MASTER

Learning strategies of high tech software firms
the case of Brainport’s high tech software cluster

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Award date:
2017

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Learning strategies of high tech software firms

The case of Brainport’s High Tech Software Cluster

By Dirk Janssen, BA

Student ID: 0878313
Date: 31-01-2017

In partial fulfillment of the requirements of the degree of

Master of Science in Innovation Sciences

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Change is the law of life. And those who look only to the past or present are certain to miss the future.

John. F. Kennedy
Abstract

The purpose of this explorative research project is to investigate which learning strategies high tech software firms use in terms of their type, level and drivers. In this way novel insights are generated about the presence of learning strategies in the domain of high tech software and what dynamics in the firm’s environment and economy drive them.

The research project’s approach is to analyze 5 diverse and representative firms of a Western-European high tech software cluster. Quantitative data is obtained through a survey to get a first overview of which learning strategies are used. In-depth qualitative insights are derived from interviews with various actors in each firm, as well as from documentation.

The main findings are that the large majority of high tech software firms can still improve their learning strategies as compared to the best practice standard set by their competitors, as well as that learning strategies are driven by and will become more important when the complexity of the sector’s technology and market demands increase.

The practical recommendations to firms, clusters and regional development agencies can be summarized as “scale up your attention to organizational innovation and learning”. This is best done by making it a priority, spending resources on it and embracing an interest in both technology and organizational improvements.

The scientific contributions include, firstly, filling the empirical gaps about the type, level and drivers of learning strategies in the high tech software sector and secondly, that the increase in the complexity of technology and market demands is the most important driver, not the rate of change, of the increased need for learning strategies.
Acknowledgements

This research project was not possible without the indispensable help, support and guidance of a number of important people. I like to extend and express my gratitude, acknowledgements and thanks to:

My supervisors, Carolina Castaldi and Isabelle Reymen, for their indispensable support, enthusiasm and encouragements about my project and the possibilities to fulfil its potential; their friendliness, understanding and generous flexibility; and their helpful advice, wisdom and elaborate and high-quality guidance that helped make my work better.

My advisors Anne Verhaag and Wim Renders. Anne, for her advice, time and support from the first day I walked into Brainport Development until a suitable research proposal and beyond. Wim, for his kind help with the specifications of the research proposal, his support to convince the High Tech Software Cluster board and with finding companies to interview, as well as his interest, advice, suggestions, availability and flexibility during the process.

The High Tech Software Cluster board for their cooperation and support and all the participating firms and individuals for their kind cooperation and willingness to share their experiences.

My friends, in particular the friend group of Innovation Sciences, for the friendship, fun and interest during the dinners we have had while we were working on our respective graduation projects.

Lastly and most importantly, my Mum, Dad, Jöbke, Annelie and Sarah for their incredible support, kindness, advice, interest, love and the welcoming home I have been honored to receive.
Collaboration partners

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About the Author

Dirk Janssen (1990) is a master student of the MSc Innovation Sciences at Eindhoven University of Technology. This master involves the study of socio-economic contexts and conditions for technological innovations. Dirk’s personal interests lie with the transitions in regional innovation systems and the future of the knowledge economy. As part of his master Dirk followed extra courses in Technological Entrepreneurship and Management and attended the Katholieke Universiteit Leuven in Belgium for courses on Labor Relations and Human Resource Management. Before his master, Dirk worked as Dutch Youth Representative to the United Nations and attained a BA Social Sciences degree with courses in economics, sociology and political science at University College Maastricht, Maastricht University.
Management Summary

The motivation to conduct a research project about the learning strategies of high tech software firms is a fascination with the requirements new technological and economic developments impose upon firms. In this light, it is reported that learning is becoming more important to keep up with innovation, technology developments and competition in one’s sector (Lundvall, 2009; Stiglitz & Greenwald, 2014; Van Dam, 2013; WRR, 2015).

To investigate whether this also holds true for high tech firm that are central in the current technological transition I decided to research the learning strategies of high tech software firms. High tech software firms are in the midst of the current technological developments relating to the ‘Internet of Things’, ‘Industry 4.0’ and market solutions such as ‘Smart Services’. However, in the literature the learning strategies of such firms remain ill-researched, in particular when they are SME’s and/or member of a regional High Tech Software Cluster. Moreover, the factors that drive the use and necessity of specific learning strategies are also particularly little worked on in the academic literature while such insights can greatly improve where firms have to spent their resources on.

These insights subsequently informed my research question:

“What learning strategies of the learning organization framework do high tech software firms who are part of a regional cluster employ and what are the drivers of these learning strategies?”

The aim of this research is to create more understanding about the levels, types and drivers of the learning strategies used by high tech software firms. These are empirical contributions to the literature and can subsequently inform recommendations for high tech software firms, high tech software clusters, and regional development boards that host such clusters.

