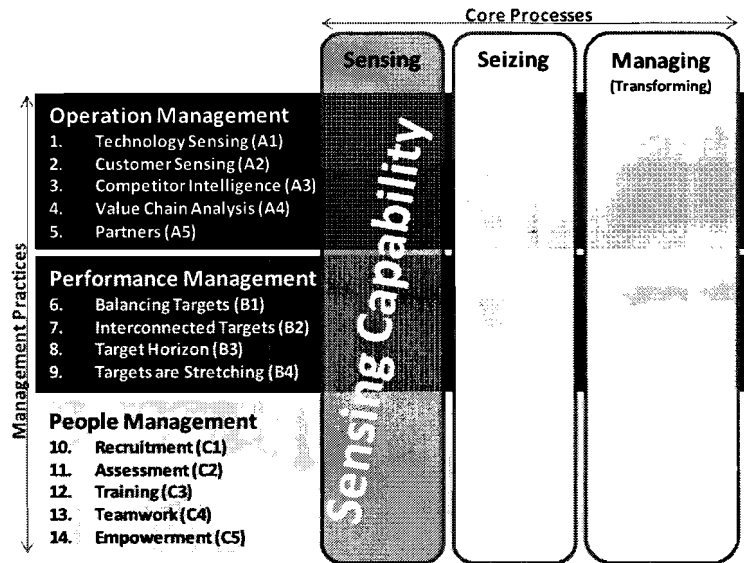


Figure A Conceptual framework to measure the sensing capability

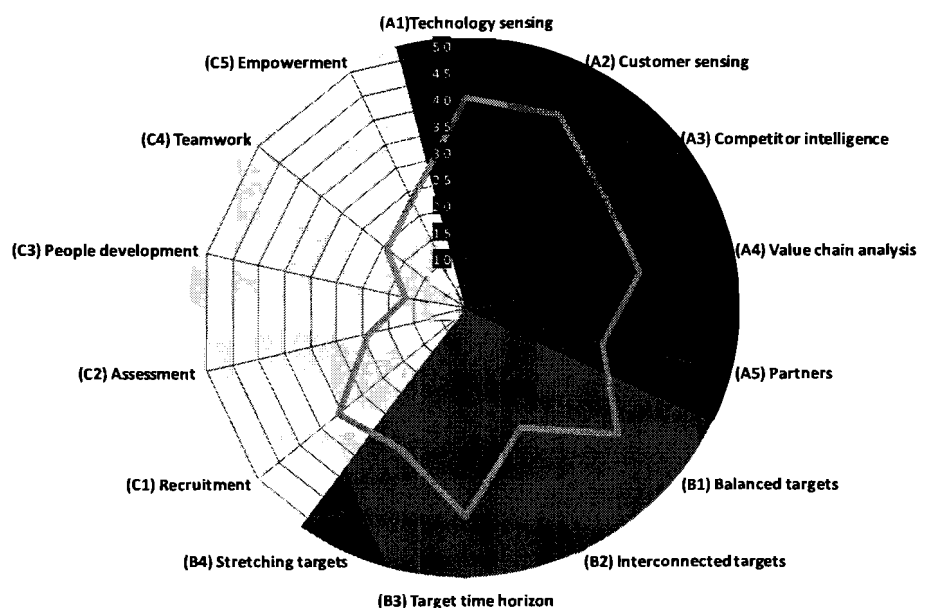


Figure B Possible result of the measurement method

Preface

If what you have done yesterday still looks big to you, you have not done much today

Mikhail Gorbachev (Russian President, 1931 -)

The first global multinational corporation in the world, the Dutch East India Company (*Vereenigde Oost-Indische Compagnie; VOC*), was established in 1602. It was the first corporation in the world who issued stock. Experimentation, exploration, trading, discovery, and challenge, was what characterized the founders of this interesting venture. I was born in the same city, 380 years later. Now, July 2008, I realize I was born with a similar instigation as them. An instigation to explore, to discover, and to challenge. Netherlands Prime Minister Jan Peter Balkenende coined the term 'VOC-mentality', which refers to this will to look across borders, discovering opportunities and challenge yourself.

And it has been a challenge the last 3.5 years. When I did my Bachelor's, I was not able to write one single page in English, lacking English capability. Academic capability was an unknown term, and international experience was nothing more than several weeks' holidays abroad. Now more than 3.5 years later I reflect back upon fantastic experiences and substantial knowledge acquisition during this period.

First of all I had the opportunity to see a little bit of the world. Traveling for 5 months in Australia, New Zealand, Thailand and Hong Kong, turned out to be an exciting experience. It shaped my personality, and my social and language skills. It also equipped me with a broader world view, better intercultural understanding, and it shaped my personal traits.

Secondly, I have been able to acquire a huge amount of knowledge about technology and business by studying hard on my Master's. Privileged to study at two world class technical universities, *Eindhoven University of Technology (TU/e)* and *Korea Institute of Science and Technology (KAIST)*, fills me with deep gratitude. I realize that what is considered as normal, it is purely privilege to be among a relatively small amount of blessed people.

Graduating in a high-technology marketing and sales organization was my final challenge as finishing touch of this wonderful period. This paper is the final result of it, please enjoy reading it.

Now I am delivering my thesis and I will be finished soon. What's next? I am ready for the next challenge....following the VOC-mentality!

Peter Treur

Frankfurt am Main, July 2008

Acknowledgements

Knowledge is in the end based on acknowledgement.

Ludwig Wittgenstein (Austrian philosopher, 1889-1951)

Filled with deep satisfaction of the knowledge I gained during my university period, I would like to take this opportunity to thank some people in particular. Especially the people I met during the last year and helped me with different several academic and non-academic challenges.

First of all, I would like to express my sincere appreciation to Timo Komulainen, for his constructive feedback during my thesis research. As my company mentor he helped me a lot, with improving my research. His broad and deep knowledge about high-technology business impressed me time after time, and I have been able to learn a lot. Thanks!

University supervision needs particular attention. Professor Sjoerd Romme in the first place, his valuable feedback and flexibility in making appointments is expedient. Special thanks also to Professor Sang-Chul Park. When I met him about 1.5 year ago, I was impressed about his way of teaching and his inspiring behavior. I still remember the phone call from him, when he called me in the summer of 2007 to announce I got an A+ for his course. I am also indebted for the contact he supplied me with; Mr. Charlie Bae.

Thanks to Mr. Charlie Bae and Mr. Nam-Yong Cho for their support in offering me the opportunity to work on my thesis research in the company. I will remember the inspiring talks I had with Mr. Charlie Bae about attitude, achievement and diligence.

I also want to show appreciation to all the other members of the high-tech marketing and sales organization, where I did my Master's Thesis research. There are too many to name, but special attention to Ruggero, Kai, Uwe and Joachim, since we had many pleasant meetings over the past 5 months.

I was very fortunate to meet Professor Tae-Eog Lee as Dean of the department Industrial Engineering, and direct mentoring professor during my time at KAIST. His effort and the effort of Professor Hayong Shin and Professor Fransoo in the Dual Degree process have been overwhelming to me.

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The fullest expression of my gratitude is given to God, who is the first in every aspect of my life. I realize I have been blessed abundantly with His guidance until now and till forever.

Peter Treur

Frankfurt am Main, July 2008

Some historical quotations might, imaginatively, demystify the report's context...

"No man ever reached to excellence in any one art or profession without having passed through the slow and painful process of study and preparation."

Horace (Ancient Roman poet, 65 BC – 8 BC)

"Man's mind, once stretched by a new idea, never regains its original dimensions."

Oliver Wendell Holmes (American physician, 1809-1894)

"This is largely the methodology I've used throughout my career - that is, starting with a question as to what might be the properties of a set of compounds that could be invented which were unusual and unpredictable. Many times I've felt a bit like Columbus setting sail."

Donald Cram (American chemist, 1919-2001)

"There are no secrets to success. It is the result of preparation, hard work, and learning from failure."

Colin Powell (65th secretary of state of the US, 1937 -)

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List of Abbreviations

B2B	Business to Business
CI	Competitive Intelligence
DC's	Dynamic Capabilities
EMEA	Europe Middle East & Africa
HQ	Head Quarter
LSI	Large Scale Integration
M&S	Marketing & Sales
NBD	New Business Development
NPD	New Product Development
RBV	Resource Based View
SWOT	Strengths, Weaknesses, Opportunities & Threats

Key Definitions

Concept	Definition/explanation
Adaptability	Adaptability refers to the capacity to reconfigure activities in the business unit quickly to meet changing demands in the task environment (Gibson & Birkinshaw, 2004).
Alignment	Alignment refers to coherence among all the patterns of activities in the business unit; they are working together toward the same goals (Gibson & Birkinshaw, 2004).
Ambidexterity	The ability to simultaneously pursue both incremental and discontinuous innovation and change (Tushman & O'Reilly, 1996).
Competitive Intelligence (CI)	Competitive Intelligence is an integral part of building market oriented organizations. Its process include (1) organizing for CI, (2) search process, and (3) sense-making (Jaworski & Kohli, 2002). Competitive Intelligence is considered as an important tool in order to build sustainable competitive advantage through strategy building, especially in dynamic markets.
Contextual ambidexterity	Contextual ambidexterity is the behavioral capacity to simultaneously demonstrate alignment and adaptability across an entire business unit (Gibson & Birkinshaw, 2004).
Dynamic Capabilities (DC's) (1)	Dynamic Capabilities are the firm's processes that use resources - <i>specifically the processes to integrate, reconfigure, gain and release resources</i> - to match and even create market change. Dynamic Capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die (Teece <i>et al.</i> , 1997; Eisenhardt & Martin, 2000).
Dynamic Capabilities (DC's) (2) (<i>followed by the author of this paper</i>)	Dynamic Capabilities are defined as a firm's behavioral orientation constantly to integrate, reconfigure, renew, and recreate its resources and capabilities, and, most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage (Wang & Ahmed, 2007).
Market orientation	Market orientation is the organization wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization wide responsiveness to it (Kohli & Jaworski, 1990).
Market-sensing capability	The ability of the organization to be aware of changes in its market, and to forecast accurately responses to marketing actions (Day, 1994).
Operationalize	Operationalization is the process of defining a fuzzy concept so as to make the concept measurable in form of (<i>variables</i>) consisting of specific observations (Wikipedia; the free encyclopedia).
Resource Based View (RBV)	The resource-based view (RBV) is an economic tool used to determine the strategic resources available to a firm. The fundamental principle of the RBV is that the basis for a competitive advantage of a firm lies primarily in the application of the bundle of valuable resources at the firm's disposal (Wernerfelt, 1984, p172; Rumelt, 1984, p557-558).
Structural ambidexterity	Structural ambidexterity is, to create separate structures for different types of activities like exploitation and exploration activities (Birkinshaw & Gibson, 2004).

1. Introduction

There is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things

Niccoló Machiavelli (Italian philosopher, 1469 - 1527)

This chapter gives a general introduction on the case study research, executed in a high-technology marketing and sales organization. Due to the desire of this company is the real name of this company is not mentioned. Throughout this paper is referred to a high-tech marketing and sales organization. The main contribution is the development of a model which aims to measure the sensing capability of the organization. This model could be applied in different companies and might be useful across industry boundaries. The author of this paper is aware of possible difficult terminology; despite the fact that all concepts are defined in the text, is a list of key definitions created. This list of key definitions can be found before chapter one of this paper, just at the convenience of the reader.

The first section introduce today's business environment which is a general context in which this research emerged. The second section of this chapter gives a reader's outline.

1.1 Today's Business Environment

The competitive landscape is changing rapidly. Different trends such as globalization, deregulation, blurring industry boundaries, technological convergence and disintermediation all pose new managerial challenges to large, incumbent companies (Prahalad, 1998). Being large and successful at one point in time is no guarantee of continued survival (O'Reilly & Tushman, 2007). The fortune 100 annual survey rankings indicate that most firms do in fact, find it extremely difficult to sustain their performance over a considerable period of time (Ireland & Webb, 2007). As evidence for this assertion, consider the fact that only 26% of the 100 companies listed in Fortune's 1980 ranking remained on the list in 2001 (Cappelli & Hamori, 2005). Competitive advantage lasts only for a certain time and leading companies sometimes lose this position because they do not, or cannot adapt to change. Therefore, when change was slower, competitive advantage was lasting longer. But in today's world of rapid change managers have to find new ways of keeping up with higher industry clock speed (Osterwalder, 2004).

Digital convergence on product level has its deep impact at the - *high-tech* - industry level as well. Many scholars have shown how difficult it is for market leaders in general, to create innovative growth, and this is widely acknowledged by practitioners across different industrial boundaries. Success require being able to go beyond isolated wins to develop deep capabilities that allow companies to disarm disruptive threats and seize new growth opportunities repeatedly (Scott, Johnson & Sinfield, 2008).

Besides the change in the business environment, also organizational changes and changes in the value chain has taken place. The effectiveness of intellectual property rights and the extensive use of information and communication technologies in design activities have amplified the trend toward decomposition of the value chain (Dibiaggio, 2007).

In *The Innovator's Solution*, authors Christensen and Raynor, discuss how to institutionalize innovation. They argue that companies should begin planning for innovation well before they need

to by appointing a senior manager to oversee the resource-allocation process, creating a team of ‘movers and shapers’ and training employees to identify disruptive ideas (Christensen & Raynor, 2003; Scott, Johnson & Sinfield, 2008). Building an engine that produces a steady stream of innovative business growth is difficult, but companies that are able to ‘do it’ can differentiate themselves from competitors (Scott, Johnson & Sinfield, 2008).

1.2 Paper’s Outline

This paper combines insights from myriad of academic sources with practical case study data, in order to generate new insights for academics as well as practitioners. The first chapters of this paper draw heavily upon different - *state of the art* - academic resources and reflect upon the high-technology market and sales organization and other extremely valuable academic concepts.

The general research question is formulated as follows:

How can a high-technology international Marketing & Sales organization become more receptive to new opportunities and turn market information into new business development?

This paper is structured as follows. The first three chapters function as a general orientation and introduce the background of this research including methodology (*figure 1*). Chapter 2 discusses the project environment where this research was executed. Chapter 3 discusses methodology, and concepts as validity and reliability are captured in this chapter.

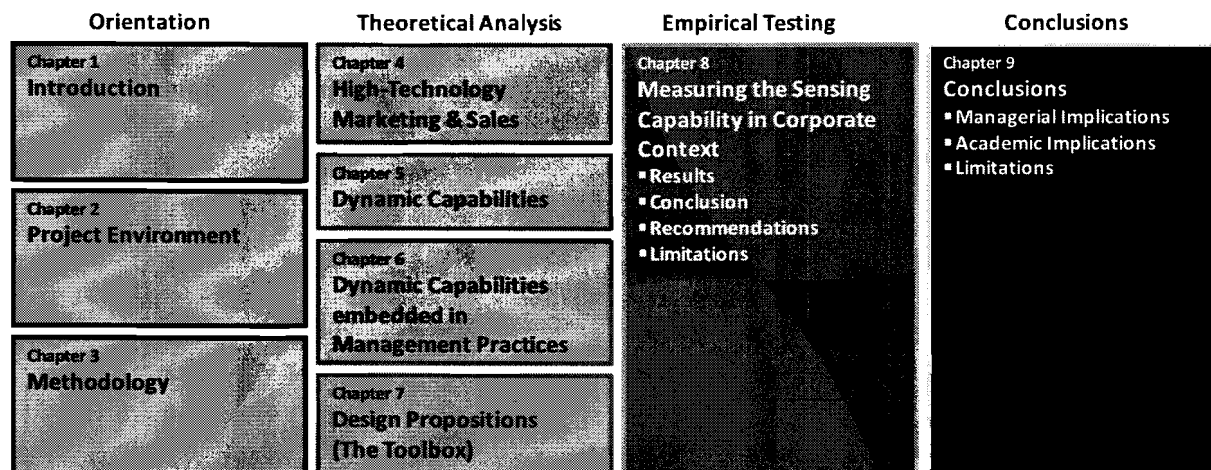


Figure 1 Paper’s outline

The second part of this research is a theoretical analysis (*figure 1*) composed by chapters four up to seven. Those chapters discuss respectively, the high-technology marketing and sales organization, the concept of Dynamic Capabilities, a measurement model is proposed for measuring one of the core processes underlying Dynamic Capabilities, and finally a general toolbox with design suggestions is given.

The third part of the paper is an empirical test of the proposed measurement model of Dynamic Capabilities in chapter eight. Related conclusions and recommendations are included.

The last chapter closes with managerial and academic implications, with respect to the developed measurement model, and limitations of this study.

2. Project Environment

No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be...

Isaac Asimov (Russian/American author and biochemist, 1920-1992)

This chapter outlines the project environment of this Master's Thesis and states the research questions and deliverables. Finally, this chapter closes with the scope of the executed research.

2.1 Case Study High-technology Marketing & Sales Organization

Doing this research in a high-technology marketing and sales (M&S) organization is beneficial for developing a model which aims to measure the sensing capability of the organization. Research has been iterative in nature, which means that practical situations gave input for theory development, and academic literature could be applied in guiding the research in developing the model. Since this research was done in the M&S organization, issues with regard to research, development, and production are not considered as primary research topics; however they cannot be disconnected from the marketing and sales operations.

2.2 Research Questions & Deliverables

The general research question is formulated as follows:

How can a successful international high-technology Marketing & Sales organization become more receptive to new opportunities and threats, and contribute to new business development, in order to prevent stagnation in the global marketplace?

Decomposition of this general research question results in the following four areas of research:

1. **Better understanding of key competitive factors for a high-tech marketing and sales organization (4)**
 - a. What are important considerations of a high-tech marketing organization to remain competitive in a dynamic environment? (4.1)
 - b. What is the value of marketing in general and how is this typical organized? (4.2)
 - c. How does marketing effect sales and visa versa? (4.3)
 - d. How does the marketing function look like? (4.4)
2. **Better understanding of factors to remain competitive in an industry which is changing with increasing pace (5)**
 - a. What organizational concepts might be leveraged to improve the receptivity and competitive advantage of a high-tech marketing organization? (5.1)
 - b. What is the main antecedent of Dynamic Capabilities? (5.3)
 - c. What is the consequence of Dynamic Capabilities? (5.2)
 - d. What is the definition of Dynamic Capabilities? (5.4)
 - e. How to measure Dynamic Capabilities? (6)
3. **Analysis of sensing capability present in the high-tech marketing and sales organization (6)**
 - a. How could the sensing capability be measured in operation management of the organization? (6.3)
 - b. How could the sensing capability be measured in performance management of the organization? (6.4)
 - c. How could the sensing capability be measured in people management of the organization? (6.5)
4. **Typical design areas to improve the sensing capability of a high-tech marketing and sales organization (7)**

2.3 Science-Based Design

This research follows a science-based design, recently developed by Romme and Endenburg (2006). According to Simon (1996) science-based design involves the entire body of intellectually thought, analytic, partly formal, and partly empirical knowledge for the design process. Romme and Endenburg (2006) identified five steps in the research and development cycle in organization design; (1) organization science, (2) construction principles, (3) design rules, (4) organization design, and (5) Implementation and experimentation. In this research, step 1 and 2 are combined and step 5 is kept out of the scope of this research.