The theoretical model used for this had to represent an exhaustive set of learning strategies. This was achieved by building an integrated framework of the learning organization. The more elaborate instruments existent were combined with insights of recent literature, particularly related to the external learning strategies that are required in a learning economy.

The methodology followed firstly included the selection of a diverse range of high tech software firms in order to create the highest possible generalizability of the outcomes. Then data was collected through a survey and semi-structured in-depth interviews with 3 to 5 participants per firm about their learning strategies and their drivers. Public and internal firm documentation was used to triangulate this data. The analysis that was subsequently conducted looked at the level, types and drivers of the learning strategies per firm. Comparisons between firms were made while the contexts inside each firm were taken into account. In these analyses steps were taken to increase and ensure the validity and reliability of the instruments used and analyses conducted.
The results about the level of learning strategies used in the firm indicate that learning strategies are, on average, implemented “to some degree” in the firms (on a scale of strongly absent to strongly present, or 3.4 on a scale of 1 - 5). This comes down to the situation that most firms have implemented some of the prescribed learning strategies of the learning organization, or have implemented them to a large extent, but not in all areas of the organization. As the distribution of firm scores deviates only a little this outcome is largely true for all firms, with lower rated firms and higher scoring firms having implemented learning strategies respectively less and more seriously throughout the organization.

The exception is the best-performing firm that scores a 3.8/Little below “present” overall. They have consistently implemented learning strategies. Learning is seen as essential because “staying ahead makes us interesting for both customers and employees” (boardroom level manager). This center stage position for learning in their firm’s corporate philosophy originated from two inspiring HR-professionals in earlier stages of the firm. They inspired the firm to give attention to the development of internal learning strategies. Their management board has continued this and has now turned its eye on investing in and developing external learning strategies. The exception of this innovating pioneer illustrates that most firms are still on a distance from the sector’s best practice in learning. This means they can still advance and further develop their learning strategies.

The results about the type of learning strategies implemented are also interesting. Firstly, it is observed that the domains that require more formalized development and thus resources are less developed than the more informal ones that do not specifically need this. In other words, low hanging fruit is pursued, and higher hanging fruit isn’t so often. Secondly, for all firms external learning strategies are overall better developed than the internal ones. This is due to the fact that collaborations and learning strategies with particularly the customer are essential in selling and providing a good service, secondment or product. It is also the case that external learning strategies are often more informal and therefore easier to pursue and accomplish. These two type-of-learning-strategies’ issues illustrate that the increase of learning strategies inside one’s firm requires active investment.

The results about the drivers of learning strategies in the high tech software sector are also a contribution to the literature. Firstly, a decreasing firm size is found to drive the use of informal learning strategies and decreases the use of more formal learning strategies. Secondly, the increasing amount of external ownership status is found to increase investments in learning strategies with short term financial gains and decrease the investment in learning strategies with longer term (non-)financial benefits. Thirdly, focus matters in two ways. A more innovative focus drives the use of learning strategies that are focused on innovation and experimentation, whereas a focus on following trends drives the use of learning strategies that are aimed at the absorption of external knowledge. Moreover, a focus on multiple markets drives the use of learning strategies aimed at acquiring multiple types of knowledge, whereas a focus on one niche market drives the use of learning strategies that increase one
type of knowledge. Fourthly, a firm organizational type, i.e. a project, product or secondment focused organization, influences whether learning strategies that increase individual technology-focused learning (secondment) or also collective technology and organizational learning (project and product) are used (Figure A.). Fifthly, both a firm’s culture, i.e. valuing and interested in technology developments only or also in organizational improvements, and a firm’s position in either a value chain or network of equal partners, also influence the need for strategies that foster technological learning only or strategies that foster both technology and organizational learning, such as the increase of social, communication and leadership skills (Figure B). Importantly, in the last two driving factors the increase in technology’s and market solutions’ complexity is reported to force the firms away from and towards a certain behavior, as is illustrated by the red/green colors in Figure A and B (on the next page). This means that learning strategies focused on organizational improvements will become more important for high tech software firm’s competitiveness in the marketplace.

Based on these findings, this research has a number of practical recommendations for high tech software firms, cluster boards and regional development boards. For high tech software firms, the recommendation is to scale up their attention for learning strategies. Specifically, it recommends to make organizational innovation and learning a management priority; to invest in staff with a social background to coordinate the development of learning strategies; and lastly, to improve the learning happening on the work floor by adopting the relevant best practices of other high tech software firms, as can be found in Appendix 9.13.

For the high tech software cluster boards, it is important to note that you can also have a role in stimulating the learning happening in your member firms. It is recommended that you make organizational innovation and learning a priority within your cluster. Indeed, set up a working group to let members and external experts inspire each other by sharing knowledge about learning and how to increase it. If other high tech clusters are faced with the same challenge as high tech software firms, namely that the increasing complexity is asking for more adaptability and thus learning strategies of one’s member firms, the same recommendations apply.