The first step of this research – *organization science & construction principles* – is covered in the first part of this research (*figure 2*). Theoretical input prior to the collection of any case study data is an essential step in doing case studies (Yin, 2003). Based on ‘systems thinking’ – *which is discussed below* – the high-tech marketing organization in a dynamic environment is assessed in an extensive literature study, and important applicable organizational concepts are selected. Those concepts offer the - *most appropriate* - construction principles in this science-based design (*figure 2*).

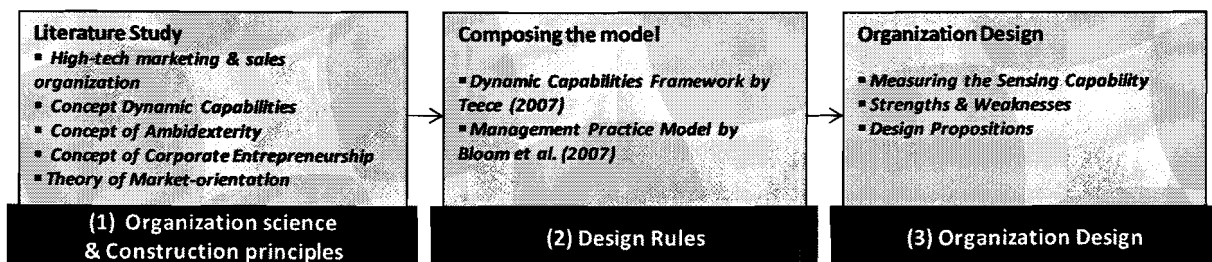


Figure 2 Science-based design approach applied in this case study

Those construction principles are a coherent set of imperative propositions, grounded in the state-of-the-art of organization science, for producing new organizational designs and forms and (re)developing existing ones (Romme & Endenburg, 2006).

Design rules - *the second step in figure 2* - are a coherent set of detailed guidelines for designing and realizing organizations, grounded in a related set of construction principles (Romme & Endenburg, 2006). In this particular case, this is the proposed *Dynamic Capabilities framework*¹, combined with the assessment on organizational level with the *management practice model* of Bloom et al. (2007). This assessment involves comparing the actual real-life situation at the marketing and sales organization with the conceptual framework proposed.

Organization design is the third step in the framework depicted in *figure 2*. Design rules help to develop a tailor-made design; they cannot be directly tested in practice, only organization-specific solutions can² (Romme & Endenburg, 2006). Improvement of organizational design is suggested, this is mainly iterative in nature since the domain knowledge of the current organizational members is leveraged as much as possible.

¹ The Dynamic Capabilities framework and the Management Practice framework are discussed in the chapters 5 and 6 of this paper.

² According to Romme & Endenburg (2006) are representations of the intended design initially highly visual in nature (e.g., a diagram depicting communication flows)

This science-based approach is a *design oriented approach*, which relies on 'system thinking', mentioned by Simon (1996). Romme (2003) states that this kind of design research, develops knowledge in the service of action; the nature of design thinking is thus normative and synthetic in nature, directed toward desired situations and systems and toward synthesis in the form of actual actions (Romme, 2003).

2.4 Scope of the Research

This Master's Thesis project basically follows the three first steps of the regulative cycle, depicted in *figure 3*, which is designed by Van Strien (1997). Because of time limitations and the problem situation considered, it is impossible to create a complete solution. The steps intervention and evaluation are not captured in the scope of this particular research.

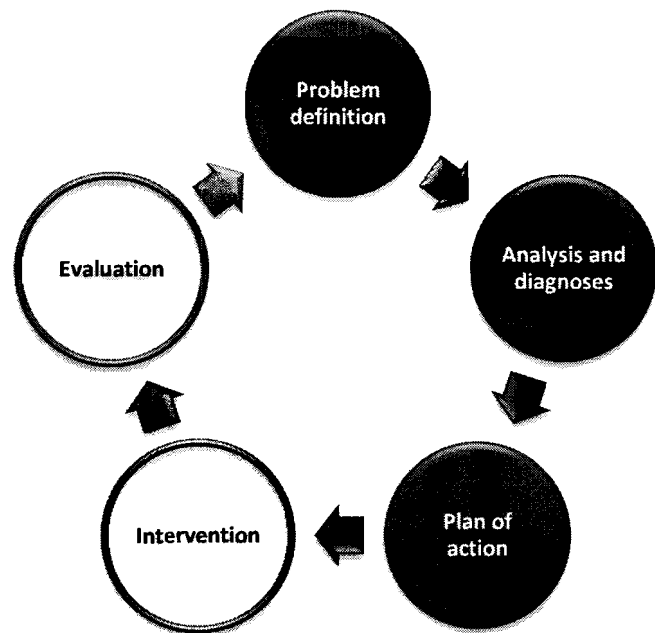


Figure 3 The regulative cycle (Van Strien, 1997)

3. Case-Study Methodology

It is theory that decides what can be observed.

Albert Einstein (American/German theoretical physicist, 1879-1955)

Research is done by using the case study methodology. Case study research is considered to be the hardest types of research to do, because of the absence of routine formulas (Yin, 2003). But it is the most desirable one since organizational design is case specific. The first section of this chapter defines case-study research (3.1). The second section elaborates on that with a validation of the chosen approach (3.2). Section three sheds light on the data collection in empirical research (3.3). And finally construct validity and reliability are discussed (3.4).

3.1 Definition Case Study

Case study research is less formal and more fluid than higher-constraint research such as surveys, program evaluations & field experiments (Graziano & Raulin, 2004). It is more iterative in nature, which is a big advantage in generating new practical and academic insights. Case study research is defined clearly by Yin (2003) and has the following characteristics:

1. *A case study is an empirical inquiry that (1) investigates a contemporary phenomenon within its real-life context, especially when (2) the boundaries between phenomenon and context are not clearly evident.*
2. *The case study inquiry (1) copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result (2) relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result. It (3) furthermore benefits from the prior development of theoretical propositions to guide data collection and analysis.*

All those characteristics, mentioned by Yin (2003), are very much applicable in this particular research on Dynamic Capabilities, on the sensing capability and the discovery of new business opportunities, from a high-technology marketing and sales perspective. By doing this research, the researcher is able to create and validate new insights in the iterating process between the practical situation and academic sources available. This results in bringing academic concepts – *corporate entrepreneurship, ambidexterity, Dynamic Capabilities, marketing-orientation etc.* – together in order to generate a model to measure the sensing capability and results in (re)design propositions.

3.2 Synthesis: Doing the Right Thing

Awareness of the full range of theories that might be relevant to the study is important (Yin, 2003). The author of this paper realizes that there are many different ways to enable new business development and rejuvenating the business. Individual theories (*perception, learning, incentives, etc.*) could be used to analyze this, as group theories (*team work, informal groups, interpersonal networks, etc.*) and social theories (*cultural differences and market place functions*). An extensive spectrum of literature is considered to be used in a conceptual framework. For the sake of the most effective aim of this research, the author chooses to reflect this issue mainly with organizational theories, hence the concepts of corporate entrepreneurship (*linkage with individual theories, group theories & social theories as well*), ambidexterity (*idem*), resource based view and Dynamic Capabilities.

As mentioned before, this research is based on 'systems thinking' and is iteratively applied. Reflecting the specific situation with design rules grounded in scientific literature takes several loops, in order to suggest appropriate (re)design for the high-tech M&S organization.

3.2.1 Propositions

Yin (2003) states that only by stating some propositions case study research moves in the right direction. The propositions of the current research are, (1) high-tech marketing requires different research attention than 'normal' marketing, (2) Dynamic Capabilities are necessary in order to remain competitive; (3) market orientation in high-tech industry is beneficial for enterprise's competitive advantage on the long term. Furthermore, is believed that (4) organizational (re) design is not straight forward and easy, and that (5) active participation of organizational stakeholders is important for successful improvements. Finally, (6) is top management support and recognition essential for success in finally redesigning the organization (regardless from the fact that implementation of redesign propositions is not within the scope of this research).

3.2.2 Unit of Analysis

The unit of analysis is typically a system of action rather than an individual or group of individuals (Yin, 2003). In this research the units of analysis are *the three management practices, through which the organization leverages the sensing capability to be receptive to exogenous developments*. This unit of analysis is based on the three types of management practices – *operation management, performance management & people management* - defined by Bloom *et al.* (2007), which are used in generating a measurement model for measuring the sensing capability of the organization.

3.3 Analysis: Doing the Things Right

Yin (1994; 2003) suggested three principles of data collection for case studies: (1) the use of multiple sources of data, (2) the creation of a case study database, and (3) maintaining a chain of evidence. Applying those three principles in will positively affect the construct validity and reliability, which is discussed in further detail in one of the subsequent sections.

3.3.1 Sources of evidence

The first source of evidence is '**documents**' about organizational structure, processes, systems etc. The second, and one of the primary sources, are **interviews**, which appeared to be guided conversations rather than structured queries. In other words, although pursuit at a consistent line of inquiry, the actual stream of questions in a case study interview is likely to be fluid rather than rigid (Rubin & Rubin, 1995; Yin, 2003 p.89). This means that in practice the interviews are to be open-ended in nature, in which the respondents are asked about facts of a matter as well as their opinions about the concerned issues (Yin, 2003). However, those interviews remain to be focused interviews in order to give answer to the research questions. After conducting, the interviews are scored according to predefined measurement tool. The best case, which means that the sensing capability is embedded in the construct, is scored with a 5 and the worst case, which means that the sensing capability is practically speaking not present in that particular construct is scored 1 (*see appendix 1 for an complete overview of the scoring tool*). The measurement scoring is based on state of the art academic literature, and this way of scoring is not uncommon in academic research (Bloom *et al.*, 2007)

Equally important is the role of the researcher in being **participant-observer** as a third source of evidence. Shaping idea's as well as from inside the organization (*task-force members*) as well as

outside (*researcher*) gives a vivid interaction, and is considered as a valuable (*design*) tool for shaping ideas. This third form also includes some workshops/feedback sessions in order to shape idea's better. A limitation of this method is however the lack of objectivity in the overall process; first, the investigator has less ability to work as an external observer and may, at times, have to assume positions or advocacy roles contrary to the interest of good scientific practice. Second, the participant-observer is likely to follow a commonly known phenomenon and become a supporter of the task-force group being studied. Third, the researcher/participant role may simply require too much attention relative to the observer role, thus the participant-observer may not have sufficient time to take notes or raise questions about events from different perspectives (Yin, 2003). By taking those significant drawbacks in consideration during the research process, the researcher can mitigate those as much as possible.

Since the research is done within the organization, a fourth source of evidence, ***direct observation*** of organizational procedures in the company is applied.

The measurement tool which was conducted (*appendix 1*), is not only used by scoring the half structured interviews, but also phrases in other meetings are captured in the scoring methodology. This explains the blank spots in the result table in *appendix 2*. This is not a problem since the organization is relatively small and with a small amount of people in the sample size a relative accurate result can be given.

3.3.2 Case Study Database

The second principle Yin (1994; 2003) mentioned is a case study database. The case study database is created and material which could be relevant is kept in this database. After analyzing the evidence from the material in this database the observations were applied to the thesis report in order to underline the reliability of the conclusions.

3.3.3 Maintaining the Chain of Evidence

The final and third principle, is maintaining the chain of evidence. The chain of evidence was maintained by linking data which is considered as evidence/design/explanation to the conclusions and discussions in the thesis report.

3.4 Construct Validity & Reliability

The reliability of this case study research is defined by Yin (2003) as the demonstration that operations of a study, such as the data collection procedures, can be repeated, with the same results. Construct validity was secured by establishing correct operational measures for the concepts being studied (Yin, 2003).

Reliability and construct validity is maintained and secured by the use of three important data collection methods: (1) multiple sources of evidence, (2) case study database, and finally (3) the chain of evidence has been maintained. Those three important data collection methods were discussed in the previous chapters and were all applied in this research.

3.4.1 Triangulation

By using different sources of evidence the concept of (data) triangulation is applied. As advised by Yin (2003) - *and as a typical phenomenon in qualitative research* - did discussion of the results by external people (Brown & Eisenhardt, 1997) take place. Discussion took place with as well as people from university as from the internal organization where the case study was executed.

Patton (1987) also mentions investigator triangulation, which is triangulation among different evaluators. So was the scoring checked and discussed with an external evaluator, who related the quote from the interview/meeting with the scoring table given in the measurement tool (*Appendix 1*).

A third form of triangulation is theory triangulation (Patton, 1987), this is a form of triangulation which is covered by the use of an extensive literature review on different distinct academic concepts.

The different triangulation methods were leveraged as much as possible which increased the reliability and construct validity of the research.

3.4.2 The Scoring of the Measurement Tool in Detail

With the measurement tool created (*Appendix 1*), the sensing capability in the management practices is quantified. However, an important issue is the extent to which it is possible to obtain unbiased responses from the respondents.

Creating a survey, would bias the respondent's answers, since the respondent would tend to give an answer which would be a desirable answer, which would be different from the real situation (Bertrand & Mullainathan, 2001). However, interviewing and observing may involve pre-conceptions of the researcher about the firm's performance and sensing capability, and would score the answers on ex-ante perceptions (Bloom & Van Reenen, 2006). This is the main drawback of scoring the individual answers and statements from a researcher's perspective.

Respondents were not informed that they were being scored in the direct interviews (blind scoring). The deception involved was deemed acceptable because it was necessary to get unbiased answers. The same is valid for the direct observations and quotes taken from meetings the researcher participated in.

The amount of direct interviews and observations which are used in this research numbers 14. This is fairly limited, but due to triangulation the results can be considered as fairly reliable. The amount of data is too qualitative in nature, and the number of respondents too limited that statistical analysis with the scores is not considered. This research is a qualitative in nature, and it gives a reliable representation of the sensing capability of the marketing and sales organization involved.

Potential measurement errors & drawbacks

1. One interviewer
2. Measurement model not completely filled with results (not every person is scored on all the constructs)
3. Limited data points
4. Measurement tool is not totally comprehensive, however a good representation

Counter actions to secure validity & reliability

1. Data triangulation
2. Investigator triangulation with internal organizational people
3. Investigator triangulation with people from outside the organization
4. Theory triangulation
5. Blind scoring (open questions)

3.5 Conclusion

The measurement tool is not completely comprehensive in the way it measures the sensing capability. There might be other mechanisms, constructs, which leverage the sensing capability of the organization. However, the subset of management practices and constructs defined are believed to be a good representation to measure the sensing capability of an organization. The research is qualitative in nature and despite the fact that data is quantified, statistical analysis on the scoring is not appropriate and the empirical result should be seen as a representation and indication of the sensing capability of the organization. Construct validity and reliability are secured by triangulation methods and blind scoring, however one researcher who did the interviews/observations is still a main drawback of this research (*but practically inevitable in light of a Master's Thesis*).

4. High-Technology Marketing & Sales Organization

What is a business? The only function of a business is to create customer value and to innovate

Peter F. Drucker (American/Austrian professor, writer & management consultant, 1909 -2005)

Most employees, take the goals of the business as a given, but in the high-technology world, strategy often revolves around the innovation activities of relatively low level technical and business people. Business creation goes beyond invention; innovation. It involves welding marketplace opportunities with inventive technology and new technical knowledge (Burgelman & Sayles, 1986).

As mentioned by Chesbrough (2003), innovation is about transforming technical input to economical value for customers. Rejuvenating the business can take place with radical and sustaining technology as input. More important is the way to translate this input into economical value on the market place. An emphasis on incremental or ongoing innovations can be a valuable strategy as long as the competitive environment is stable and technological changes are competence enhancing. However, it is dysfunctional when a company faces a turbulent competitive environment or when disruptive technologies are emerging (Bower & Christensen, 1995; Lynn *et al.*, 1996).

Organizational setup like organizational structure and focus are important aspects in the ability of being receptive in a fast changing environment. Global issues like centralization and decentralization play a role in this matter, also functional internal structures. Decentralization, for example, must be pursued in order to lead in a changing business environment as enterprises expand, otherwise flexibility and responsiveness will erode. Also strict functional structures seems not be beneficial for opportunity/threat recognition (Teece, 2007).

Let's have a look at several concepts which have relationship with the ability of high-tech organization, which needs to rejuvenate business and create new growth opportunities. In light of this, does this chapter mainly focus on the role of M&S organization and their role in rejuvenating the business. First technology-push versus market-pull forces are briefly introduced (4.1), the importance of the marketing role is discussed as well (4.2). A short reflection on the interaction between marketing & sales is given (4.3), and marketing structures and processes are discussed (4.4).

4.1 Technology Push versus Market Pull

Innovation is complex, uncertain and almost - *but not quite* - impossible to manage (Tidd, Bessant & Pavitt, 2005). It emerges where market insight and technological insight intersect; a process that is often easier to harness within the small entrepreneurial firm than in the larger, more established organization (Berman & Hagan, 2006).

While Lynn, Morone & Paulson (1996) mention three sides of the innovation process, videlicet market, technology & timing, does the strategic framework of Wheelwright & Clark (1992) mention two distinct forces of innovation; technology push & market pull (*figure 4*).

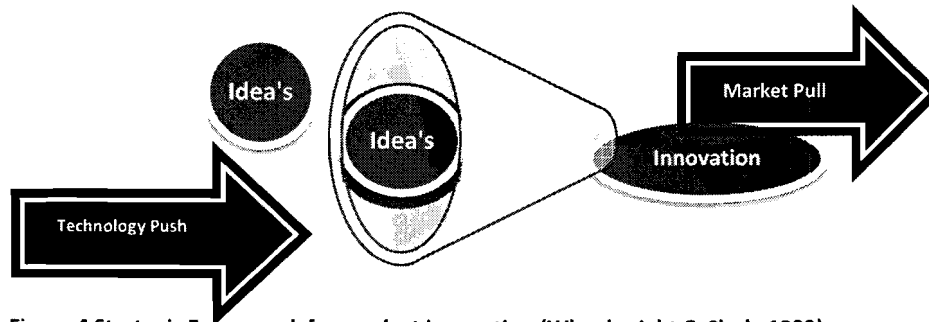


Figure 4 Strategic Framework for product innovation (Wheelwright & Clark, 1992)

With a technology oriented approach, the marketing function does provide little or no guidance to management. Marketing programs tend to be considered secondary and are often created after the product technology has been developed (Aaby & Discenza, 1993). The market oriented approach however starts with doing research in the market place for getting valuable ideas about possible product/service offerings.

Driving technology is important, since radical different technology can disrupt the market place. But on the other hand, firms should understand the latent and (un)expressed needs of its customers (Danneels, 2004), which is part of the understanding of the marketplace (*this is elaborated in further detail in the following sections*).

Burgelman *et al.* (2004) argue that a primarily technology push view *or* a primarily market pull perspective, posses serious pit falls to the innovation process (p.682). So both forces in the development of new products and processes are incredibly important for the sustainability of the firm. Teece (2007) argues that there is considerable evidence that business success depends as much on organizational innovation - *e.g. design of business models* - as it does on the selection of physical technology. This in principle emphasizes the importance of a comprehensive focus on innovation, and goes beyond a technology focus only.