For the regional development boards that host and facilitate high tech software clusters or other high tech clusters that are confronted with similar challenges, the recommendation is to create more awareness about the importance of organizational innovation and learning. It is recommended to investigate the need for specific learning strategies and types of knowledge; to infuse the message that a technological focus alone might not suffice in the future; and to set-up an Organizational Innovation and Learning Academy where multiple clusters, their member firms and invited external parties can increase and share their knowledge in order to be sufficiently adaptable in the future economy.
Figure A: Influence of organizational type on the learning strategies used by a firm

Figure B: Influence of firm's culture and market position on the learning strategies used by a firm
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1. Introduction

1.1. Topic, motivation and relevance

“Learn or lose”. This is reportedly the choice for those who will be impacted by the ‘Fourth Industrial Revolution’, i.e. the rise of cyber-physical systems (Van Dam, 2016). In this industrial revolution, the technology of internet is blended with complex physical systems. Change will be even faster, wider, deeper and impacting complete systems (Schwab, 2016). During this time learning is stated to becoming even more important for firms to keep up with innovation, technology developments and competition in one’s sector (Economist, 2017; Lundvall, 2009; Stiglitz & Greenwald., 2014; Van Dam, 2013; WRR, 2015).

The reason for this is that change alters the way individuals and firms work and impacts upon the knowledge and skill-sets that are required to perform well in the economy (Lundvall, 2006; Lundvall & Johnson, 1994). Learning in firms helps to absorb new insights and acquire new skills and is as such essential to overcome change, competition and labor market scarcity (Lundvall, 2002). Driven by these technological developments the discussions about the ‘learning organizations’ are also (re)started and intensified (Economist, 2017; Stiglitz & Greenwald., 2014; Van Dam, 2013; WRR, 2015).

Personal fascination with the requirements technological transitions impose on firms that produce them motivates me particularly to ask how learning strategies of the learning organization become more important for high tech software firms. High tech software firms, often collaborating in clusters, are in the midst of the new Industrial Revolution, working on Industry 4.0, Internet of Things and Smart Services (Brainport development, 2016a). If the pioneers of the new technologies will be required to adapt, other sectors that aim to involve themselves in it as well will probably face the same challenges. It brought me to wonder:

“What learning strategies of the learning organization framework do high tech software firms who are part of a regional cluster employ and what are the drivers of these learning strategies?”

The implementation of learning has been linked with the future of wealth, welfare and wellbeing of all actors involved (Stiglitz & Greenwald., 2014; Van Dam, 2013; WRR, 2015). Without learning, productivity and performance will go down and profitability and living standards will fall (Economist, 2017; Stiglitz & Greenwald., 2014; Van Dam, 2016). This makes the practical relevance of getting more insight in the incidence and drivers of learning strategies in firms seemingly obvious.

Moreover, the current body of literature also has a number of empirical gaps that are in need of more research. Firstly, there have been no studies analyzing the use of learning strategies by high tech
software firms. This is interesting not only because these firms might indicate what other sectors that want to pioneer too will be faced with. High tech software firm are also special, because they are seen as a mix between business services and high tech manufacturing (Aramand, 2008; Miles, 1993). This is interesting, because innovation related behavior in business services and manufacturing have historically been different (Garriga, von Krogh, & Spaeth, 2013; Makri, Hitt, & Lane, 2010). The high tech software sector combines the two, so the empirical findings about these domains do not necessarily have to apply.

Secondly, the factors that drive and influence the use of a specific type and level of learning strategies in general and in specific for high tech software firms can benefit from more research. The impact of firm size is for instance little researched. When more insight is attained about what drives the need and use of specific variants of learning strategies, it becomes easier for firms to understand in which learning strategies they should spend their scarce resources on given their own context. Moreover, it again also contributes to the understanding in which other sectors learning strategies may become important.

Thirdly, the perceptions of member firms what role their regional cluster should play in promoting learning in its member firms is under-researched. As clusters can be platforms for collaboration and the pooling of skills, knowledge and resources (Jaegersberg & Ure, 2011), clusters can potentially help those member-firms that are not fully equipped themselves to transition into the future economy. New research can show whether and what firms expect of clusters in this area.

These three gaps in the academic body of knowledge indicate that a research about the learning strategies and its drivers in the high tech software sector is also scientifically relevant.

Lastly, for a research to produce useful insights and answers, it requires that the research question is answerable, important, empirical, based on originally defined variables and often also leading to practical applications (Bordens & Abbott, 2008). The choice to conduct an explorative research study about learning strategies and its drivers by researching the high tech software firms of the High Tech Software Cluster (HTSC) in the Brainport Eindhoven Region fulfills all these criteria. This makes this research question also practically feasible.

These reasons altogether make it interesting and useful to research the use and drivers of learning strategies in the high tech software sector. The next sections of the introduction will introduce the basic research set-up and research questions, present the outline of the report and give more background information about the cluster the researched firms are part of.
1.2. Research set-up and research questions

In light of the above, this research will be an explorative case study that focuses on the use and drivers of learning strategies of high tech software firms with the aim to contribute to the literature and provide recommendations for firms, clusters and regional development boards.

The approach taken is to look at 5 firms that are diverse in size and organizational type and who are member of the High Tech Software Cluster in the Brainport region surrounding Eindhoven. It will be an “informatively rich” qualitative case study, based on ±20 interviews and documentation, which is supported by the use of descriptive statistics on survey data. The following research questions are used as its starting point:

Main research question:
“What learning strategies of the learning organization framework do high tech software firms who are part of a regional cluster employ and what are the drivers of these learning strategies?”

The sub-research questions that help answer the main research question are,
Concerning theory:
(1) What is the definition of the learning organization?
(2) What internal and external learning strategies does the learning organization framework suggest?

Concerning empirical data collection, data analysis and data interpretation:
(3) What learning strategies of the learning organization framework are employed by high-tech firms, most notably in the case of the High Tech Software Cluster (HTSC) in the Brainport region?
(4) What are the drivers of these learning strategies?
(5) What practical recommendations and theoretical implications can be given based on the findings about the learning strategies and their drivers?

In addition, the High Tech Software Cluster board requested to investigate the importance the interviewees attached to learning strategies and knowledge management in general. Therefore the following question was asked in the interviews:

(*) How important do high tech software firms find knowledge management and learning?

The general outcomes to this question are presented in Appendix 9.12 and further in-depth analysis can be found in the Results Section 5.3. “Drivers of learning strategies”.
1.3. Outline
The aforementioned research sub-questions 1 and 2 are answered in Chapter 3 “Theoretical Framework”. Research sub-question 3 and 4 are answered in Chapter 5 “Results” and research sub-question 5 is addressed in Chapter 6 “Discussion”.

Furthermore, a literature review about the relevant state of the academic debate is presented in Chapter 2 Literature Review. This has functioned as the input for formulating the research questions. In a separate document “Literature Review” I have reviewed the literature more in-depth. This document is accessible when requested and has functioned as the more all-encompassing state of the debate to which the results in the discussion are contrasted against.

Moreover, all methodological choices are accounted for in Chapter 4 “Methodology”.

Lastly, Chapter 7 “Conclusion” answers the main research question by presenting the most important research findings and the most prominent practical recommendations.

1.4. Case description: High Tech Software Cluster in the Brainport region

The high-tech software firms that are being analyzed are part of the high-tech software cluster (HTSC). This cluster consists of 32 firms in the region of Eindhoven that specialize in software for innovative and complex products, mostly made by the manufacturing industry (Brainport development, 2016b). Software is undergoing rapid advancements and is as such becoming increasingly important for manufacturing (Renders, 2015). In order to increase the time-to-market and time-to-value and deal with the ever-increasing complexity the high-tech software companies decided to join forces in 2014 and form the high-tech software cluster (HTSC, 2016; Renders, 2015).

The cluster firms currently work together in four different areas: technological development and collaboration, internationalization, branding, and the labor market (Brainport development, 2016a; Renders, 2015). For the technological development and collaboration, interested firms have mapped their respective expertise, are working on a shared technological roadmap and some collaborations for new product development have started (HTSC Werkgroep Technologie & Samenwerking, 2016). Internationalization is promoted, amongst others, by jointly attending and presenting the cluster on international technology fairs, like the Hannover Messe. Moreover, they have mapped and contacted the most promising international regional partners (HTSC Werkgroep thema Internationalisering, 2016). Branding of the cluster as a whole and the individual members is increased by the setup of the website and the organization of workshops on the most prominent conferences in the field, such as Bits & Chips (HTSC Werkgroep Zichtbaarheid, 2016). Lastly, in 2016 a fourth working group has
started on the labor market and measures that are needed to maintain the necessary flow of new employees for the HTSC companies.

The cluster is closely linked with the rest of the Brainport Eindhoven Region, a region known for its focus on high-tech systems and design (OECD, 2013a, 2013b). Companies, knowledge institutes, government agencies and now even citizens and end-users work together to innovate (Brainport development, 2012). The HTSC cluster management is executed by the regional development agency Brainport Development (Brainport development, 2016a). Brainport development works to ensure the right conditions for innovation in the domains of “people”, “technology”, “business”, “basics”, and “governance” (Brainport development, 2012). The measures taken in the area of “people” mainly focus on attracting and retaining (international) knowledge workers (Brainport development, 2011a). To complement its expertise, the Brainport region also collaborates with the high-tech regions of Leuven (Belgium) and Aachen (Germany) in the so-called ELAT-collaboration or “Eindhoven-Leuven-Aachen triangle” (Brainport development, 2011b; ELAT, 2008; Elat Project Coordination, n.d.; Leuven Research & Development, 2011; Van Lier, 2011).