Cooper (1984) found – *in addition to Burgelman et al. (2004)* - different initiation modes of new product/business development, while Burgelman *et al.* (2004) expected an organization to be either market or technology driven, did Cooper found six different initiation modes of innovation. Cooper (1984) mentions the following initiation modes for new product development: (1) customer-driven, (2) market-driven, (3) close-follower, (4) technology-driven, (5) planned-diversification, and finally (6) opportunistic-diversification (*table 1*). The first, second, third, and the fifth mode are primarily driven by the marketing function, or the market oriented organization.

Initiation Mode	Description
(1) Customer-driven	Opportunity identification from a specific customer needs
(2) Market-driven	The problem or opportunity identification arises from the company's specific strategy of serving a defined market and through the subsequent interaction with the needs of that market.
(3) Close-follower	Opportunity identification arises from the company matching a new product developed by a direct competitor
(4) Technology-driven	The new product concept arises directly form a technological discovery or from the availability of new technology
(5) Planned-diversification	The new product concept was developed as a way to deliberately enter new markets in a strategic attempt to diversify away from traditional markets and/or products
(6) Opportunistic-diversification	The new product concept involved entering a new market, although such diversification had not been a corporate intention.

Table 1 Different initiation modes of new business development (Cooper, 1984)

One more note on innovation drivers: two directions, technological push and market pull orientation, do not oppose each other. It is possible, in fact highly desirable, to feature both in a firm's new product strategy (Cooper, 1984). The role of marketing in a high-technology organization is thus important, let's have a more detailed look at the value of the marketing organization in the subsequent sections.

4.2 Marketing Organization

It is tough to conceptualize marketing simultaneously as a pervasive voice for the customer, a strategic lever for market targeting, and product positioning and a tactical weapon for everyday pricing and propositioning (Webster *et al.* 2005). The definition of marketing is not as unambiguous as one should expect. At the top of the corporate organization, corporate marketing responsibility has been redefined as global brand development and stewardship and overall marketing communication strategy. Most other traditional marketing activities, including day-to-day brand management, key account management, and distribution have been reassigned to the regional branch.

4.2.1 Difference Between Marketing Activities & Marketing Process

First of all it is good to mention that there is a difference between *marketing activities* and *marketing process*. Marketing activities consist of advertising, market research, product planning, selling and so forth, and are principally undertaken in the marketing department (Payne, 1988). This also could be seen as direct or indirect support of the sales activities. Marketing processes involve the whole company, as processes are the means by which the company continuously maintains a match between its products and its customer's needs (Payne, 1988). Other academics refer to market orientation (Varela & Benito, 2005; Moorman & Rust, 1999; Workman, Homburg & Gruner, 1998; etc). Both need management support but especially for the latter it is stated essential that management shows commitment to gathering, sharing and using market information (Varela & Benito, 2005).

4.2.2 The Value of Marketing

In the article of Moorman & Rust (1999), the authors argue for the value of the marketing function *beyond* an organization wide market orientation. These arguments suggest that the marketing function can and should coexist with a market orientation, and that the effectiveness of a market orientation depends on the presence of strong function that includes marketing.

Several empirical studies of business organizations indicate that an organization-wide market orientation has a positive impact on the financial performance of firms and their new products (Day and Nedungadi, 1994; Deshpande, Farley, and Webster, 1992; Jaworski and Kohli, 1993; Moorman, 1995; Narver and Slater, 1990). Likewise, important advances have been made in conceptualizing the key capabilities exhibited by market-oriented firms (Day, 1990; Day, 1994; Kohli and Jaworski, 1990; Webster, 1992; Webster, 1997).

According to Leemon (1995) there are four generic core processes of the marketing function. Those four core processes offer direct value to the organization: (1) offer creation; new product or service development, (2) offer to order; getting the customer to buy, (3) offer to cash; producing, delivering and getting paid, (4) customer service; dealing with problems, soliciting feedback .

Analyzing and understanding market information can unlock opportunities for a company to find increased value, market share growth, price premiums, add-on products and services. A coherent market strategy can draw together all customer-oriented processes, as well as provide a link between strategy and tactics, by making sure that long-term market goals are being addressed in the company's day-to-day activities. As the company reengineers its physical processes, marketing's job is to make sure that the company reengineers information processes for maximum value (Leemon, 1995).

One of the more valuable contributions that marketing can make is the information it gathers, analyzes, and distributes across functions and throughout processes (Leemon, 1995). In other words it can contribute in communicating and disseminating the voice of the customer and help to grow new business opportunities from a market pull perspective. This market need orientation and communication has been found directly related to business performance, by Cooper (1984), and were generally found to yield positive results.

4.3 Marketing-Sales Interaction

MacMillan (1988) states that marketing and sales are important areas for searching out opportunities to take initiative for new business development. In practice it is not always that obvious to distinct the marketing and the sales function. Organizations find that they have a marketing function inside sales, and a sales function inside marketing (Kotler *et al.*, 2006). The sales people wish that the marketers would worry about future opportunities (*long-term strategy*) and leave the current opportunities (*individual and group sales*) to them (Kotler *et al.* 2006). According to Kotler *et al.* (2006), two problems could emerge in the relationship between sales & marketing:

- **Economic conflict:** The marketing group is under pressure to achieve revenue goals and wants the sales force to 'sell the price' as opposed to 'telling through price.' The salespeople usually favor lower prices because they can sell the product more easily and because low prices give them more room to negotiate.
- **Cultural conflict:** Marketers, who until recently had more formal education than sales people are highly analytical, data oriented, and project focused. They are all about building competitive advantage for the future.

Four generic core processes of the marketing function (Leemon, 1995):

1. Offer creation
2. Offer to order
3. Offer to cash
4. Customer service

The heightened importance of customer relationship management and the greater risk in being dependent on fewer, larger customers are together forcing marketing responsibilities out into the field sales organization (Webster *et al.* 2005). In other words, this could erode the marketing function into the more operational space of the marketing scope, in spite of long term strategy building. And if the marketing orientation is too much operational focused, then companies tend to be more product-centric and technology-driven, what would imply that they lack truly customer-focus, market-based strategy development (Webster *et al.*, 2005).

4.4 Structural Approach of Organizing the Marketing Function

A functional marketing organization refers to the concentration of the responsibility for marketing activities (*knowledge and skills*) within a group of specialists in the organization. The benefits of functional structures are well documented and include enhanced efficiency and ability to develop specialized, distinctive capabilities (e.g., Thompson and Strickland, 1983). The risks include the challenge of coordination between specialized functions, inter-functional conflict, functional myopia, and overspecialization.

A marketing processes organization refers to the dispersion of marketing activities (*knowledge and skills*) across non-specialists in the organization (Workman, Homburg & Gruner, 1998). This approach can take a variety of forms. For example, Kohli and Jaworski (1990 p. 3) define market orientation as the organization wide generation, dissemination, and responsiveness to market intelligence. Consistent with a process structure, they suggest that a market orientation involves multiple departments sharing information about customers and engaging in activities designed to meet customer needs (Narver and Slater, 1990). Day (1994 p. 38) describes two key cross-functional processes of market-driven organizations: market-sensing and customer linking activities (Moorman & Rust, 1999).

The critical question is than how the marketing function should be designed to provide the greatest value for the organization (Moorman & Rust, 1999). In an environment which is more dynamic than ever before, does the marketing function fulfills an important role. The marketing function is the direct connection with the customer, competes directly with the competition, and is able to sense new developments - *of any kind* - which could disrupt the current business significantly. A need for efficient *exploitation* of the current business and a mean for effective *exploration* of the dynamic exogenous environment is thus cornerstone of today's high-tech marketing and sales organization in order to remain competitive. This calls for the need of Dynamic Capabilities, which is introduced in the next chapter.

5. Dynamic Capabilities as Necessity for Sustainability in a High-Tech Environment

That which is static and repetitive is boring. That which is dynamic and random is confusing. In between lies art.

John A. Locke (English philosopher, 1632-1704)

Dynamic Capabilities (DC's) encapsulate wisdom from earlier work on distinctive competence (Learned *et al.* 1969; Selznick, 1957), organizational routine (Nelson & Winter, 1982), architectural knowledge (Henderson and Clark, 1990), core competence (Prahalad and Hamel, 1990), core capability and rigidity (Leonard-Barton, 1992), combinative capability (Kogut & Zander, 1992) and architectural competence (Henderson and Cockburn, 1994). The concept of DC's is fairly new and research findings remain still disconnected (Wang & Ahmed, 2007). For a high-tech marketing and sales organization this concept seems to be incredibly important and it helps academics and practitioners to comprehend the complexity of today's high-tech business.

The concept of DC's has been considered as an important concept by various authors (hence for example: Eisenhardt & Martin, 2000; Helfat, 1997; Lavie, 2006; Teece, *et al.*, 1997; Teece, 2007; O'Reilly & Tushman, 2007). Those authors mention the importance of DC's for commercial organizations in order to survive in the long run. The DC's concept is primarily valuable for high-technology firms, while high-technology firms operate in a market which could be characterized as 'dynamic'. Market dynamism as principal antecedent for the necessity of DC's has been depicted in *figure 5*. So is the main consequence: firm performance.



Figure 5 Conceptual model of antecedent and consequence of Dynamic Capabilities

First four strategic management models are discussed briefly, and the explanation why the DC's concept is a valuable concept to use in this particular research (5.1). Then market dynamism as main antecedent of DC's is discussed (5.2). The consequence, firm performance, is discussed in the subsequent paragraph (5.3). The final two paragraphs respectively define DC's (5.4), and discuss three core-processes of DC's (5.5).

5.1 DC's as Paradigm of Modern Management Theory

Four leading models of strategic management have emerged over the last decades in modern management theory (Gowen & Tallon, 2005). Porter (1979) introduced the Competitive Forces theory, which focuses on profitable subsectors that are attractive in an industry. Shapiro (1989) applied the concept of game theory with his theory of Strategic Conflict. And the Resource Based View (RBV) perspective focuses on the internal resource deployment of firms. The fourth perspective is the perspective of the Dynamic Capabilities. A brief comparison is depicted in *table 2*.

The focus of the RBV is a complement to the traditional emphasis of strategy on industry structure and strategic positioning within that structure as the determinants of competitive advantage (Henderson & Cockburn, 1994; Porter, 1979).

Model	Focus	Merit	Shortcoming	Main contributor(s)
Attenuating Competitive Forces (ACF)	Focuses on profitable economic subsectors that are more attractive due to structural impediments to competitive forces	Effectiveness-based and exogenous	Neglects internal sources of competitive advantage for the firm	Porter (1979)
Strategic Conflict	Applies the concepts of game theory to corporate competition	Efficiency-based and endogenous	Market-forces not considered	Shapiro (1989)
Resource Based View (RBV)	Promotes competitive advantage from the firm's idiosyncratic (heterogeneous) and difficult to imitate resources	Efficiency-based and endogenous	Ignores forces in external environment	Rumelt (1984) Wernerfelt (1984)
Dynamic Capabilities (DC's)	Model depends on the firm's capabilities for alignment with the dynamics of the business environment, in terms of adapting, integrating and reconfiguring resources to establish competitive advantage	Captures both external and internal factors	Constructs are not operationalized	Teece & Pisano (1994) Teece, Pisano & Shuen (1997) Teece (2007)

Table 2 Four leading models of strategic management

Well-known companies like IBM, Texas Instruments, Philips and others appear to have followed a 'resource based strategy' of accumulating valuable technology assets, often guarded by an aggressive intellectual property stance. However, this strategy is overtone not enough to support a significant competitive advantage. Winners in the global marketplace have been firms that can demonstrate timely responsiveness and rapid and flexible product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competences (Teece *et al.*, 1997). However, the resource based view of the firm is thus an influential theoretical framework for understanding how competitive advantage within firms is achieved, and how that advantage might be sustained over time (Barney, 1991; Eisenhardt & Martin, 2000; Nelson, 1991; Penrose, 1959; Peteraf, 1993; Prahalad and Hamel, 1990; Schumpeter, 1934; Teece, Pisano, and Shuen, 1997; Wernerfelt, 1984).

With regard to the marketing and sales function in a high-technology enterprise, the resource based view could give some input in determining how to leverage resources within the firm and where to allocate those - *scarce* - resources in order to gain sustainability in the market place. The resource-based approach sees firms with superior systems and structures being profitable not because they engage in strategic investments - *that may deter entry and raise prices above long run cost* - but because they have markedly lower cost, or offer markedly higher quality or product performance (Teece *et al.*, 1997). For the marketing and sales function in the organization, this would imply utilizing the marketing and sales resources as efficient as possible, and this efficient utilization would offer the organization sustainable competitive advantage in the marketplace.

That brings us to the point that internal utilization of resources for marketing and sales purposes would be sufficient to sustain in the market place. Together with Eisenhardt & Martin (2000), the author of this paper does not agree on this 'short sighted' conclusion; the RBV misidentifies the locus

of long-term competitive advantage in *dynamic markets*, which is ultimately the case in a high-technology market. The RBV furthermore overemphasizes the strategic logic of leverage, and reaches a boundary condition in high-velocity markets (Eisenhardt & Martin, 2000). Ilinitch, D'Aveni, and Lewin (1996) pointed out that the dominant paradigms in organizational theory are based on stability seeking and uncertainty avoidance, through organizational structure and processes. Those paradigms are inadequately for global hyper-competitive environments (Rindova & Kotha, 2001). The Dynamic Capabilities paradigm however copes with those issues and the main antecedent, dynamic markets, is discussed in the following section.

5.2 Market Dynamism as Antecedent of DC's

The concept of Dynamic Capabilities (DC's) basically extended the RBV to dynamic markets (Teece *et al.* 1997). The rationale behind, is that the RBV has not adequately explained how and why certain firms have competitive advantage in situations of rapid and unpredictable change. In these markets, where the competitive landscape is shifting, the DC's by which firm's '*integrate, build, and reconfigure internal and external competencies to address rapidly changing environments*' (Teece *et al.*, 1997 p. 516), become the source of sustained competitive advantage.

Competitive advantage requires both the exploitation of existing internal and external firm-specific capabilities, and developing new ones is partially developed in Penrose (1959), Teece (1982), and Wernerfelt (1984). Several scholars have been focusing on the specifics of how some organizations develop firm-specific capabilities, and how they renew competences to respond to shifts in the business environment (*e.g. Ilami & Clark (1994) and Henderson (1994)*) these issues are intimately tied to the firm's business processes, market positions, and expansion paths. Several writers have offered insights and evidence on those firms that develop their capability to adapt and even capitalize on rapidly changing environments (Hayes *et al.*, 1988; Prahalad & Hamel, 1990; Dierickx and Cool, 1989; Chandler, 1990; and Teece, 1993). Eisenhardt (1989) talks about high-velocity markets and D'Aveni (1994) names it hypercompetitive environments. The question is *how* do firms organize to achieve dynamic fit within these environments (Rindova & Kotha, 2001).

	Moderately dynamic markets	High-velocity markets
Market definition	Stable industry structure, defined boundaries, clear business models, identifiable players, linear and predictable change	Ambiguous industry structures, blurred boundaries, fluid business models, ambiguous and shifting players, nonlinear and unpredictable change
Pattern	Detailed, analytic routines that rely extensively on existing knowledge	Simple, experimental routines that rely on newly created knowledge specific to the situation
Execution	Linear	Iterative
Stable	Yes	No
Outcomes	Predictable	Unpredictable
Key to effective evolution	Frequent, nearby variation	Carefully managed selection

Table 3 Dynamic Capabilities and types of dynamic markets (Eisenhardt & Martin, 2000)

Moderately dynamic markets are ones in which change occurs frequently, but along roughly predictable and linear paths. They have relatively stable industry structures, such that market boundaries are clear and the players (*e.g. competitors, customers, complementors*) are well known (Eisenhardt & Martin, 2000). In contrast, when markets are very dynamic, or what is termed ‘high velocity’ (*e.g., Eisenhardt, 1989*), change becomes nonlinear and less predictable. High-velocity markets are ones in which market boundaries are blurred, successful business models are unclear, and market players (*i.e., buyers, suppliers, competitors, complementors*) are ambiguous and shifting. The overall industry structure could be categorized as unclear. In these markets, DC’s necessarily rely much less on existing knowledge and much more on rapidly creating situation-specific new knowledge.

While DC’s are simple in high-velocity markets, they are not completely unstructured or ‘organic’ (*e.g., Burns & Stalker, 1966; Lawrence & Lorsch, 1967*). Indeed, if there were no structures, these processes would fly out of control and exhibit no coherence (Eisenhardt & Martin, 2000). A structural comparison between those two different market dynamics is given in *table 4* which has been adapted from Eisenhardt & Martin (2000).

Table 4 depicts the top 10 customer base over the last four years of a high-tech marketing and sales organization. It shows that some customers remain at a fairly stable position; however there is quite some movement in the customer base. It shows that in 4 years time the ‘top 10 customers list’ contains 5 new customers. Customers seem to decline rapidly and new customers emerge rapidly as well. This is one important indication that industry could be categorized as a high-velocity market.

Rank	2005	2006	2007	2008
1	A	A	A	D
2	B	D	D	A
3	C	B	B	B
4	D	F	C	K
5	E	C	K	C
6	F	G	F	F
7	G	J	I	N
8	H	E	L	O
9	I	I	G	M
10	J	K	M	P
New per year	-	1	2	3
New cum.	-	1	3	5

Table 4 Top 10 customers 2005-2008

Teece (2007) mentions, in addition, that the possession of Dynamic Capabilities is especially relevant to multinational enterprise performance in business environment that display certain characteristics. The first is that the environment is open to international commerce and fully exposed to the opportunities and threats associated with rapid technological change. The second is that technical change itself is systemic in that multiple inventions must be combined to create products and/or services that address customer needs. The third is that there are well-developed global markets for the exchange of *- component -* goods and services. These characteristics are to be found, especially, in high-technology sectors. More specifically, those characteristics are applicable for the semiconductor industry as well.

Three characteristics of environment where DC’s are highly important:

1. Environment is open to international commerce
2. Technology change is systemic
3. Well developed global markets

5.3 Firm Performance as Consequence of DC's

Many studies demonstrated a positive relationship between DC's and organizational performance (Hung *et al.*, 2007). Organizational performance has been measured according to (1) competitive advantage, (2) market share, (3) profit, (4) cost, (5) sales revenue, and (6) customer satisfaction to the largest customer. Danneels (2002) for example proves in a qualitative analysis that product innovation capability - *as part of the broader DC's* - is beneficial for the firm competences and renewal performance. Zott (2003) explored how DC's affect different firms in an industry and showed that even a minor difference in the Dynamic Capabilities, has big impact on industry level. A brief overview of some of the academic papers which found significant relationship between DC's and performance is given in *table 5*.