Figure 1: HTSC in the Brainport Region, The Netherlands.
2. Literature review

2.1. A Change in Innovation Processes

After the first criticisms had started by Lundvall & Johnson (1994) more than two decades ago, the idea of the knowledge economy as the right structure for an innovative economy is currently being questioned in both the policy and academic domain. The knowledge economy assumes that codified knowledge, produced by fundamental research and corporate research and development, is the only starting point of innovation (Cohendet & Meyer-Krahmer, 2005). The reasoning behind the position that this is not anymore the right institutional perspective rests on the claim that innovation processes have changed in fundamental ways (Lundvall, 2002, 2006; Lundvall & Johnson, 1994; Stiglitz & Greenwald., 2014; WRR, 2015) and that therefore the institutional set-up of the economic system has to change as well.

Innovation processes have, firstly, changed in the way that it is not often so that codified knowledge, coming from fundamental research, brings innovation (Cohendet; Meyer-Krahmer, 2005). Many of the innovations occurring are actually a product of creative efforts coming from tacit – in short, not articulated, and not easily accessible – knowledge that resides as experience and know-how in individuals or as collective procedural routines in groups (Lam, 2000; Lundvall, 2006). Moreover, even if knowledge is actually formulated explicitly and is publicly available – which is increasingly the case due to the internet and other information and communication technology (ICT) - the help of a human expert is often still necessary. Her experience, memory and intuition are needed to find and select the necessary information within the overwhelming amount of available information (Lundvall, 2006).

Secondly, innovativeness of firms is not anymore a derivative of knowledge production, but from its knowledge absorption capacity and adaptiveness (WRR, 2015). The reason for this is that, under the influence of ICT, the speed of change has accelerated (Lundvall, 2006). If products and services are increasingly quickly becoming outdated, the only way to survive and stay competitive is when one can adapt to and absorb new trends, technologies and customer needs. Not knowledge production but the capacity to keep up with the new trends and combine or apply them in new ways is what determines, more than before, whether one maintains a strong position in the market. Indeed, it is learning and absorbing existing knowledge rather than producing it that keeps individuals and organizations innovative (Lundvall, 2006; WRR, 2015).

Thirdly, innovation does not only spring from R&D, but can originate anywhere in the innovation process. Although already in the 80’s it was noticed that feedback loops of information were essential (Von Hippel, 1988), it now becomes clear that “the one-way road from new scientific results to the
new product is the exception rather than the rule” (Lundvall, 2006, p. 10). Instead, more than before, innovation can be instigated by any actor involved – marketers, salesmen, suppliers, even customers. This has two implications: firstly, innovation more than ever takes place within a network; and secondly, innovation is not only limited to product or process innovation, but also includes service and business model innovation (WRR, 2015). The fact that innovations can be created by any actor in the network increases the importance of circulating knowledge in the innovation network (Stiglitz & Greenwald., 2014; WRR, 2015).

2.2. The Learning Organization's purpose and domains

Prior to the general discussions how best to design a (regional) economy in light of new innovation processes, the idea that firms can benefit from being learning organizations took stage as a response to the same pressures. It was Peter Senge in 1990 that first stressed the importance of organizations learning from their experience and the subsequent wisdom of its personnel. This included not only receiving their insights, but also generating new ones by processing and combining them to create something new. Indeed, “the learning organization is an organization that possesses not only inductive capacity but also a generative one – that is the ability to create alternative future” (Senge, 1990, p. 17).

As such, the purpose of the learning organization can be said to enable the firm to adapt, develop and innovate (Martensen & Dahlgaard, 1999) and deal with the challenge of organizational renewal (Ferguson-Amores, 2005). When a firm has not yet consciously adapted its practices to be a learning organization, the model can help evaluate a firm’s strategy along the dimension of whether or not it promotes learning (Mohanty & Deshmukh, 1999).

Since Senge (1990), the core practices of the learning organization, namely gathering information and transforming this into collective knowledge, have stayed in place. Additionally, elements have been added to the notion of the learning organization. Most prominently the systematic connection to the external environment has been added, for instance by scanning for information (Jensen, 2005). Separately from Peter Senge’s learning organization, Cohen and Levinthal (1990) had already pointed out that “outside sources of knowledge are often critical to the innovation process, whatever the organizational level at which the innovating unit is defined” (p.128). This is including the level of business departments where one business unit is the innovating department, and external departments such as the marketing unit can contribute valuable knowledge as well. Cohen and Levinthal take it a step further and conclude that “the ability to exploit external knowledge is thus a critical component of innovative capabilities” (p.128) and later scholars agreed with this conclusion (Meeus, Oerlemans,
Cohen and Levinthal called the ability to exploit external knowledge in the firm “absorptive capacity”. This idea led to the inclusion of a number of internal and external practices learning organizations undertake to increase their learning. (More information about the link between the absorptive capacity literature and the learning organization literature can be read in the separate document “Literature Review – Chapter 5 ‘Links with other sub-fields’).