Study	Description	Conclusion
Daneels (2002)	Field study using interview, observations, and documents as data sources from five high-tech firms.	Product innovation capabilities improve firm competences and renewal performance.
Zott (2003)	Comparison of DC's and performance of firms within an industry	Even a small initial difference between firms' DC's can generate significant firm performance
Luo (2000)	DC's perspective on international business	DC's reinforces international expansion and firm performance
Hung <i>et al.</i> (2007)	Quantitative analysis of Organization Process Alignment, DC's and the effect on firm performance.	Organizational DC's positively and significantly contributes to organizational performance

Table 5 Overview of studies of DC's which influenced firm performance

As will be shown later on in this paper, it is quite common sense that if the firm is more aware of the environment it is operating in, it can adapt better. When the firm is able to adapt better it will affect ultimately firm performance in many - *positive* - ways.

5.4 Dynamic Capabilities Defined

Dynamic Capabilities have no doubt been relevant to achieving competitive advantage for some time. However, their importance is not amplified because the global economy has become more open and the sources of invention, innovation, and manufacturing are more diverse geographically and organizationally (Teece, 2000), and multiple inventions must be combined to achieve marketplace success (Somaya and Teece, 2007).

As discussed in Teece *et al.* (1997), some emerging marketplace trajectories are easily recognized. Teece (2007) gives an example of the microelectronics industry, where trends like miniaturization, greater chip density, and compression and digitization in information and communication technology, are easily recognized. However, most emerging trajectories are hard to discern. *Sensing - and shaping* - new opportunities are very much a scanning, creating, learning, and interpretive activity (Teece, 2007). With the notion of sensing and seizing opportunities, Teece (2007) underlines again the importance of the marketing and sales function in developing Dynamic Capabilities.

5.4.1 Definition of Dynamic Capabilities

Eisenhardt & Martin (2000) define DC's as a set of specific and identifiable processes such as product development, strategic decision making and alliancing. The term 'dynamic' refers to the

Dynamic Capabilities:

1. Evolve from learning mechanisms
2. Are different from ad-hoc problem solving capabilities
3. Are repetitive
4. Are higher-order processes
5. Do not include performance

capacity to renew competences so as to achieve congruence with the changing business environment; certain innovative responses are required when time-to-market and timing are critical, the rate of technological change is rapid, and the nature of future competition and markets difficult to determine. The term 'capabilities' emphasizes the key role of strategic management in appropriately adapting, reintegrating, and reconfiguring internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment (Teece *et al.*, 1997).

Dynamic Capabilities *evolve from learning mechanisms*, such as experience accumulation, knowledge articulation, and knowledge codification (Zollo & Winter, 2002). This means that, DC's have multiple origins; some are rooted in routinized behavior, some are rooted in asset selection/investment choices, and some are rooted in creative and differentiated entrepreneurial acts, which involve unusual skills that are not particularly imitable (Augier & Teece, 2006). DC's includes specific activities such as new product development, alliances, joint ventures, cross line of

Definition of Dynamic Capabilities
(Wang & Ahmed, 2007)

Dynamic capabilities are defined as a firm's behavioral orientation constantly to integrate, reconfigure, renew, and recreate its resources and capabilities and, most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage

business innovation, and other more general actions that foster coordination and organizational learning (e.g., Gulati *et al.*, 2002). These capabilities result from actions of senior managers to ensure learning, integration, and, when required, reconfiguration and transformation, all aimed at sensing and seizing new opportunities as markets and technologies evolve (O'Reilly & Tushman, 2007).

Hence, that DC's are *significantly different from ad-hoc problem solving capabilities* (Winter, 2003), Whether change is initiated from external challenges or from autonomous decisions made internally; change is always possible by creative problem solving (Winter, 2003). Those behaviors are

(1) non-repetitive and (2) operational in nature. DC's however are capabilities which are *repetitive* and can be categorized as a *higher-order process* (Winter, 2003). In other words, when DC's are present in the organization, the organization has processes in place to change processes.

The paper defines Dynamic Capabilities with Wang & Ahmed (2007) as the behavioral orientation to integrate, reconfigure, renew and recreate its resources and capabilities, and most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage. By using this definition it is stated that (1) DC's are not simply processes, but embedded in processes. Processes are often explicit or codifiable structuring and combination of resources, and thus can be transferred more easily within the firm or across firms. Capabilities refer to a firm's capacity to deploy resources, usually in combination, and encapsulate both explicit processes and those tacit elements - *such as know-how and leadership* - embedded in the processes (Wang & Ahmed, 2007). Hence, capabilities are often firm-specific and are developed over time through complex interactions between the firm's resources (Amit and Schoemaker, 1993)³.

³ Wang & Ahmed (2007) give the following example: Quality control is a process that can be easily adopted by firms, whereas total quality management (TQM) is not just a process, but requires the firm's capability to develop an organization-wide vision, empowering employees and building a customer-orientation culture.

Figure 6 depicts the relationship between (1) resources, (2) core capabilities, and (3) dynamic capabilities. Resources are the foundation of a firm and the basis for firm capabilities (Wang & Ahmed, 2007). Core capabilities are 'second order' and are a bundle of a firm's resources and capabilities that are strategically important to its competitive advantage at a certain point. The 'third order'; DC's emphasize a firm's constant pursuit of the renewal, reconfiguration and re-creation of resources, capabilities and core capabilities to address the environmental change (Wang & Ahmed, 2007).

This means that DC's are the 'ultimate' organizational capabilities that are conducive to long-term performance, rather than simply a 'subset' of the capabilities in the definition of Teece *et al.* (1997)⁴.

Because of the high-abstraction level the concept of DC's has not been operationalized and they are hardly measurable.

The role of the marketing and sales organization is determining in the process of developing DC's. References to Duncan (1976) and Tushman & O'Reilly (1997) about ambidexterity and to March (1991) about exploration and exploitation are inevitable as well. It underlines again the connections of those - *academic* - concepts in one way or another.

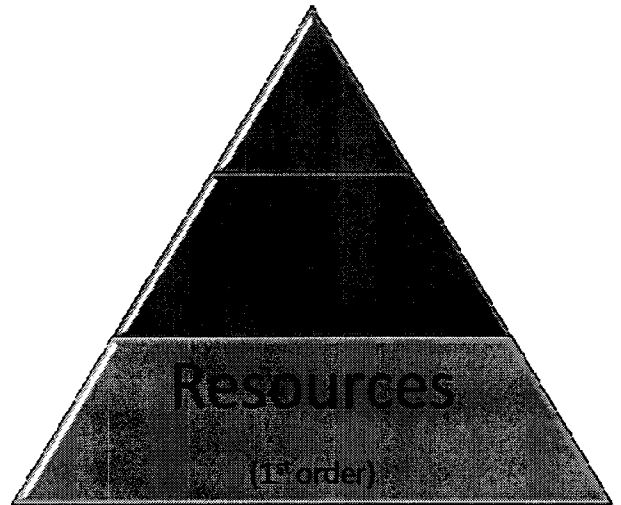


Figure 6 Dynamic Capabilities in relation to Core Capabilities

5.4.2 Measuring Dynamic Capabilities

Understanding and implementing the processes and structures that undergird DC's is organization specific, and requires intimate knowledge of both the organization and the ecosystem in which the organization cooperates and competes (Teece, 2007). DC's, furthermore, typically involve long-term commitments to specialized resources (Winter, 2003), which should be considered as an investment. The concept of DC's is valuable for marketing and sales organizations, which are operation in high-technology markets. The basically outward focus of receptive organizations is the most important aspect of the concept of DC's. The role of marketing and sales is thus inevitable.

However, the main question which remains is how to create and improve the Dynamic Capabilities in a high-technology marketing and sales organization? The concept is extremely abstract and a real measurement tool has not been presented in academic literature. The author of this paper aims to develop such a measurement tool. The rationale behind is that if DC's could be operationalized and could be measured, it will be possible to determine if there are DC's present in the organization. If they are present they could be improved and strengthened, and if they are lacking they could be created and developed. Measuring DC's would be a significant contribution to as well as academics

TQM requires the firm not only to install a quality management process, but most importantly to tap into the tacit 'energy' of the firm.

⁴ Teece *et al.* (1997) and Eisenhardt & Martin (2000) define DC's as the firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change. DC's thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die.

as practitioners. Recent work by Teece (2007) reveals three core processes in the DC's: (1) sensing, (2) seizing, and (3) managing threats and opportunities (*figure 7*). The author of this paper believes that those are second order processes and not DC's in itself (*figure 6*). However, if those three core processes are in place, the DC's are most probable integrated in the organization. Teece (2007) also talks about micro foundations who are enabling those capabilities. Those micro foundations are more tangible processes and resources which could be leveraged to create and nurture DC's.

The author of this paper agrees with Teece (2007) that those three processes depicted in *figure 7* are an absolute necessity to be receptive to opportunities and threats in the dynamic environment of the organization, and could be considered as cornerstone of DC's.

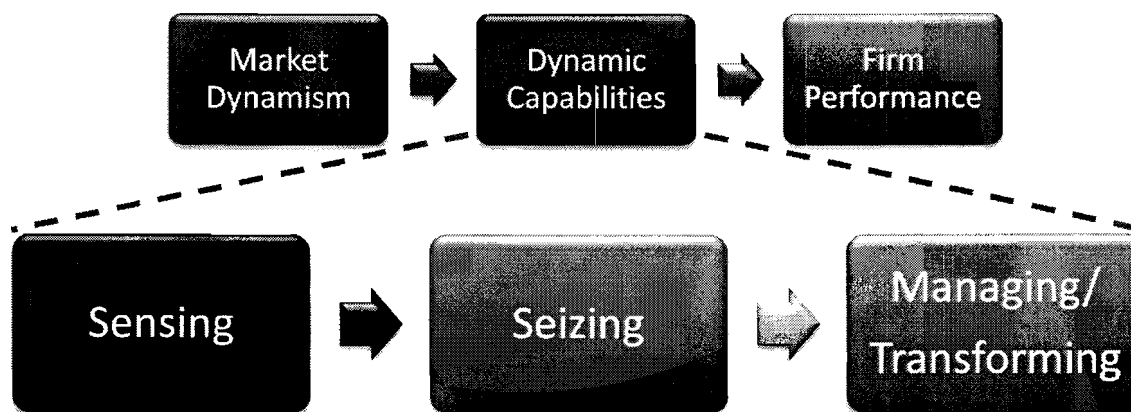


Figure 7 Sensing, Seizing & Managing (Teece, 2007)

Those three core processes – *sensing, seizing & managing* – are the building blocks of DC's. If sensing capability is lacking or utilized poor, then there cannot be DC's present. If the sensing capability is utilized relatively well, but the seizing capability is missing, then still could be said that there cannot be DC's present in the organization. Because, if the organization senses an opportunity but is unable to seize it, it cannot adapt to the changing environment.

Concluding, those three core processes should be present in a high-technology organization to be able to adapt quickly enough to the changing and highly dynamic environment. This means that if the 2nd order processes – *sensing, seizing & managing* – are present *and* there is a behavioral orientation to integrate, reconfigure, renew and recreate its resources and capabilities, then the organization is highly capable to adapt to a rapid changing environment in a structural and a quick way.

5.5 Three Core Processes: Sensing, Seizing & Managing

As stated in the previous sections are Dynamic Capabilities (DC's) incredibly important for long term survival of high-technology firms. The concept of DC's fairly new and unfortunately is there a lot of ambiguity in the definition of the concept. But that is not the biggest problem. Since the concept of DC's is relatively new and general, it misses a clearly operationalization of the constructs. Teece (2007) tried to operationalize the concept, but real measurement in a structural way is lacking.

The author of this paper attempts in the first place to operationalize the 2nd order processes which are the underlying foundation of DC's. In order to determine *how* to create, enhance and enrich those core capabilities. Further research focuses on measuring the sensing capability of the

organization. Ultimately, should all three core processes be operationalized and determined, but that is out of the scope of this research.

Before the sensing capability is operationalized, the next sections briefly discuss the three core processes defined by Teece (2007), which are to be believed as the foundation of DC's. Those core processes are (1) sensing, (2) seizing, and (3) managing/transforming (*figure 8*).

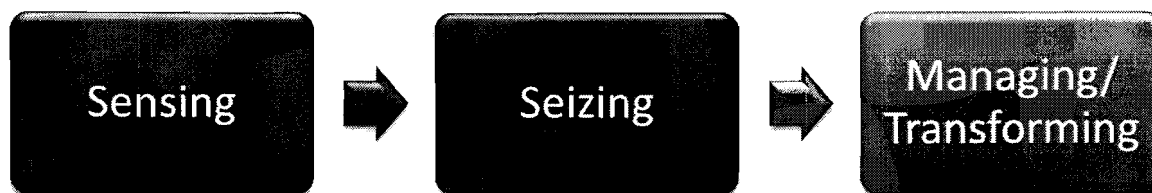


Figure 8 Three core processes for DC's (Teece, 2007)

5.5.1 Sensing Opportunities

Sensing opportunities and threats, particularly in rapidly shifting markets, requires scanning, searching, and exploration. In organizational terms this involves a set of resources and routines such as a strategy-making process associated with variation, resources devoted to competitive intelligence and tracking technological change, and forums for discussions of new opportunities (O'Reilly & Tushman, 2007). More subtly and beyond the requisite resources, this capability also requires a balance in centralization and decentralization of control to encourage feedback from market-facing units, a culture of openness that encourages debate, the commitment of resources by senior leaders - *financial and time* - to encourage long-term thinking, and a senior management team that fosters a long-term mindset and promotes exploration (e.g., Burgelman, 2002; Edmondson, 1999; Rotenberg & Saloner, 2000). Teece (2007) emphasizes the need of decentralization of the sensing activities, in which the information gets to the management via a bottom-up process. And furthermore mentions the dynamical character of sensing activities by stating that tight planning will be part of seizing, but less so of sensing.

5.5.2 Seizing Opportunities

Seizing opportunities is about making the right decisions and executing, what others have referred to as strategic insight and strategic execution (Harreld, *et al.*, 2007). In organizational terms, this requires leaders who can craft a vision and strategy, ensure the proper organizational alignments - *whether it is for exploitation or exploration* - assemble complementary assets, and decide on resource allocation and timing. In more concrete terms, this involves developing a consensus among the senior team about the strategic intent, avoiding the decision traps that path dependencies and mindsets bring, and aligning the business model and strategy. Without these capabilities, firms may sense opportunities and threats, but be unable to act on them in a timely manner (Bazerman and Watkins, 2004; O'Reilly & Tushman, 2007).

In other words, seizing opportunities is reacting according to the opportunities which are 'sensed' in advance. This is equally valid after the discovery of threats from wherever they may come. Reacting on opportunities and treats seems to be indispensable for sustainability in the - *especially rapid changing and uncertain* - marketplace. Top management support and leveraging competitive advantage strategically, are absolute prerequisites for success.

5.5.3 Managing Opportunities

While operational capabilities may provide for competitive advantage at a given point in time, long-term success inevitably requires that leaders reallocate resources away from mature and declining businesses toward emerging growth opportunities. Teece (2007, p.38) points it this way: *'The key to sustained profitable growth is the ability to recombine and reconfigure assets and organizational structures as markets and technologies change'*.

What are the capabilities that facilitate asset orchestration? Again, this involves senior leaders' willingness to commit resources to long-term projects (Danneels, 2002), the ability to design organizational systems, incentives and structures that permit targeted integration across organizational units to capture the advantages of co-specialized assets (Helfat & Peteraf, 2003), and the appropriate staffing of these units (Jansen, 2006; Lubatkin, Simsek, Ling & Veiga, 2006). The crucial task here is not the simple organizational structural decision in which the exploratory and exploitative subunits are separated (*hence structural ambidexterity*), but the processes by which these units are integrated in a value enhancing way (Tushman & O'Reilly, 2007).

6. Dynamic Capabilities Embedded in Management Practices

The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them.

William Bragg (British physicist, 1862-1942)

In this chapter a conceptual model for measuring the *sensing capability* is developed. The first section discusses *management practices* as tool to measure DC's (6.1). After that, the conceptual research model is presented (6.2). The sensing capability in operation management (6.3), performance management (6.4), and people management (6.5) are discussed subsequently. And the last section (6.6) concludes this chapter.

6.1 Management Practices

In order to put the in 2007 developed model of Dynamic Capabilities (*here considered as core capabilities*) in context of a high-tech organization, the designer of this paper chooses to do that with a managerial framework. The three core processes – *sensing, seizing and managing* – should be embedded in the management practices of the high-technology firm. Without structural embeddings of those three core processes in the enterprise's management practices, it is impossible to have Dynamic Capabilities present.

Recent work by Bloom *et al.* (2007) offers a model which makes it possible to measure management practice. This tool has been developed to assess overall management practices, and has been used for comparing those among different enterprises and different countries. In the research of Bloom *et al.* (2007) this model has been used in more than 4000 companies and showed remarkable results across industry and geographical boundaries. The model contains three different dimensions of management practices, videlicet (1) operation management, (2) performance management and (3) people management (*figure 9*). Those three dimensions/layers of management practices have been operationalized further in order to enable managers and academics to measure the concerning performance.

Bloom *et al.* (2007) found that better management practices are significantly associated with higher productivity, profitability, sales growth rates and firm-survival rates. This paper uses those three dimensions to measure the *sensing capability* of the organization.

6.2 Conceptual Framework

Operation management, performance management and people management form together a general framework for management of an enterprise. Assessing those three management practices in parallel is important in order to get a comprehensive overview of the management practices. The three core processes (*discussed in the previous chapter: sensing, seizing, and managing*) should be embedded in the management practices of the enterprise in order to create higher-order capabilities: Dynamic Capabilities.

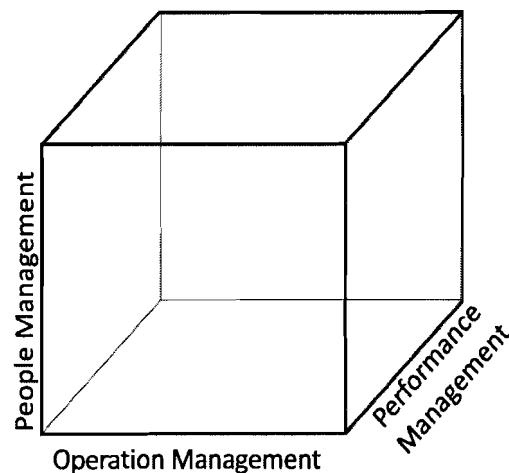


Figure 9 Management Practices three dimensions of Management

Figure 10 shows the three core capabilities of Teece (2007) crossed with the management practices of Bloom *et al.* (2007). The basic rationale behind this conceptual framework is that those three core processes should be embedded, nurtured and reinforced by all the three types of management practices. The more those core processes are embedded in the management practices of the firm, the more likely it is that the firm has DC's, which most likely enhance the sustainability and profitability of the firm in the long run.

The *sensing capability* should be embedded in operation management, performance management, and people management. If the sensing capability is not leveraged sufficiently, it is impossible to have a good *seizing capability* in place. Operational practices should be in place to sense the external environment. Those should be supported by the performance practices of the organization. Individual capabilities and the attitude to improve individual capabilities should reinforce and nurture the sensing capability as well.