For the specific features of the learning organization, a discussion about its exact features as well as the accountability for the composition of the integrated framework used in this research can be found in “Chapter 3 Theoretical Framework”. However, after an extensive review of literature Ji Hoon Song and Chermack (2008) have identified five commonalities in the varying definitions of the learning organization (until 2008). They state that firms that are learning organizations have A) a conducive learning environment; B) a continuous learning process; C) a system-orientation; D) an environment where learning can be done by oneself; and E) an orientation towards higher performance. These five factors come back in every learning organization theory (Ji Hoon Song & Chermack, 2008).

In terms of the domains in which these five factors are important, a range of domains is found when reviewing the literature about exact elements of the learning organization, as is done in Chapter 4 Theoretical Framework for the creation of the theoretical framework. It is found that internal learning strategy domains include the clarity of purpose and mission, leadership commitment and empowerment, organizational structure, quality management, human resource management, transfer of knowledge, compensation and budgeting systems and experimentation. The external learning strategy domains include collaboration with customers and end-users, subcontractors and suppliers, knowledge institutes and universities, consultants and firms in the same sector (Arundel, Lorenz, Lundvall, & Valeyre, 2007; Cohen & Levinthal, 1990; Goh & Richards, 1997; Lund, 2004; Lundvall, 2006; Stiglitz & Greenwald., 2014; WRR, 2015).

Figure 2: The learning organization - categories of actions and subsequent effects
2.3. Drivers of Learning and Learning Strategies

There exists various factors that drive firms to establish learning practices, informally or formally through learning strategies. As Goh and Richards (1997) have said “learning is a collective activity that takes place under certain conditions or circumstances” (p.577). Hence below I discuss five factors that are identified through the literature review as driving the need and occurrence of learning and learning strategies.

Organizational culture
A first factor is a firm’s organizational culture, especially a culture of high expectations in combination with the tendency to look for internal causes for failures and the ability to change organizational practices (Bingham & Haleblian, 2012). Comparing with a better performing group (or mental standard) results in putting more effort into reaching a high performing average (Massini, Lewin, & Greve, 2005). Bingham and Haleblian (2012) point out that it is important that the firm believes at least part of the cause of the below-average performance is internal. When a firm is then also able to change its organizational practices, more learning strategies will be put into place with the result that more learning occurs. Moreover, the firm’s maturity might play a role as well; Baldwin et. al. (1997) have found that learning strategies are different for every ‘evolutionary phase’ of large industrial organizations. In addition, Fard et. al. (2009) found that - in an Iranian context – a culture of participation and a learning-oriented working floor increase the likelihood that an organization practices learning organization strategies. Furthermore Prugsamatz (2010) has found that the organizational learning culture is also very important for learning in an Thai nonprofit context. While generalizability of the Fard et. al. (2009) and Prugsamatz (2010) studies is limited due to its non-Western context, Martensen & Dahlgaard (1999) have found that also in a Western context a firm’s organizational learning culture is found to be an important criterion for establishing a successful learning organization.

Business and innovation strategies
Secondly, the business and innovation strategies that firms choose matter too. Firstly, it is found that a differentiation strategy – focusing on adding a unique added value – fosters a learning orientation more than a cost leadership strategy in which the firm strives to offer the product for the lowest price (Kharabsheh, Jarrar, & Simeonova, 2015). Moreover, the innovation focus matters too: innovating products or innovating processes (Cavaliere & Sarti, 2011). Product innovation depends more strongly on a base of prior organizational knowledge and learning by human capital, either through human resource development or the recruitment of new staff. Process innovation builds more strongly on learning by external networking, e.g. universities, research institutes and other companies and groups, and learning through competitive functioning (which basically means the interaction with
customers, suppliers and competitors). Learning strategies that help with the selected innovation focus will be more important for that firm (Cavaliere & Sarti, 2011).

*Path dependency*

A third factor that explains the behavior of firms with regards to learning strategies is path dependency. Basically, path dependency comes down to the fact that learning strategies that exploit the historically existing knowledge base of the firm are favored above explorative learning strategies (Sirén, Kohtamäki, & Kuckertz, 2012). The reasoning for this is that “firms search in close proximity to their existing knowledge base” and this subsequently “provides opportunities and sets constraints for further improvement” (Boschma, 2005, p. 63). As all firms start off with different knowledge bases, each firm follows a different path. Interestingly, Cohen and Levinthal (1990) already indicated with their work on absorptive capacity that learning is an inherent path-dependent process, in the sense that firms cannot learn knowledge for which they have not built up a relevant absorptive capacity. Moreover, Siren et. al. (2012) indicate that such path-dependent behavior has its risks: it represents an ‘exploitation trap’ in the sense that firms that do not consciously think through their learning strategy will end up investing more in exploiting than exploring, threatening the survival of the firm. They have quantitatively found this exploitation-favoring effect in 206 Finnish software firms. This exploitation trap shows that the effect of path-dependency is very real. However, a more explorative learning strategy that helps to gather new valuable knowledge in other areas is still possible to stay relevant in the future economy.

*Sector dynamics*

Fourthly, sector characteristics are an important circumstance influencing whether learning is important to survive and if so, what learning strategies matter most. For instance, whether the market is an innovating market, what competitors do and how complex successful innovations are influences the need and level of (interactive) learning (Bierly & Hämeläinen, 1995; Meeus et al., 2001). More complex innovations require more inter-firm collaborations, and urges firms therefore to cooperate and learn from these external collaborations (Meeus et al., 2001). That firms rarely innovate by themselves anymore is confirmed empirically (Lundvall, 2006). Moreover, when competition in a sector expands to become more global, it becomes more important to keep up and distinguish oneself from other competitors and for that learning is very important too (Baldwin et al., 1997).

*Technological dynamics*

Fifthly, the sectoral technology dynamics are also important. The more complex the technologies in a sector, the harder it is for one firm alone to master them by themselves and as a consequence more external learning strategies have to be implemented (Meeus et al., 2001). One of the reasons that technologies get more complex is that there is a “general trend towards a more composite knowledge base where a new product typically combines many technologies and each technology is rooted in
several different scientific disciplines” (Lundvall, 2006, p. 6). Moreover, when the technologies develop rapidly learning strategies that help to absorb such technological developments become more important (Lundvall, 2006). It is especially “the widened use of ICT that speeds up change and the acceleration makes it less meaningful and attractive to engage in the development of codification and information systems” (Lundvall, 2006, p. 3). Indeed, ICT “has given cheap and worldwide access to some types of information” and “has also offered new tools for handling information, and for advancing processes of knowledge creation and innovation”; (Lundvall, 2006, p. 1). The consequence of this accelerated rate of change is that the “capability to learn becomes more important than given sets of specific capabilities” (Lundvall, 2006, p. 1). Thus, in those sectors where the speed of change is high organizational learning and learning strategies will be more likely to be important.

![Figure 3: Drivers of learning and the need for learning strategies recognized in the literature](image)

### 2.4. The Learning Organization’s link with other sub-fields

The learning organization’s learning strategies spring from various origins (Lundvall, 2006). Having reviewed the literature about innovation, knowledge and human resource management and its links with the learning organization has given a general conclusion: all domains are deeply entwined in the sense that they have a high number of overlapping practices and represent the roots of the learning organization framework. Indeed, the three fields have provided input for the formation of particular learning strategies of the learning organization. Moreover, this has happened throughout the development of the concept, and as the fields developed themselves. As there are such strong links, and the learning organization incorporates all three fields, (Lundvall, 2006) has stated that “the
distinction between HRM, knowledge management and management of innovation as different analytical fields and as the responsibility of distinct professions may therefore be worth to reconsider” (p. 18).

However, as only those practices of the innovation management and human resource management fields that stimulate learning are selected for the learning organization framework, a complete submission of these is not indicated in Figure 4 below. In the case of knowledge management, there exists an argumented case for the view that the learning organization is indeed a version of knowledge management (Chinowsky, Molenaar, & Bastias, 2007; Mohanty & Deshmukh, 1999). It is quite convincingly argued that the learning organization is not only selecting a number of knowledge management practices only, it is seen as an advanced state of knowledge management. This means that older versions of knowledge management are no longer relevant in the current economy. Following this, the learning organization field is indicated in Figure 4 as replacing the knowledge management stream.

Additionally to the contributions of these fields, the learning organization literature has also triggered similar discussions about the form and purpose of a region and national economy. As Figure 4 shows, the learning organization literature gave input and triggered these discussions, but these new discussions also provided input for new forms of the learning organization. They particularly brought more emphasis for the external learning strategies into the learning organization literature.

![Diagram: Academic fields' input for each other](image)

**Figure 4:** Academic fields’ input for each other where ‘input over time’ is indicated by an arrow.
2.5. Learning organization’s empirical existence in various contexts

Besides a large amount of studies on the learning organization as a theoretical concept and how to measure it, there is also research that looks as the extent to which organizational learning and specifically the learning organizations exist in general and in specific contexts. These studies are discussed here. As an important note upfront: in the case of Arundel et. al. (2007) it is not solely the learning organization framework that is being tested on its empirical existence and its empirical facts, but also the highly equivalent concepts as ‘the operating adhocracy’ or ‘discretionary learning’.