Three core processes sensing, seizing, and managing, should be embedded in the management practices of the enterprise in order to create higher-order capabilities: Dynamic capabilities.

The same is more or less valid for the seizing capability and the managing/transforming capability of the organization. However, sensing, seizing and managing need different attention when it comes down to embeddings in the management practices. The scope of this research is to measure the sensing capability. Seizing and managing fall outside the scope of this paper (figure 10).

The first rationale behind this conceptual framework is: when it is possible to measure the core capabilities of the high-technology marketing and sales organization, it is possible to manipulate and improve the operationalized factors. In order to propose (organizational) design modifications and improvements, those intangible concepts have to be quantified first.

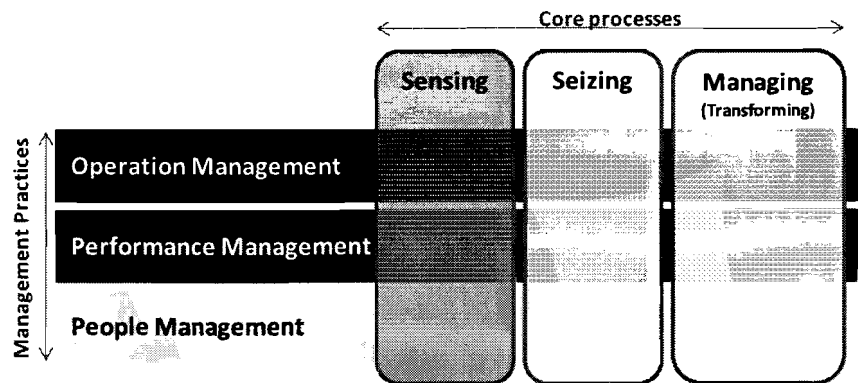


Figure 10 Conceptual Research Model; measuring core processes in Management Practices

The second rationale is that Dynamic Capabilities are complex capabilities, and they need a careful design approach. The ultimate goal of that design process is that Dynamic Capabilities are deep embedded in the management practice of the high-tech marketing & sales organization. Taking those management practices as a measurement-tool is the first step in the design process of designing a highly receptive and dynamic high-technology enterprise. The next sections operationalize the sensing capabilities, embedded in the three management practices.

6.3 Operations Management

There are various organizational structures that allow integration of strong functions in a process structure, such as market orientation. The appropriateness of any structure of the marketing function depends on several contingencies in both the environment and in the organization itself (Workman, Homburg & Gruner, 1998). A common approach taken in the literature is a contingency approach in which the structure of an organization depends on factors in the environment. Early conceptual work by Nonaka and Nicosia (1979) and Weitz & Anderson (1981), followed by empirical efforts by Ruekert, Walker, and Roaring (1985) and Ruekert & Walker (1987), point to dynamics in the environment that influence organizational design decisions. A more complex and turbulent environment usually means more integrative structures (*and corresponding knowledge and skills*). There is, however, evidence suggesting that turbulence may indicate the need for specialized resources, especially if innovation is a desired outcome (Bantel & Jackson, 1989; Moorman & Miner, 1997). However, specialized functional resources also have been found to slow down firm activities (Hambrick, Cho & Chen, 1996; Smith *et al.*, 2000). Customizing organizational structure and aligning this with strategic focus is essential for successful utilization of the marketing function. This emphasizes the need of special attention for the marketing function in high-technology industry.

In operationalizing the sensing capability, five basic elements can be distinguished. An optimized sensing capability includes (*figure 11*):

- Technology sensing (A1)
- Customer sensing (A2)
- Competitor intelligence (A3)
- Value chain analysis (A4)
- Partners (A5)

Those five operation management constructs are discussed in the following sections.

6.3.1 Technology Sensing (A1)

New knowledge - *exogenous or endogenous* - can create opportunities and threats as emphasized by Schumpeter (1934). Monitoring internal and external technological developments and relating this with customer needs is inevitable to technology leadership. Organizational processes can be put in place inside the enterprise to garner new technical information, and tab developments in exogenous science (Teece, 2007). This implies a focus on technology by the marketing and sales organization. Chesbrough (2003) also emphasize the strong need for technology sensing when he describes '*Open Innovation as a mandate for enterprise success nowadays*'. Failure to design-in new technologies in a timely fashion will lend to failure; conversely, success can sometimes be achieved by continuous rapid 'design-in' (Teece, 2007).

The first proposition is formulated as follows:

Proposition A: The marketing & sales operation should sense opportunities and threats on technology level

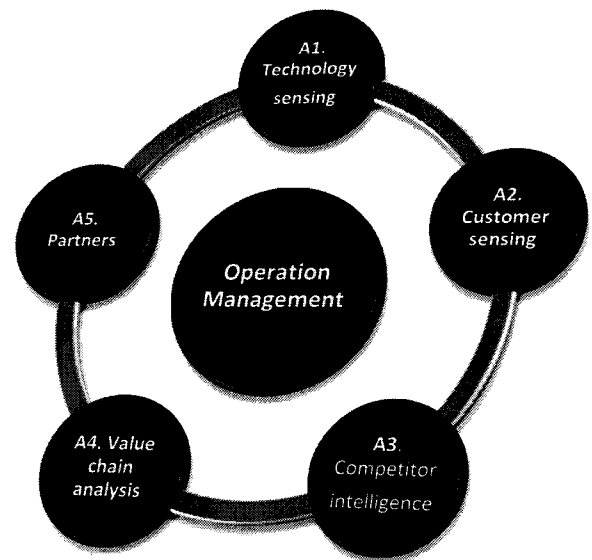


Figure 11 Five constructs in Operation Management domain

6.3.2 Customer Sensing (A2)

Narver and Slater (1990) distinguish two distinct forces in a market oriented firm: customers & competitors. Doing market research is inevitable. A company should understand first of all the customer needs. However, benchmarking strategy with key competitors is also an important aspect to formulate appropriate and corresponding strategy. Sultan & Barczak (1999) mention AT&T corp. as a successful example of a technology company who is proactive in undertaking market research. They have established marketing research departments and staff dedicated with this specific responsibility. Following customers and technology on application level seems to be indispensable. The second proposition is formulated as follows:

Proposition A2: The high-tech marketing & sales operations should structurally sense for knowledge which enhances customer and potential customer understanding

6.3.3 Competitor Intelligence (A3)

Competitive intelligence is considered as a critical input to the market planning process (Jaworski *et al.*, 2002). The importance of strategic focus and marketing is highlighted by Jaworski *et al.* (2002): “Contemporary writings in marketing stress the importance of competitive intelligence in shaping strategic marketing decisions (e.g., Dickson, 1992; Kotler, 1994) and building market-oriented organizations (Day, 1990; Jaworski and Kohli, 1993; Narver and Slater, 1990)”.

Understanding competitive intelligence (CI) and factors that enhance its effectiveness are important since firms that do engage in CI activities are vitally concerned about the utility of their competitive intelligence output (e.g. Colmenares, 1992; Kahaner, 1997). Research in the marketing literature addresses competitive intelligence as an integral part of building market-oriented organizations. The strategic planning literature focuses on the development of CI techniques (e.g. Fahey, King and Narayanan, 1981), the search process (e.g. Aguilar, 1967), and external information sources (e.g. Keegan, 1979).

Lenz and Engledow (1986) observed that many companies have few resources or staff in place to utilize this (CI) process properly. Fahey and King (1977), however observe that some organizations have competitive intelligence units with a full-time director and associated staff.

Day (1994, 2003) recommends benchmarking as a way of moving beyond simple competitor analysis. Benchmarking is not just about doing regular tear-down analysis of competitors’ products and studying firms for insights into performance. In market-driven firms, benchmarking must involve examination of attitudes, values, and management processes of other firms (Day, 1994). According to Day, the benchmarking process should reveal developments in capabilities and processes that can increase competitive advantage (Foley & Fahy, 2004).

Proposition three mentions thus the importance of structural focus on competition to increase competitive advantage:

Proposition A3: The high-tech marketing & sales organization should have deep understanding about competitors and competitor analysis should drive strategic decision making

6.3.4 Value Chain Analysis (A4)

Understanding the customer is an important aspect in the sensing capability of the enterprise. However, understanding the customer’s customer could be considered also important. Especially in

the high-tech industry, developments are not only technology driven, but also pulled from a market perspective. A deep understanding of the value chain enables to predict more accurately what kind of products are needed to fulfill consumers need, and enables strategic decision-making early in that process. This leads to the following:

Proposition A4: The marketing and sales organization should have deep understanding about the value chain and future direction of value chain changes

6.3.5 Partners (A5)

De Man (2004) emphasizes the importance of alliances and connections with other actors in the environment besides customers and competitors. Ireland & Webb (2007) also underline strategic alliances and corporate venture capital programs are examples of important means of efficient exploration (*sensing*) paths. The main drivers of alliances and external connections are (1) increasing competition, (2) liberalization and internationalization, (3) technological turbulence, (4) individualization of demand, and finally (5) organizational innovation & management innovation. The primary benefits and aims of being connected to external parties in the environment are (1) accessibility to new markets, (2) increasing efficiency, (3) lower risk of R&D, (4) accessibility to specialized and complementary competencies, (5) ability to serve individual customer needs, (6) hedge against missing out on technology and (7) setting the standard (De Man, 2004).

Whether these aims are directly translatable into measurable benefits is another matter. One of the most important difficulties of the network economy is to determine the true benefits of networking (De Man, 2004). In light of a dynamic and ever changing market it is inevitable to develop and maintain external connections. Several benefits are already covered in previous propositions; the final proposition under operation management is the following:

Proposition A5: The marketing and sales organization should be connected with important actors in the environment, including standardization bodies and regulatory authorities.

6.4 Performance Management

Performance management is a way of stimulating and directing employees in their professional behavior. The exploration and sensing capability of the organization depends upon how performance of individuals is measured and how sensing activities are stimulated. If people only get short term goals they will ignore long term focus. Creating a kind of contextual ambidexterity⁵ is thus an issue in the overall sensing and seizing capability. Gibson & Birkinshaw (2004) argue that the capacities of alignment and adaptability develop through the creation of a particular type of organization context at the business unit level. Broadly defined, organization context is the systems, processes, and beliefs that shape individual-level behaviors in an organization (Burgelman, 1983a; Burgelman, 1983b; Denison, 1990; Ghoshal & Bartlett, 1994). Organization context has important similarities to the related concepts of structural context, organization culture, and organization climate. Structural context refers to the establishment of administrative mechanism that fosters certain behaviors in employees (Bower, 1970; Bower & Doz, 1979; Burgelman, 1983a; Burgelman, 1983b). Aspects such as organization culture and climate are not considered in this performance management section,

⁵ This concept is discussed in the subsequent section. Furthermore does this paper offer a list of most important concepts and key definitions on the page prior to the 'table of contents'.

since those concepts are too intangible. However they are partly covered in people management section.

The next sections shed some more light on the tension between exploration and exploitation activities: ambidexterity. Finally, four constructs are defined as part of 'performance management'.

6.4.1 Ambidexterity

Market pressures force today's companies to a demanding balancing act: reap the benefits of the current business, while at the same time starting new activities that will be beneficial in the future (Kanter, 1989). Birkinshaw & Gibson (2004) call the need for balancing the focus *alignment*.

In literature different terminology is used for the same (*or very similar*) phenomenon. Birkinshaw & Gibson (2004) talk about *alignment and adaptability*. Other authors talk about *exploration and exploitation* (e.g. Berends *et al.*, 2007; Gilsing & Nooteboom, 2006). Drucker (1985), talks about focus on *operational business and new business*, while Kanter (1989) names it *main stream business versus new stream business*. Ireland *et al.* (2003) coin the terms *opportunity-seeking* and *advantage-seeking* behaviors. Maidique & Hayes (1984) talk about the need for balancing *continuity and chaos* in order to be successful in high-technology environment. The bottom line of this different terminology is: there is a tension in executing current and known business and the development and exploration of new business. The organization that is capable to balance this in order to optimize profitability on the long run could be called the ambidextrous organization.

Alignment vs. Adaptability

Exploitation vs. Exploration

Continuity vs. Chaos

Main stream vs. New stream

Technology push vs. Market pull

Opportunity-seeking vs. Advantage-seeking

Exploitation is about efficiency, increasing productivity, control, certainty, and variance reduction. Exploration is about search, discovery, autonomy, innovation and embracing variation (O'Reilly &

Tushman, 2007). With regard to the conceptual research model, this affects both *people management as performance management*.

Exploring technology-based new business opportunities requires a different organizational setting. Drucker (1985) and Galbraith (1982) suggest that the short-term orientation of operational business units and the need to develop new business requires structural separation between mainstream and new stream businesses (Berends *et al.*, 2007). It's difficult to find the right balance between adaptability and alignment (Birkinshaw & Gibson, 2004) or exploitation & exploration. In other words, it is difficult to become and be an ambidextrous organization.

Several scholars have argued that companies have to exploit current technology/market opportunities and explore simultaneously new technological and market-based opportunities (Cohen en Levintal, 1990; Hamel & Prahalad, 1994; He and Wong, 2004; March, 1991; Morone, 1993; Tushman and O'Reilly, 1996). Balancing the exploitation of current knowledge and the exploration of new technological fields is critical to sustaining the long-term success (Berends *et al.*, 2007).

Many large high-technology companies mainly exploit current business and hardly leverage exploring capabilities. March (2003, p. 14) argued that because of this short-term bias "*established organizations will always specialize in exploitation, in becoming more efficient in using what they*

already know. Such organizations will become dominant in the short-run, but will gradually become obsolescent and fail". Financial returns from exploration are more uncertain and more distant in time. For these reasons, organizations are often less effective at exploration and become vulnerable to technological and market changes (e.g., Siggelkow, 2001; O'Reilly & Tushman, 2007).

6.4.1.1 Structural Ambidexterity

There are two forms of ambidexterity, namely *structural ambidexterity* and *conceptual ambidexterity*; this section and the next section will elaborate more on those two distinct forms of the ambidextrous organization.

The concept of organizational ambidexterity has been around for years, but the evidence suggests that many companies have struggled to apply it. The standard approach *structural ambidexterity*, is to create separate structures for different types of activities (Birkinshaw & Gibson, 2004). Duncan (1976) argued that ambidexterity should be managed through dual structures. The concept of structural separation between different types of activities is also evident in organization literature (Duncan, 1976; Drucker, 1985; Kotler *et al.*, 2006), as mentioned in previous sections. This type of structural ambidexterity could be arranged, for example, giving the core business units responsibility for creating alignment with the existing products and markets; and the R&D department and business development group for new markets, new technologies and emerging industry trends (Birkinshaw & Gibson, 2004). This structural separation could also be created in the marketing function, with upstream (*strategic marketing*) and downstream (*operational marketing*) marketing teams (Kotler *et al.*, 2006).

6.4.1.2 Conceptual Ambidexterity

Contextual ambidexterity differs from structural ambidexterity in many important ways, but the two approaches are best viewed as complementary. Indeed, many successful companies, including Hewlett-Packard, 3M and Intel, use a combination of both approaches to deliver simultaneously on the needs for alignment and adaptability (Birkinshaw & Gibson, 2004). First, they constitute acting outside the narrow confines of one's job and taking actions in the broader interests of the organization. Second, they describe individuals who are sufficiently motivated and informed to act spontaneously, without seeking permission or support from their superiors. Third, they encourage action that involves adaptation to new opportunities but is clearly aligned with the overall strategy of the business (Birkinshaw & Gibson, 2004). The direct link with corporate entrepreneurship or Intrapreneurship could be made. It also shows the link of performance management with people management.

At the *organizational level*, contextual ambidexterity can be defined as the collective orientation of the employees toward the simultaneous pursuit of alignment and adaptability. It is manifested in the behaviors of hundreds of individuals in the ways described above and in the unwritten routines that develop in organizations. In this respect it is analogous to the well-established concept of *market orientation*, which is a collective orientation of people throughout a business toward the gathering, interpretation and dissemination of market knowledge (Birkinshaw & Gibson, 2004).

Performance management plays a very important role in stimulating contextual ambidexterity. Sensing capability should be embedded in the performance management system of the enterprise. Four constructs are operationalized (figure 12):

- Balanced targets (B1)
- Interconnected targets (B2)
- Target time horizon (B3)
- Stretching targets (B4)

6.4.2 Balanced Targets (B1)

So in an ambidextrous organization targets should be balanced. At least in the case of conceptual ambidextrous organization all the employees should have balanced targets.

If goals are exclusively financial and operational, the sensing capability is most likely not stimulated. Goals that are balanced (*financial and non-financial*) are often more inspiring and challenging than financial goals alone (Bloom *et al.* 2007). Bloom *et al.* (2007) furthermore found that the general firm performance is better when targets are balanced. Gibson & Birkinshaw (2004) state that targets issue creative challenge to people and should not be too narrow to financial goals only. This generates the following proposition:

Proposition B1: Targets should be balanced (financial & non-financial); this enhance system thinking and reinforce creativity. Financial targets focus primarily on exploiting the business while non-financial targets should reinforce exploration activities.

6.4.3 Interconnected Targets (B2)

Furthermore, targets should form a coherent set, cascaded down from corporate level. Targets among different product groups should be interconnected in such a way that the whole company performance is optimized. This also implies *system thinking* to create synergy on a corporate level. Cusumano & Shelby (1996) mention the importance of overlap in responsibility in different functional distinct teams: this is to be linked to the sensing capability as well. The second proposition:

Proposition B2: Targets should be interconnected; this enhance synergy effects among different product groups. They serve to expand exploitation activities to a more comprehensive approach of doing business

6.4.4 Target Time Horizon (B3)

The target time horizon is also an important aspect of performance management. If targets are merely short term oriented, employees will focus on short term events. That would reinforce exploitation efforts only. For exploring activities, employees should have longer time horizon. This tension between long term and short term targets is common in marketing literature and mentioned by Webster *et al.* (2005). The third proposition:

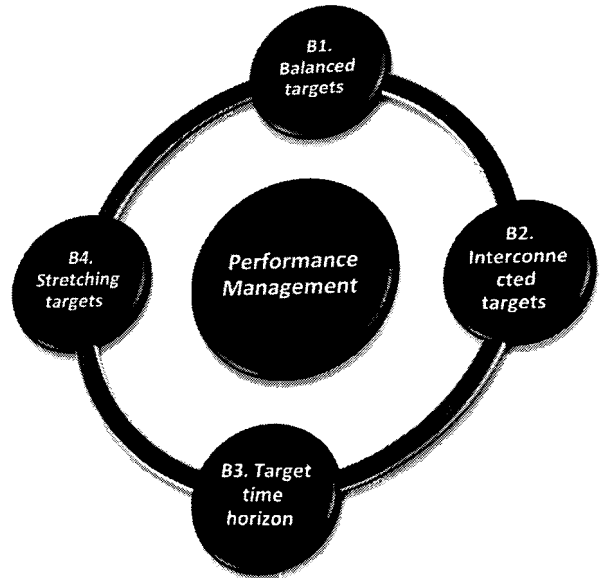


Figure 12 Four constructs in Performance Management domain

Proposition B3: Targets merely focused on short term business restrict people for exploration activities. Additional, longer term targets are necessary for long term sustainable success

6.4.5 Stretching Targets (B4)

Targets should be genuinely demanding for everybody and be grounded in solid economic rationale. This means that targets are balanced according to the dynamic environment (Bloom *et al.*, 2007). O'Reilly & Tushman (2007) created a model which shows a high performance context, if targets are stretched (*figure 13*). In order to create a high performance context, targets should be demanding, which corresponds with the findings of Bloom *et al.* (2007). However, too demanding targets are not desired, since employees lose motivation of reaching those targets. O'Reilly and Tushman (2007) speak about 'social support' in order to reinforce employees to cope with high demanding performance management. This is the vertical axes of the figure, and is strongly related to people management, which is discussed in the next section. Gibson & Birkinshaw (2004) talk about discipline, which induces members to voluntarily strive to meet all expectations. So, demanding targets which are reachable are important for motivating individual employees, which also influence the sensing capability and the willingness to explore.

So the final proposition for performance management is formulated as follows:

Proposition B4: Targets should be stretching, since the market is dynamic. Targets however should be demanding and not too easy.

6.5 People Management

Schumpeter (1934) stated about 80 years ago: "new enterprises are mostly founded by new man and the old business sinks into insignificance". This statement identified the need to instill the logic of entrepreneurship into the established businesses (Menzel *et al.*, 2006). And what Drucker (1985) stated two decades ago, "today's businesses, especially the large ones, simply will not survive in this period of rapid change and innovation unless they acquire entrepreneurial competence", still seems to hold true today.

Schumpeter classified the entrepreneur as a sociologically distinct individual. This person is characterized as one who sees an opportunity, seizes the opportunity, creates a new product, changes a production process, or otherwise creates a new marketable contribution to the economy (McDaniel, 2002). The entrepreneurial type of person is able to recognize opportunities by preparing for them, and then be willing to take action according to recognized opportunities.

Terminology for entrepreneurship within the larger organization differs among different streams of academia. So is corporate entrepreneurship also referred as corporate venturing, or Intrapreneurship (Hornsby *et al.*, 2002). According to Stevenson and Jarillo (1990), most academia accept that all types of entrepreneurship are based on innovations that require changes in the pattern of resource deployment and the creation of new capabilities to add new possibilities for positioning in markets. Building capabilities can be undertaken at many different organizational levels, and involves widely differing combinations of resources and have a wide range of outcomes (Stopford & Baden-Fuller,

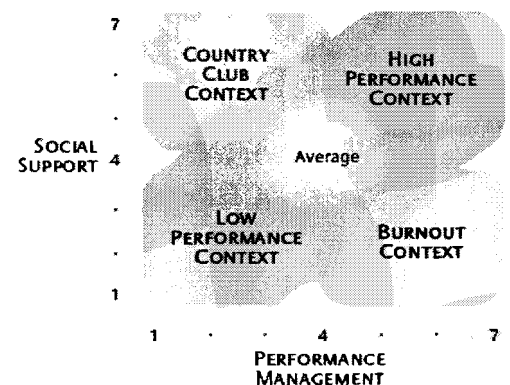


Figure 13 Stretching targets to enhance performance (O'Reilly & Tushman, 2007)

1994). This is strongly related to the sensing capability of the organization. This thus corresponds with the notion of Teece (2007) that the sensing capability depends partly on the individual capacities of the employees.

Figure 14, depicts five constructs that aim to measure the sensing capability of the high-tech marketing and sales organization, embedded in people management; the third management practice from the framework of Bloom *et al.* (2007).

6.5.1 Recruitment (C1)

Cusumano & Selby (1996) mention the importance of hiring smart people, who know the technology and the business. They argue that this is one of the key principles which is beneficial for the company and innovative performance. Menzel (2008) furthermore states that individuals' intelligence and creativity is important for firm performance and this directly could be linked to the sensing capability of the employees. This generates the following proposition:

Proposition C1: The organization should recruit talent as a way of stimulating to be globally integrated and locally responsive at the same time, hiring educated people and a heterogeneous workforce to enhance the sensing capability of the organization.

6.5.2 Assessment (C2)

Gibson & Birkinshaw (2004) mention the importance of 'assessment' in people management and direct link with corporate entrepreneurship, creativity and sensing capability. The way assessment is done and feedback is given on the performance of the people will contribute to enhancement or decline of creative actions and thus also affect the sensing capability of the organization. Gibson & Birkinshaw (2004) mention that if assessment is not done by a boss only, but also by peers and subordinates, it reinforces vivid debate and enhance personal stretch, corporate entrepreneurship and thus also creative action. Frequent, critical and personal assessment reinforces, (1) proactiveness, (2) aspirations beyond current capability, and (3) team orientation (Cyert & March, 1963; Hamel & Prahalad, 1998; Handy, 1989; Miller, 1983; Stevenson & Gumpert, 1985). Assessment as developing people is thus important for the sensing capability of the organization. Cusumano & Selby (1996) mention the importance of continual learning through self-criticism and sharing this with team members and direct subordinates. This leads to the following proposition:

Proposition C2 : Assessment should be done in such a way that it creates a supportive environment that smoothed the hard edges of the highly discipline-oriented demands that are placed on the people of the organization (Ghoshal & Bartlett, 1996). This would reinforce creative action and the sensing capability of the employees

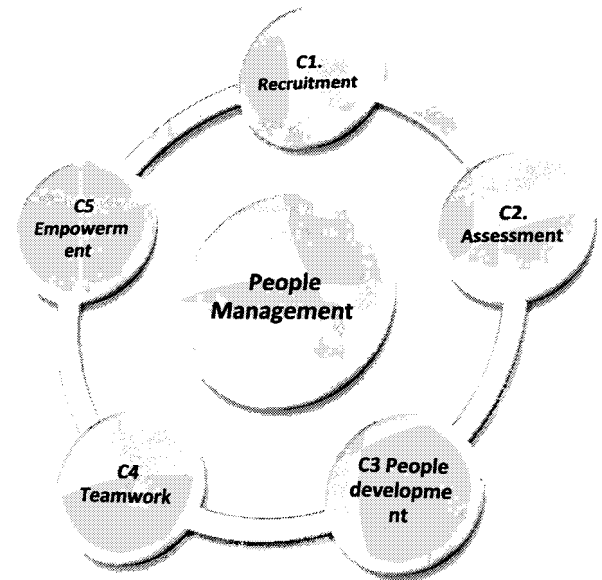


Figure 14 Five constructs in People Management domain

6.5.3 People Development (C3)

Exploration occurs as the firm integrates diverse knowledge with existing knowledge stocks. Absorbing new knowledge to become the foundation for future exploitation actions (Ireland & Webb, 2007). Giving diverse training thus reinforces the sensing capability of the individual employees.

Personal aspirations affect the individual sensing capability (Cyert and March, 1963; Grinyer and McKiernan, 1990; Hamel and Prahalad, 1998; Stevenson and Jarillo, 1990; Stopford & Baden-Fuller, 1994). Organizational learning and individual training should be aimed to improve the scope of the individuals what directly improves individual sensing capability. Individual capability to resolve dilemmas is another aspect mentioned by Stopford & Baden-Fuller (1994). Renewing organizations surmount challenges which had previously appeared impossible; often a creative process of resolving internal dilemmas (Hampden-Turner, 1990). Finally, Adler *et al.* (1999) pointed to the importance of worker's training and trust in relationship with management as key facilitators of sensing capability.

Proposition C3: Considerable effort of developing employees should be given in order to maintain/improve the sensing capability of the individual employees. Training improves employees' capability and creativity. Other ways of people development are career path development, and mentoring.

6.5.4 Teamwork (C4)

Team orientation highlights the crucial role played by teams of top and middle managers in building coalitions to support innovative ideas and creative individuals. This is an important aspect of corporate entrepreneurship according to Stopford & Baden-Fuller (1994). Support and teamwork induce members to lend assistance and countenance to others. It is important to allow actors to access the resources available to other actors, freedom of initiative at lower levels, and senior functionaries to provide guidance and help (Gibson & Birkinshaw, 1994).

Teamwork is thus another way of creative action and reinforces vivid dynamic interaction among members of the organization. Teamwork can thus be hypothesized as enhancing the sensing capability:

Proposition C4: Teamwork should be leveraged to support innovative ideas and creative individuals.

6.5.5 Empowerment (C5)

Tushman & O' Reilly (1996) identified a decentralized structure, a common culture and vision, and supportive leaders and flexible managers as the key sources of ambidexterity. Organizational structure characterized by decentralized authority, semi-standardized procedures, and semi-formalized processes support exploration. Decentralization authority patterns yield a large number of occasions throughout a firm for knowledge to be meaningfully acquired and processed (Siggelkow & Levinthal, 2003).

Colman (2002) also found clear evidence that individuals are often the source of valuable ideas to re-bundle resources and knowledge to create incremental innovations. He mentions the example of Honda; much of Honda Motor Corporation's success can be attributed to empowering individuals to stimulate positive change. For example, the company permits its employees to join teams that explore ideas they find interesting. Allowing such interactions has led to numerous innovations throughout the firm. Empowerment and decentralization, thus enhances the sensing capability, this leads to the next proposition:

Proposition C5: Empowerment and decentralization enhances the sensing and seizing capability of the organization

6.6 Conclusion

This chapter presents a conceptual research model in order to measure the sensing capability of the organization. Three management practices are used to measure the degree in which the sensing capability is embedded in the management practices of the organization; (1) operation management, (2) performance management, and (3) people management.

Opportunity discovery is closely related to the market orientation of the organization (Hence Jamrog *et al.*, 2006). When opportunities are first glimpsed, entrepreneurs and managers must figure out how to interpret new events and developments, which technologies, to pursue, and which market segments to target. They must assess how technologies will evolve and how and when competitors, suppliers, and customers will respond (Teece, 2007). Operation management practices should be in place to support this incredibly important function. The performance management practices should steer employees in the same direction and people management should be aimed at improving the individual and collective capability to sense.

The fourteen determined constructs could be measured by defining an ideal situation, which is scored with a 5 and a worst case scenario for each construct with a scoring of 1. When this construct is utilized moderately, which is determined in the scoring grid, than it gets the score 3. By determining the scoring grid in advance and relating this with interview data and other organizational evidence, than a company, business unit or department could be scored on all those constructs (*see Appendix 1 for the developed measurement scale/scoring grid*). An example of a possible result is given in *figure 15*.

Additional benchmarking with other companies or departments could be done easily, as will be shown in the empirical analysis.

Before the empirical analysis is described (*chapter 8*), the following chapter (*7*) first discuss how an organization could improve the sensing capability by using design propositions. These design propositions form a toolbox to improve sensing capability, by offering guidelines how to improve on the constructs.

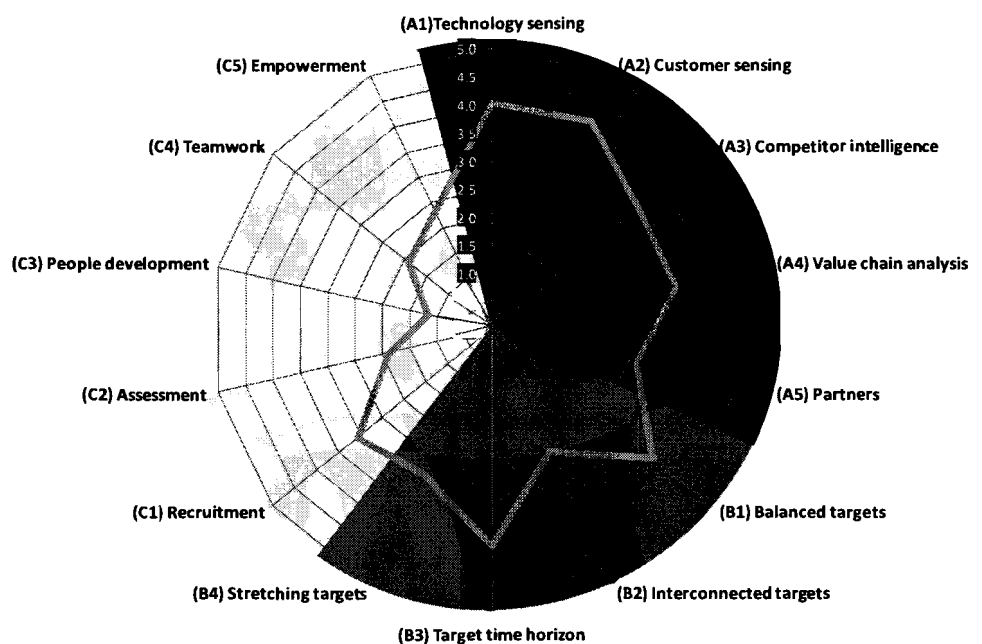


Figure 15 A picture of a possible result

7. Design Propositions (The Toolbox)

There are risks and costs to a program of action. But they are far less than the long-range risks and costs of comfortable inaction

John F. Kennedy (Thirty-fifth president of the US, 1917-1963)

Since, the proposed measurement model aims to measure the sensing capability from a relatively broad perspective, it is impossible to give a comprehensive set of design propositions for any particular case. This chapter describes a *selection* of key design propositions, based on literature and influenced from the empirical research. The author of this paper strongly believes in customized solutions for context specific problems. However, this chapter describes key design propositions in a more generic perspective. Some concrete customized suggestions for the high-tech marketing and sales organization where this model is tested, are given in the conclusion of the empirical part of this paper: chapter 8.

The first section discusses the interdependency of the three management practices (*operation management, performance management and people management*) in order to design solutions which improve the sensing capability of the organization (7.1). The second section explains the logic behind the suggested design propositions (7.2). In the subsequent sections some design propositions are suggested for operation management (7.3), performance management (7.4) and people management (7.5). This chapter closes by giving a brief conclusion (7.6).

7.1 Interdependent Design Propositions

It could not be overemphasized that sensing capability should be embedded in all three management practices to be optimal (*figure 16*). Without embedding the sensing capability in all the management practices (*operation, performance and people management*), optimal sensing capability cannot be the outcome. Individual capabilities and organizational systems and processes should be aligned for an optimal sensing capability in order to build Dynamic Capabilities. This means that the following design propositions cannot be seen independently, but those are *interdependent* in nature. They all work together for that ultimate goal to enhance the sensing capability of the organization, in order to seize opportunities – *and cope appropriately with threats* – which emerge in the exogenous environment.

7.2 Creating Design Propositions

The key component of a design proposition is, according to Denyer *et al.* (2008), the intervention type I, to be used in solving the problem in question. A design proposition can be seen as offering a general template for the creation of solutions for a particular class of field problems. For validation, design propositions have to be field-tested using pragmatic validity.

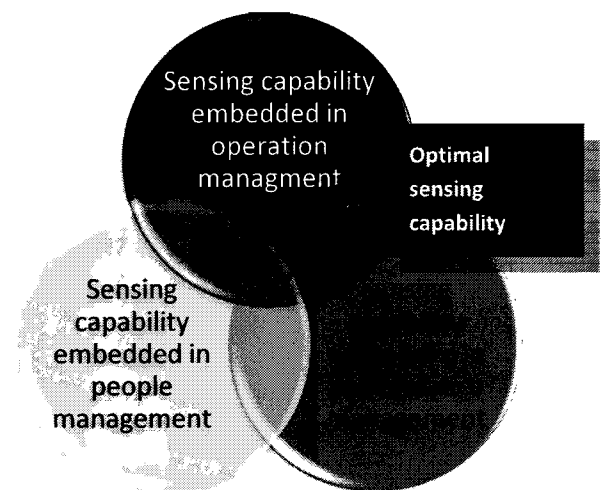


Figure 16 Optimal sensing capability is embedded in all three management practices

Bunge (1967) developed the technological rule, which follows the logic of prescription; 'if you want to achieve outcome O in context C, then use intervention type I'. Based on this technological rule Denyer *et al.* (2008) developed the logic of a design proposition aimed to be used in organizational design. This logic is called the CIMO-logic, which implies that in a certain context (C), use a certain intervention (I) based on a mechanism (M) to create an intended outcome (O). This logic is used in the subsequent sections to create some valuable design propositions for (re) design of the management practices.

When one finds such sets of interventions, it is important to acknowledge that the elements of organizational design are interdependent and configurational. To achieve an outcome in a given setting it is not possible to do simply I^1 . Managers need to adopt $I^1+I^2+I^3+I^n$. In other words, the design proposition is comprised of a combination of interventions ($I^1..I^n$) that invoke particular generative mechanisms ($M^1..M^n$) to produce a particular outcome (O) in a specific context (C) (Denyer *et al.*, 2008). As mentioned, this chapter gives some key design propositions and the set of interventions ($I^1..I^n$) and mechanisms ($M^1..M^n$) should be considered as *direction* over a *comprehensive solution*.

7.3 Improving Sensing Capability in Operation Management

In order to improve the sensing capability with respect to operation management of the high-tech marketing and sales organization, this section suggests some intervention types. *Table 6* depicts a summary of several design propositions. However this list is far from exhaustive or comprehensive. In the author's opinion those are the most important and basic necessities to improve the sensing capability, captured in (re)design of operation management.

Technology sensing in general could be improved by giving regular training (I^{A11}) to employees, which could be external training, but also experts on technology *within* the enterprise could fulfill this need. The creation of standardized customer profiles (I^{A21}) (Payne, 1988) is a proposed intervention for enterprise wide customer understanding. This could be done for the current customers as well for potential customers to target. A similar intervention is proposed for competitor intelligence (I^{A31}).

An intervention, which could be used for enhancing value chain understanding, is leveraging 'soft' targets in the performance management system (I^{A41}) to direct employees to deliver a certain analysis, with a certain quality level, over a certain amount of time. As stated, design propositions are interdependent, and propositions in the area of operation management, are effecting performance management and people management. Ideally does a certain intervention leverage the sensing capability in different management areas; e.g. generation of soft targets (*performance management*) to do a study on a certain value chain (*operation management*) together with cross departmental team members (*people management*).

CONSTRUCT	INTENDED OUTCOME	MECHANISM	INTERVENTION
Technology sensing (A1)	Improve technology understanding	Through the creation of collective technology insights of marketing & sales	I ^{A11} Internal training by key experts from product development team/R&D
	Effective feedback loop technology	Through bottom-up communication	I ^{A12} Weekly report from key technology person from regional HQ to global HQ
Customer sensing (A2)	Improvement of customer understanding	Through regular updates about top X customers, including information desired from distinct stakeholders (M&S).	I ^{A21} Creation of (<i>standardized</i>) customer profiles (Payne, 1988) and structural dissemination to distinct stakeholders in the organization via IT system
	Improvement of current & future market insight (potential customers)	Through additional focus on application level instead of product level	I ^{A22} Determination of application categorizing (<i>e.g. EDP, mobile</i>) and creating joint understanding through company wide cooperation. I ^{A23} Generate regularly (<i>e.g. 4 times a year</i>), a company broad meeting where future on application level is discussed with implications on product level. Open communication would leverage scope and knowledge base of all employees. (<i>Foley & Fahy (2004) talk about a market assessment meeting</i>)
Competitor Intelligence (A3)	Improvement of competitor understanding	Through regularly update about top X competitors, including information desired from distinct stakeholders (M&S)	I ^{A31} Creation of Competitor Intelligence reports (Payne, 1988).
Value Chain understanding (A4)	Improvement of value chain understanding	Through regular analysis done on a predetermined value chain	I ^{A41} Leverage performance management (<i>e.g. soft targets</i>) to execute value chain analysis. Select a value chain and let current product marketing employees work on this with clear deliverables and time horizon (<i>preferably cross functional, which enhances teamwork and shared identity</i>). (<i>Conceptual ambidexterity</i>) I ^{A42} Appoint leaders in the marketing organization (<i>e.g. strategic marketing</i>) responsible for the most important value chain (<i>Structural ambidexterity</i>)
Partners (A5)	Improving sensing capability through connection with exogenous parties	Prioritizing which external players (here called partners) could be beneficial for the business *standardization bodies *research institutions *suppliers *complementors *educational institutions *alliance management	I ^{A51} Select the most important partnerships, and appoint responsible persons to manage and/or follow up.

Table 6 Key design propositions for improving sensing capability in Operation Management

The table is self-explanatory and directs into possible solutions. Some concrete case-study based recommendations are given in the conclusion of chapter 8, where the empirical findings of the first test are discussed.

7.4 Improving Sensing Capability in Performance Management

Chapter 6 explains in detail how performance management directs employees in professional behavior, and thus also influences sensing activities. Soft targets in a performance management system can be leveraged to guide employees in increasing sensing behavior. This is shown in *table 7*.

CONSTRUCT	INTENDED OUTCOME	MECHANISM	INTERVENTION
Target Balance (B1)	Optimized target balance for sales and marketing which enhances the sensing capability (balance financial & non-financial targets/ hard & soft targets)	Through leveraging the soft targets of the employees.	I ^{B11} Generate soft targets which are useful for the organizational understanding of exogenous issues. For example; Market analysis, value chain analysis, etc.. Those soft targets should be challenging and determined in advance.
Target Interconnection (B2)	Optimized target interconnection among dispersed marketing functions.	Through the use of soft targets to enhance teamwork	I ^{B21} Generate cross functional task assignments (<i>among dispersed marketing functions</i>) to analyze a certain market. (<i>Conceptual ambidexterity</i>).
	Optimize target interconnection among different product groups	Through the use of soft targets to enhance teamwork	I ^{B22} Market analysis on application level, which goes beyond a product-centric scope
Target Time Horizon (B3)	Longer time horizon in order to balance the short term and long term scope	Leveraging the Soft targets with long term scope.	I ^{B31} In combination with other interventions, generate cross functional task assignments with an extended scope
Stretching Targets (B4)	Optimized performance by challenging performance measurement system which takes the dynamic environment into account.	Target system	I ^{B41} Define appropriate target and 'average' performance level, and add x% to it

Table 7 Key design propositions for improving sensing capability in Performance Management

One of the most valuable mechanisms to leverage the sensing capability of the organization is using soft targets to enhance teamwork, common understanding (*also mentioned in people management*), and interrelate marketing and sales work. Cross functional task assignments to analyze a certain market segment, competitor or value chain (I^{B11}). This work directly increases inter-functional outward looking activity, which directly contributes to the sensing capability of the organization!

Soft target can also be used to add mid-term and longer-term focus to the marketing activity (I^{B41}).

Stretching targets in a dynamic market needs separate research attention. In the current academic literature the concept of Dynamic Capabilities is not clearly linked to performance management systems, which is still a academic challenge. In general, targets shall be clear to understand, and challenging (*difficult*), but not impossible, to reach.

7.5 Improving Sensing Capability in People Management

Table 8 presents key design propositions to improve sensing capability in people management.

CONSTRUCT	INTENDED OUTCOME	MECHANISM	INTERVENTION
Recruitment (C1)	High educated people and heterogeneous labor force, which enhance organizational dynamics and sensing capability	Through recruitment, higher educated and heterogeneous people	I ^{C11} Acquire marketing talent (Payne, 1988) and cross industrial employees.
Assessment (C2)	Improvement of individual effort through fair and competitive feedback	Through giving individual employees feedback	I ^{C22} Frequent (e.g. 4 times a year) assessment, based on soft targets, team discussions and quality of previous assignments.
		A 360 degree assessment process in which each manager is evaluated not only by his or her boss but also by peers and subordinates (Ghoshal & Bartlett, 1996)	I ^{C23} Generate assessment tool/outline based on proposed mechanism
People Development (C3)	Enlargement of scope of individual employees to capitalize on improved sensing capability	Through developing people intensively	I ^{C31} Mentoring systems, I ^{C32} Internal and external training I ^{C33} Job rotation. I ^{C34} Career path planning
Teamwork (C4)	Synergy effects among marketing & sales, different product groups and different areas of the organization	Through the creation of common identity & shared values (Kogut & Zander, 1992) and leveraging heterogeneous knowledge	I ^{C41} Leveraging soft targets by doing cross functional assignments I ^{C42} Interdepartmental lunches I ^{C43} Sports leagues that require mixed-department teams I ^{C44} Newsletters that 'poke fun' at various interdepartmental relations I ^{C45} Exchange of employees across departments I ^{C46} Cross-department training programs I ^{C47} Senior department managers spending a day with executives in other departments (draws partly on Kohli & Jaworski, 1990)
Empowerment (C5)	Improvement of sensing capability and proactive individual efforts	Through empowering people. Incentivize and recognize entrepreneurial behavior	I ^{C51} Decentralize feasible parts of decision-making I ^{C52} Tolerate occasional mistakes

Table 8 Key design propositions for improving sensing capability in People Management

7.6 Conclusion

This chapter outlines several design propositions (The Toolbox), which are aimed to improve the sensing capability of the high-tech marketing and sales organization. Developing the sensing capability is the first step in developing Dynamic Capabilities, which enables the organization to continually sense and seize opportunities and remain sustainable in the dynamic marketplace.

The reader should recognize that the suggestions given in the tables are not a complete set of propositions. There are many ways to improve the constructs which enable the sensing capability of the organization. It should be seen as a general outline for further improvement of the sensing capability. Secondly, a single design proposition is not the complete solution for any given business problem, but it is an input to the designing of the specific solution. Propositions are made according to context specific considerations and along with the evidence from field-testing and knowledge of the local situation and business domain in question (Denyer *et al.*, 2008).

8. Measuring the Sensing Capability in Corporate Context

In all affairs it's a healthy thing now and then to hang a question mark on the things you have long taken for granted.

Bertrand Russell (British philosopher and mathematician, 1872-1970)

Chapter 6 suggests measuring the elemental and first core process in creating and nurturing the foundation of Dynamic Capabilities, the *sensing capability*. This is done with a comprehensive and broad model of management practices, which is adapted from Bloom *et al.* (2007). The result of empirical testing is discussed in detail in this chapter. The model is tested in a high-technology M&S organization.

The first section, introduces the overall empirical results of the sensing capability of the high-tech marketing and sales organization (8.1). Section two, discusses the sensing capability captured in the operation management (8.2). The third section reflects on the sensing capability captured in the performance management (8.3), and the fourth discusses the sensing capability captured in people management (8.4). Section five captures the conclusion (8.5), and section six presents the main recommendations for this practical case (8.6). The last section closes with reflecting on the methodological limitations of the empirical study (8.7).

8.1 The Sensing Capability Empirically Measured

The developed measurement tool gives an impression about the sensing capability of the high-tech M&S organization. It does not include the exploitation capability which reflects how the organization is running its current business!

Once again is emphasized that results are based on *qualitative research*, and that the diagram (*based on the calculated numbers*) should be accepted as an indication of the measured constructs. The amount of data points is limited, but several actions are taken to validate the results of this measurement⁶.

Figure 17 gives a graphical representation of empirical results. Before the constructs are discussed in detail, it is possible to make the notion that the different types of businesses score different points when it comes down to the sensing capability.

The spider diagram depicts result from two types of businesses: the primary business and the secondary business. The primary business includes the large business areas of the organization, and the secondary business reflects the smaller business areas. The consolidated line is based on a weighted average of the primary business and the secondary business related to the revenue generation of those two businesses, in order to put both results in perspective of the whole M&S organization.

⁶ For a methodological account is referred to chapter 3 of this paper

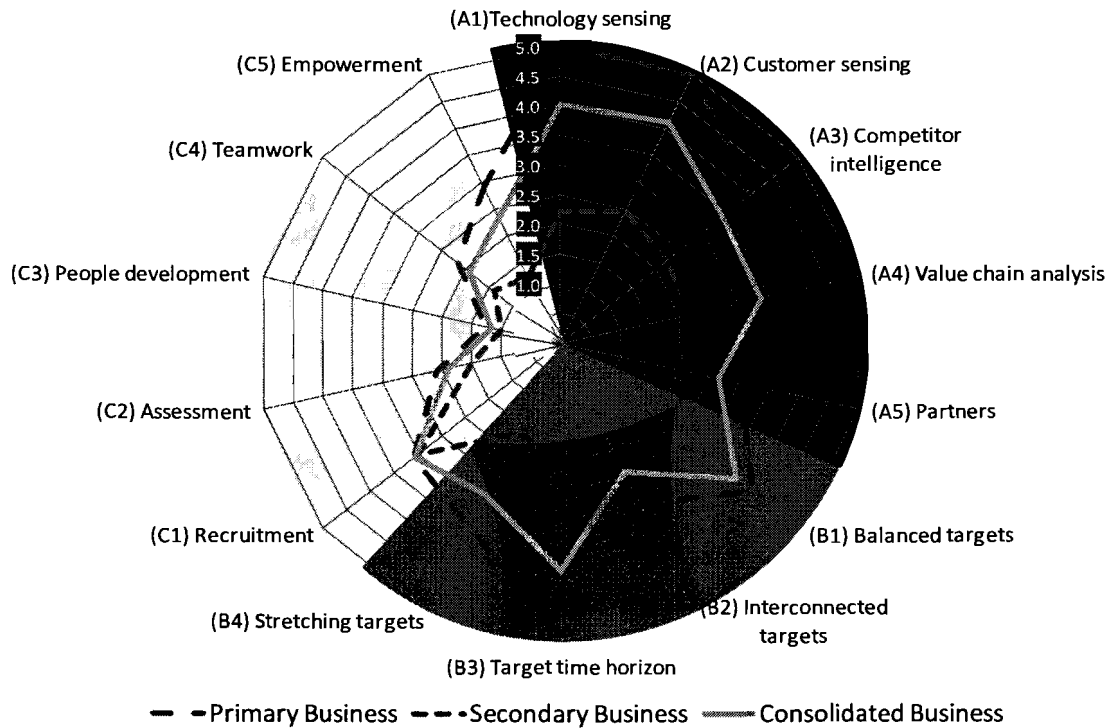


Figure 17 The sensing capability empirical determined by 14 constructs

The three parts in the measurement model, (1) operation management, (2) performance management, and (3) people management are discussed in more detail in the following subsequent sections.

8.2 Operation Management

The first management practice (*which is the most tangible*) is operation management. In order to measure the sensing capability of the organization, five constructs are defined in chapter 6. Technology sensing capability (A1), customer sensing capability (A2), competitor intelligence, (A3) value chain analysis (A4) and partnering (A5).

The first construct (*technology sensing*) scores extremely good (score 5) for the primary business, however for the secondary business it scores relatively low (score 2.2) (*figure 17*). The interface between the main customers and the primary business captures deep technology integration. So, technology sensing capability works out very well to generate an effective feedback loop from a primary business perspective.

Similar results are seen in the customer sensing capability. Market ambiguity is not found in the primary business, contrary to the secondary business. Anticipating on the development in the marketplace further down the value chain is important for scoping and dealing with changing markets and changing customer needs. The most important accounts are closely followed and deep integration is found in the relationship with those customers, this explains the high score for the primary business (score 5 for customer sensing and score 4 for value chain understanding). However, the organization demonstrates less significant focus to their smaller business reflected by the relative low score (score 2.4 for customer sensing and score 2.2 for value chain understanding). In order to improve the sensing capability for the secondary business, systematic, longer-term business planning would be necessary.

The primary business scores high on Competitor Intelligence (score 4). A closer linkage with global HQ and deep customer integration, are significant contributors to better competitor understanding. However, in the secondary business CI is mainly done at ad-hoc basis. In practice, resources are allocated only when the need is urgent. This means that the CI process is reactive and unstructured, reflected by a score of 2.

Finally, the construct partners relies on external linkages like regulatory authorities, standard setting bodies, and educational and research institutions. The empirical result relies on a limited amount of data since most of the interviewees are not exposed to this type of construct. The concept of 'Open innovation' introduced by Chesbrough (2003) is not a widely understood term in the M&S organization and is mainly considered as a HQ issue (score 2.5 for the overall business).

8.3 Performance Management

Performance management is operationalized in four main constructs which rely on the research of Bloom *et al.* (2007): Balance targets (B1), interconnected targets (B2), target time horizon (B3), and stretching targets (B4).

Figure 17 shows that the performance management scores of the primary business are generally higher than the scores of the secondary business.

The better the balance of financial and non-financial targets the better it is for the sensing activities in the organization. The score on balancing targets (B1) is moderate for the secondary business, which seems to be optimized for exploiting the business (score 3). However, in the primary business the importance of, non financial, soft targets seems to be higher, with a score of 4.

Target interconnection (B2) is hypothesized as sensing reinforcing. When different product groups are linked in interconnected targets the people in the organization tend to synthesize more in their work and people are reinforced to reach synergy effects. *Figure 17* shows moderate score for the primary business (score 3). Targets in the secondary business are predominantly based on accounting figures and the different marketing departments work more or less independently (score 1.3). Synergy between product groups is not systematically utilized.

With regard to target time horizon (B3), the current primary business is long-term oriented, which is hypothesized as beneficial for the sensing capability (score 4.9). Secondary business on the contrary is very short term oriented (score 1.8).

The fourth and last construct under performance management is stretching targets (B4). Several academic sources are pointing to set genuinely demanding targets in order to reach a high performance. However, targets should be reachable; otherwise performance will drop (Bloom *et al.* 2007; O'Reilly & Tushman, 2007; Gibson & Birkinshaw, 2004). This empirical research shows moderate point for primary business (score 3.5) and low points for secondary business (score 1.7) for stretching targets.

8.4 People Management

The third management practice which affects the sensing capability of the organization is people management. Five constructs are measured; recruitment (C1), assessment of employees (C2), people development (C3), teamwork (C4), and empowerment (C5).

Overall, the scores on those five constructs do not differ much from primary and secondary business (*figure 18*). This could be explained by the fact that human resource policy is more or less equal in both areas. Another conclusion which could be drawn is that people management is far from optimized to effectively nurture the sensing capability, with scores below 3.1.

The first construct measured is recruitment (C1). Tushman & O'Reilly (1997) state that strong entrepreneurial and technical competencies and relatively young people, are good for sensing opportunities. The relative high score (score 3) on this construct is caused by the fact that people are relatively young, various nationalities and thus also heterogeneous in one way or another. Furthermore, the workforce is relatively highly educated which all contributes to the sensing capability of the organization.

The organization uses a fairly top down approach of assessing people (C2). Richer communication among higher and lower level employees could be beneficial. Scores are 1.5 and 2 for primary and secondary business respectively. This shows that (*from a perspective of enhancing sensing capability*) the assessment process of the organization is far from desired.

People development (C3) is an important aspect in creating sensing capability in a high-tech marketing and sales organization. This is shown extensively in chapter 6. Training opportunities in the M&S organization is generally considered as very low (scores of around 1).

Good teamwork (C4) would leverage synergy effects between marketing and sales and between distinct marketing departments. It would enable systems thinking which enhances the sensing capability as well. Teamwork in secondary business (score 2) turns out to be lower than in the primary business (score 3).

Empowerment (C5) is the last construct which has been empirically validated (scores of 2.9 for primary business and 1.3 for secondary business). Since the organization is designed to be functional and efficient, entrepreneurial and decentralized structures, culture and systems, could be categorized moderate or weak.

8.5 Conclusion

From the empirical analysis it could be seen that different types of business can score differently on the constructs measured, which is ultimately the case in the two types of businesses assessed. Some general conclusions could be drawn from this study.

First, the primary business, and the whole consolidated M&S, score high in both operation management and performance management for sensing capability, even if the organization is generally considered as 'exploitation oriented' (*table 9*).

Second, people management in general scores moderately low for both primary and secondary business, this is explained by company wide policy, which affects both businesses.

Third, secondary business scores moderately low in operational management and performance management when it comes down to sensing capability. However, if both businesses are consolidated according to relative revenue generation does it not affect the total business.

	Primary Business	Secondary Business	Consolidated Business
Operation Management	High	Moderately Low	Moderately High
Performance Management	Moderately High	Moderately Low	Moderately High
People Management	Moderately Low	Moderately Low	Moderately Low

Table 9 Strength and weaknesses of the sensing capability for primary and secondary business

Fourth, customer linking capability seems to be a distinctive capability of the primary business, which has been made apparent by the recognition of close communication and joint problem solving capabilities with key customers (Day, 2004).

Fifth, especially for the secondary business, management must find methods and procedures to peer through the fog of uncertainty and gain more insight in the exogenous environment, in order to enhance the sensing capability. The next section elaborates on this with some practical recommendations.

8.6 Recommendations

Chapter 7 of this paper presents a toolbox, which offers suggestions for improvements on different management practices. The recommendations given, improve the sensing capability of the organization.

- 1. Actively develop people.** People management practice should be leveraged to improve the individual and collective sensing capability of the employees. Suitable interventions includes, mentoring systems, job rotation and career path planning.
- 2. Increase the scope and frequency of training.** Internal and external training can enlarge the scope of current employees and stretch there ambition. It does not only improve the sensing capability, but most likely also improves people's performance in general.
- 3. Increasing cross functional teamwork by using soft targets.** Generate cross-functional task assignments among marketing and sales departments, for analyzing important markets, value chains or other sensing enhancing practices (*contextual ambidexterity*). Disseminate standardized insights through the organization via current IT system. Soft targets are an important tool to achieve the necessary attention.
- 4. Extension of the scope of the organization: from a merely product-centered focus, to a focus on application level.** Different interventions could be leveraged for extending this scope. Value chain and market analysis on industry/application level. Company wide discussions, cross functional teamwork, and conceptual and structural ambidextrous initiatives (*this means: nominating responsible person to steer application level initiative; see also the last recommendation*).
- 5. Generate customer profiles regularly.** Regularly update standardized customer profiles via the current IT system. Leverage current marketing and sales organization for teamwork. Potential customers shall be included as feasible. In addition a company wide discussion about market direction and active debate to leverage market understanding.
- 6. Generate customer intelligence reports.** Regularly update the reports. Organize meetings (*e.g. 4 times a year*) to discuss in order to stimulate wide discussion about the status of the competition.
- 7. Start a team to drive strategic initiative.** (*Structural ambidexterity*). The additional tasks mentioned in the previous recommendations, and the extension of the scope on application level, need separate management attention. In general, is the organization efficient and

functional organized, however nominating a team (*e.g. strategic marketing*) or responsible person is useful for the secondary business to coordinate cross-functional assignments and related targets.

The latter recommendation is one which connects the operation management domain with the performance and people management domains. It shows once more that those practices are interrelated and one intervention affects the other. The latter recommendation (*intervention*) relies on taking a systemic (*not systematic!*) approach for improving organizational wide sensing capability.

8.7 Research Limitations

The empirical research relies on limited data, which affects the internal validity of the empirical research. The data which is used for the scoring relies mainly on 12 interviews, since 2 interviews are eliminated from the sample size (*one because of lack of experience with the business, and one was removed since this person came from another distinct business area*). Since the measurement model is developed and refined in parallel of data gathering period, not all people contribute to all the constructs. However, since (1) triangulation methods are used (*see chapter 3 for a more detailed description*), and further (2) individual and group discussions confirmed the results, it is believed that the result is valid. Furthermore, (3) is there correlation among the dispersed interviews which is reflected in relatively small standard deviations among the scores. For confidentiality reasons, the data is not included in this paper.

9. Conclusions

Perception is strong and sight weak. In strategy it is important to see distant things as if they were close and to take on a distanced view of close things

Miyamoto Musashi (Japanese swordsman, 1584-1645)

This concluding chapter closes with key insights, gained from an extensive literature study and empirical research. The different sections contribute in answering the general research question, which is formulated as follows: *How can a successful international high-technology Marketing & Sales organization become more receptive to new opportunities and threats and contribute to new business development, in order to prevent stagnation in the global marketplace?*

The extensive literature study in the first place contributes to better understanding of a high-technology marketing and sales organization. The concept of Dynamic Capabilities turns out to be an appropriate concept for studying the high-technology marketing and sales organization (9.1). Academic knowledge, serves as input for making the *sensing capability* measurable and quantifiable (9.2). The third section gives the managerial implications of applying the model in practice (9.3). The subsequent sections reflect respectively on academic implications (9.4) and limitations of this study (9.5).

9.1 High-tech Marketing and Sales Organization & Dynamic Capabilities

Organizations are fuzzy, ambiguous, complex socially constructed systems that cannot be well understood from a single perspective (Denyer *et al.*, 2008). Therefore this paper reflects on the high-technology marketing and sales organization from different perspectives, like market orientation, ambidexterity, Dynamic Capabilities and corporate entrepreneurship.

Being receptive to a changing environment is more important than ever before in corporate history, since new technological development is changing the world with rapid pace. Many academic sources indicate that organization-wide marketing orientation has a positive impact on the business performance. Deep customer and competitor understanding are cornerstones of today's competitive advantage.

The concept of Dynamic Capabilities (DC's) is an academic concept which is considered as extremely important for commercial organizations in order to survive in the long run. High-tech marketing and sales organizations fulfill an important role in sensing changes in the exogenous environment, since they are the main connection between the global enterprise and the unpredictable and dynamic market. *Dynamic Capabilities are defined as a firm's behavioral orientation constantly to integrate, renew, and recreate its resources and capabilities, and most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage* (Wang & Ahmed, 2007). Dynamic Capabilities (1) evolve from learning mechanisms, (2) are different from ad-hoc problem solving capabilities, are (3) repetitive, (4) higher-order processes and do not include (5) firm performance.

Despite the fact that Dynamic Capabilities are considered to be essential for sustainability in a high-technology environment, and various research is conducted over the last decade, it still remains a highly abstract concept, which does not directly offer practical hands-on tools for practitioners.

The basic rationale behind this research is that if it is possible to measure the DC's of the high-tech marketing and sales organization, it is possible to manipulate, improve, and develop them. This results in defining the core processes as the building blocks of DC's. Three core processes are to be distinguished, *videlicet* (1) sensing, (2) seizing, and (3) managing opportunities and threats.

9.2 Measuring DC's with Management Practices

DC's should ultimately be embedded in the management practices of the organization. Without structural embeddings, an enterprise is not able to have DC's in place. This research proposes to link the three core processes - *as building blocks for DC's* - to three types of management practices defined by Bloom *et al.* (2007); (1) operation management, (2) performance management, and (3) people management. Any high-technology organization that wants to develop DC's, should align all three management practices to constantly integrate, reconfigure, renew and recreate its resources and capabilities.

The scope of this research is on the first core process: the *sensing capability*. A measurement tool is proposed and the sensing capability is linked to the three management practices proposed by Bloom *et al.* (2007). Operationalization of the sensing capability embeddings in the management practices resulted in 14 constructs. Technology sensing (A1), customer sensing (A2), competitor intelligence (A3), value chain analysis (A4) and partners (A5), form the constructs for measuring the sensing capability captured in operation management. Balanced targets (B1), interconnected targets (B2), target time horizon (B3) and stretching targets (B4) are the four constructs under performance management. People management includes recruitment (C1), assessment (C2), people development (C3), teamwork (C4) and empowerment (C5).

The better the sensing capability is embedded in the three management practices of the firm, the better the firm is able to seize opportunities or threats in the exogenous environment. The more probable it becomes that the organization develops Dynamic Capabilities, which in turn enables the organization to adapt to the rapid changing environment time after time, and remain competitive in changing markets for a longer period in time. It cannot be overemphasized that this is thus an important concept for the high-technology marketing and sales organization.

9.3 Managerial Implications

First of all, the proposed measurement tool offers practitioners a ***practical solution to measure the sensing capability*** of their organization. It generates insight how the different management practices are aligned and optimized for sensing the exogenous environment.

Secondly, ***internal benchmarking is possible***. Practitioners are able to make a comparison of the sensing capability of the different departments or business units within their organization. The empirical test of the model (*chapter 8*) shows that the sensing capability in one business is better embedded than in another.

Thirdly, the ***graphical representation in a spider diagram*** (*proposed in chapter 6 and applied in chapter 8*) enables practitioners to see directly what the strong and weak points are. Both on individual constructs as on management practice level.

Fourth, by having insight in the strong and weak points in the sensing capability of the organization, direct action can be taken in order to improve the sensing capability. An initial ***toolbox of possible***

solutions is presented in chapter 7. This toolbox however, is not exhaustive or fully comprehensive. On the contrary, it is just a direction and further customization and validation should be applied. Customized solutions are necessary to cope with context specific problems and weaknesses found in management practices.

The proposed measurement model and toolbox thus directly contribute to improve the receptivity of the marketing and sales organization, which answers the research question of this paper.

9.4 Academic Implications

This paper provides a clear contribution to academics, since it is one of the ***few explicit attempts to measure the sensing capability as core process of Dynamic Capabilities***. New insights are created by linking DC's literature (Teece, 2007; Wang & Ahmed, 2007) to the management practices framework of Bloom *et al.* (2007). While Teece (2007) speaks about the sensing capability which should be embedded in organizational systems and individual capabilities, this research makes this link explicit by connecting it to three types of management practices.

However, the Dynamic Capability literature is generic and - *still* - abstract in nature. This paper shows that it is possible to apply this concept more explicit (*hands-on*), by means of a fair attempt to make the sensing capability measurable. However, the author of this paper still believes that this attempt to measure the sensing capability with the tree types of management practices – *operation management, performance management & people management* – needs additional research. The measuring tool for the sensing capability should be ***applied and tested in other companies/business units in order to improve the external validity*** of the model.

Also ***should be considered to generate a standardized questionnaire*** to measure the determined constructs in a more efficient manner.

Furthermore, one could use the model in ***cross company and cross industrial studies and apply the model for benchmarking***.

A logical successive academic challenge would be to make the ***second core process, seizing, more explicit in order to generate new academic insights and develop tools for practitioners***.

Furthermore, this paper shows that academic literature from fields like ambidexterity, corporate entrepreneurship, Dynamic Capabilities and market orientation have a lot of linkages and Dynamic Capability literature, which hardly has been made apparent in a comprehensive academic framework. Further ***research about overlap, distinction and complementary insights should be pursued*** to make the concept of DC's more explicit and better applicable for managers.

Not much is known about performance management systems, which take the dynamic environment into consideration. ***Further research should be done how to design a performance management system that takes environmental factors into consideration***. Especially the area of sales representatives whose performance is measured according to sales revenues with fluctuating prices, seems to be an interesting research avenue.

9.5 Limitations

A limitation in the empirical part of this research is the threats to the **internal validity** of this mainly qualitative research. The results are based on a limited amount of interviews, and are held by one person. Several actions are taken to mitigate this limitation (*elaborated in chapter 3*).

Another weakness of the empirical study is the poor representativeness or **external validity**. External validity is defined by Yin (2003) as '*establishing the domain to which a study's findings can be generalized*'. The developed measurement method and the scoring measures need to be tested in other empirical situations. After further refinement, it might be applied across a wide variety of business unites companies and industries.

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Appendix 1; Conceptual Research model Operation Management (1-8)

1. Technology sensing (A1)

- a. How does X monitor technology?
- b. How is this organized?
- c. Please talk me through that process

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Technology is considered as R&D activity and not connected with the marketing organization	Technology sensing is considered as normal activity, but structural reporting with HQ hardly takes place.	Technology sensing does happen by monitoring markets and applications further down the value chain. Trend analysis and long term planning is done at a structural basis (Teece, 2007). This involves deep understanding of competitors and value chain.
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

2. Customer Sensing (A2)

- a. How does X identify target market segments?
- b. Did it change recently? When is it updated?
- c. How does X monitor customer need?
- d. How good do you know the market?
- e. Please talk me through customer sensing activities

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Market segmentation did not change over the last decade. Despite the fact that many things changed. Furthermore are markets not segmented according customer needs or direct competition The organization is focused on technology mainly.	Market segmentation is done according to customer needs, and further developed. However, segmentation is not embedded in the organizational process and is done ad-hoc.	Market segmentation is embedded in a set of processes/systems and continuously reviewed. If different customer groups emerge, current segmentation is discussed organization wide. Modifications are made accordingly The organization is customer & market driven. When opportunities are identified from specific customer needs, actions are taken.
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

3. Competitor Sensing (A3)

- a. How does X monitor competitors?
- b. How is this organized?
- c. Is there a structural competitor intelligence process in place?
- d. What is done to influence competitors' behavior in the market place?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	<p>Competitor information is not present in the organization. No resources are available for this process.</p> <p>Despite the fact that the high-tech marketing organization moves in a rapidly changing environment it does not know about the moves of the competition.</p>	<p>Competitor intelligence is an activity which is done ad-hoc. The information is accurate and comprehensive, but not efficient.</p> <p>Since it is done ad-hoc critical events already happened.</p>	<p>Competitor information is actively searched for and processed. Deep understanding about competition is available and this results in a comprehensive, accurate, and efficient overview of the main competitors regularly (Jaworski <i>et al.</i>, 2002).</p> <p>There is a clear competitive intelligence process, embedded in a formal structure (Jaworski <i>et al.</i>, 2002).</p>
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

4. Value Chain Analysis (A4)

- a. Is Value chain analysis done?
- b. Would that help the business?
- c. How does it influence the business?
- d. What is the understanding of the value chain/value constellation?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	<p>Marketing function eroded to operational space. No strategic function in the marketing organization. This means that the value chain is not analyzed and a clear picture of the value chain is missing.</p>	<p>Key information about customers and competitors generated and disseminated throughout the organization. The value chain for different product groups is done on ad-hoc basis. There are resources available to execute proper analysis, but a structural process is missing.</p>	<p>Organization wide generation, dissemination, and responsiveness to market intelligence. Process structure aimed at sharing information about customers and engaging in activities designed to meet customer needs (Narver & Slater, 1990). Market-sensing & customer linking activities included (Moorman & Rust, 1999). Long term business development driven by the marketing organization (Kotler, <i>et al.</i>, 2006).</p>
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

5. Partners (A5)

Are there any linkages with suppliers, complementors, regulatory authorities, standard-setting bodies, educational and research institutions?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	The organizations does not tap in developments with suppliers, complementors, regulatory authorities, standard-setting bodies, with educational and research institutions.	Linkages with exogenous parties on the supplier side, complementors, regulatory authorities are done at ad-hoc basis.	People and processes are allocated to tap in exogenous environments. Regulatory authorities, standard-setting bodies and legal issues are covered consistently with the business. There are several linkages found. 'Open innovation' (Chesbrough, 2003) is a broadly known and understood concept by the employees of the organization.
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

Performance Management (6-9)

6. Balanced Targets (B1)

- a. What types of targets are set for the company/department?
- b. Tell me about the financial and non-financial goals.
- c. What does company headquarters or appropriate manager emphasize to you?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Goals are exclusively financial or operational and aimed at exploiting the current business.	Goals include non-financial targets, which form part of the performance appraisal of top management.	Goals are a balance of financial and non-financial targets. Senior managers believe the non-financial targets are often more inspiring and challenging than financials alone. System thinking is found broadly in the organization, beyond a product-centric focus. Those non-financial targets are explicitly to develop markets and acquire new customers. Creative action is reinforced. Targets issue creative challenges to people and are not narrow (Gibson & Birkinshaw, 2004)
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

7. Interconnected Targets (B2)

- a. Is there interconnection in targets among different product groups?
- b. Synergy effects among different departments and different product groups?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Goals are based purely on accounting figures. Short term operation without sensing contribution in the strategy making process. Departments work completely independent and synergy effects among departments and dispersed product groups are not found.	Corporate goals are based on shareholder value but are not clearly communicated down to individuals. Departments work independently and interdependency is not found structurally.	Corporate goals focus on shareholder value. They increase in specificity as they cascade through business units ultimately defining individual performance expectations. Multifunctional teams meet regularly to track and plan deliverables for different areas. This could be presented to top management. So bottom-up strategy building. Business model creation and value propositions and business plans are created. Synergy effects among different product groups are systematically present.
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

8. Target time horizon (B3)

- a. What kind of time scale are you looking at with your targets?
- b. Which goals receive the most emphasis?
- c. How are long term goals linked to short term goals?
- d. Could you meet all your short-term goals but miss your long-term goals?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Top management's focus is on short term targets.	There are short and long-term goals for all levels of the organization. As they are set independently, they are not necessarily linked to each other.	Long term goals are translated into specific short term targets so that short term targets become a staircase to reach long term goals. New business development is included in long term strategic thinking. New stream businesses are part of the executing procedures (Drucker, 1985; Berends <i>et al.</i> , 2007).
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

9. Stretching Targets (B4)

- a. How tough are your targets? Do you feel pushed by them?
- b. On average, how often would you say that you meet your targets?
- c. Are there any targets which are obviously too easy (will always be met) or too hard (will never be met)?
- d. Do you feel that all groups receive targets with the same degree of difficulty?
- e. Please talk me through.

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Goals are either too easy or impossible to achieve; Managers provide low estimates to ensure easy goals (Bloom <i>et al.</i> , 2007). Dynamic market is not taken into consideration, and targets are fixed for a longer period of time.	In most areas, top management pushes for aggressive goals based on solid economic rationale. However, according to the changing environment, targets are too rigid.	Goals are genuinely demanding for all divisions. They are grounded in solid economic rationale. This means that goals/targets are balanced according to the dynamic environment.
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

People Management (10-14)

10. Recruitment (C1)

- a. Could you say something about recruitment of this company?
- b. Can you tell me about the talented people you have recruited/are recruited here?
- c. What is the policy of the company with regard to diversity of its workforce?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Senior management do not communicate that attracting, retaining and developing talent throughout the organization is a top priority. Furthermore is the workforce homogeneous and entrepreneurial talent not considered in hiring people.	Senior management believes and communicates that having top talent throughout the organization is a key way to win, through entrepreneurship and self-initiative. But heterogeneity of the workforce is not present	Senior managers are evaluated and held accountable on the strength of the talent pool they actively build. Diversity of people is very important since heterogeneity of the people pays off in the sensing capability of the organization (Tushman & O'Reilly, 1997). Strong entrepreneurial and technical competencies and relatively young people is good for sensing & seizing opportunities (Tushman & O'Reilly, 1997). Recruitment & selection, training and career path management of executives is globally integrated and locally supported at the same time (Bartlett & Ghoshal, 1989).
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

11. Assessment (C2)

- a. How does people’s assessment takes place?
- b. Does it create a supportive environment?
- c. Please talk me through

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Assessment is purely done top-down and bottom-up communication and reflection is missing.	In setting goals and targets there is some bottom-up input and pro-activeness is stimulated (Handy, 1989; Miller, 1983; Stevenson & Gumpert, 1985). However, evaluation is top down only.	Senior managers are evaluated and held accountable on the strength of the talent pool they actively build. Evaluation is done in such a way that it creates a supportive environment that smoothens the hard edges of the highly discipline-oriented demands that are placed on the people of the organization (Ghoshal & Bartlett, 1996). A 360 degree assessment process in which each manager is evaluated not only by his boss but also by peers and subordinates (Ghoshal & Bartlett, 1996)
Interview 1	Quotes & Evidence		
Interview 2 (etc)			
Weighted Average			

12. People development (C3)

- a. What kind of training is given to the employees?
- b. What happens if somebody suggest some training or self development?
- c. Please talk me through

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Training is not done at all, or executed poorly. Aspirations beyond current capability are not nurtured.	Training is given, but on a moderate level. Training is not aimed to enhance proactive thinking of the employees.	Considerable effort of developing employees is given (Gibson & Birkinshaw, 2004). Training is given to develop the capabilities of the entire organization to enhance the execution of overall vision creation. Development of soft and hard skills increase motivation and to stimulate initiative. Aspirations beyond current capability are nurtured by training events (Hamel & Prahalad, 1998).
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

13. Teamwork (C4)

- a. Could you explain how your team works together?
- b. Joint goal setting? Strategy determination?
- c. How about cross functional/cross-product team work?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Hardly teamwork present. The organization is functional oriented and individual goals are not linked to a higher abstraction level.	Moderate teamwork is found. Regular meetings are organized where everybody could come up with ideas and suggestions. However, synergy effects among different products/departments is hardly present	Team orientation highlights the crucial role played by teams of top and middle managers in building coalitions to support innovative ideas and creative individuals. This is an important aspect of corporate entrepreneurship (Stopford & Baden-Fuller, 1994).
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			

14. Empowerment (C5)

- a. What is the decision making power and the freedom to act in your job?
- b. Could you give me an example?

SENSING	Score 1	Score 3	Score 5
Scoring grid:	Organization is extremely centralized. It discourages personal initiative.	There is quite some decision-making power. The organization balances centralization & decentralization.	Decisions are pushed down to the lowest appropriate level (Gibson & Birkinshaw, 2004). Radically decentralizing responsibility by giving unit leaders the authority to fundamentally change their business' strategy and operations (Ghoshal & Bartlett, 1996; Tushman & O'Reilly, 1996)).
Interview 1	Quotes & Evidence		
Interview 2 (etc)	Quotes & Evidence		
Weighted Average			