**General existence**

Even though the organizational learning of most firms is not measured (Brotherton, 2011), for the firms that are studied a large variety of organizational learning levels is found (Moilanen, 2005). Interestingly, overall the found variety of organizational learning across organizations is larger than a variety of individual employee learning (Moilanen, 2005). This means that any firm can gain a lot from learning from its best competitors (Stiglitz & Greenwald., 2014).

An indication of the ratio between high, medium and low level learning organizations is found by (Lundvall & Nielsen, 2007). In their research, they found that 27% of all Danish firms with more than 25 employees qualify as a high level learning organization, 44% as a medium level learning organization and 28% as a low level learning organization. The allocated level is determined by the amount of a total of 14 learning organization practices a firm implements: it is low, when 0-4 practices are implemented; medium when 5 – 8 practices are implemented; and high when 9 – 14 practices are implemented (Lundvall & Nielsen, 2007). This research has stated something about the situation in Denmark, is perhaps generalizable to other Scandinavian/West-European countries, but it is obviously too little information to generalize it to the rest of Europe.

Fortunately, Arundel et. al. (2007) and their research can give us more insight about the empirical existence of the learning organization in Europe. They found that ±40% of European firms are discretionary learning organizations that are capable of more radical innovations. Another ± 30% is an organization that is more focused on incremental innovations and improvements in lean routines. The last 30% of organizations in Europe is generally not focused on learning, but characterizes itself by a Taylorist (factory) work organization or a traditional (small shop) work organization. The ratio of learning organizations varies quite widely across European countries: from one extreme in the research, 60% in The Netherlands, to the median 40% in Belgium and the minimum 20% in Greece.
Existence in certain contexts

The existence of learning organizations is common in sectors where there is rapid technological change (Lundvall, 2009). This is because codification – the recording of already acquired knowledge - is only helpful when the environment is relatively stable and one wants to transfer the knowledge to other employees that will work in the same environment. When the environment changes more rapidly, learning is increasingly important for a firm. This is particularly the case with newly acquired tacit knowledge that have to transferred into the rest of the organization (Lundvall, 2009). A sector that is mentioned a lot in this respect, because of its rapid change, is the ICT/software sector (Lundvall, 2009). As this research is concerned with high-tech software firms that are often SMEs and are organized in a cluster, we now turn to these three contexts to look at empirical findings existent.

Research gaps

Firstly, there have been a number of studies looking at organizational learning in software firms. Siren et. al. (2012) has looked at the existence of path-dependency and exploitation-favored behavior (‘the exploitation trap’) in 206 Finnish software firms. Salmi & Torkkeli (2010) have used a software company as a case to look at the antecedents of absorptive capacity in exploitation and exploration alliances. And Wie and Xie (2008) have looked at a cluster of software firms and how their knowledge management processes impact on innovation. However, these studies have not specifically looked at the predominance of the learning organization, nor at the situation of high-tech software firms.

Secondly, there have been a limited number of studies on the learning organizations existence in small and medium-size enterprises. The only specific study is the quantitative study by Lundvall (2006) which concludes that “among firms with less than 50 employees, only one out of five firms have developed a learning organization at the high level, while the same is true for every second of the bigger firms” (p.16). This study has taught us that “with growing firm size, the share of highly developed firms increases” (p.16), but qualitative insights into what drives smaller firms to to be a learning organization less often are not known. This while Bouncken, Pesch and Kraus (2015) have shown that SMEs have to be extra careful in their innovation and innovation timing into a new market and Bouncken et. al. (2015) state that SMEs can take advantage of pioneering strategies. Therefore we can conclude that the reasons behind and use of the learning organization in small and medium-size enterprises can benefit from an increase in (qualitative) research.

Thirdly, the role of regional clusters in establishing learning organizations and enhancing innovation can also benefit from more studies (Ron Boschma, 2016). Regional clusters are defined in the literature as geographically co-located firms and their ecosystem, including suppliers, service providers, knowledge institutes and governmental bodies, that through inter-organizational knowledge and business linkages create (financial) value for the stakeholders involved (Jaegersberg & Ure, 2011;
In other words, regional clusters are collaboration-based communities that attempt to align interests and resources for a common goal in the marketplace (Jaegersberg & Ure, 2011). Moreover, clusters are generally characterized by the fact that the sector-relevant knowledge is diffusely distributed, complicated and actively protected (Ryan & Phillips, 2004).

Regional clusters are believed to be central to regional development (Jaegersberg & Ure, 2011). This is mainly due to the fact that its geographical proximity brings about other types of proximity, such as cognitive proximity, which altogether help establish uncertainty reduction, coordination and control (Ron Boschma, 2005). Additionally, capturing knowledge spillovers of firms in the region is more easy (Ryan & Phillips, 2004). Moreover, “firms can use resources more effectively, lower costs, and enhance competitiveness” (Lai, Hsu, Lin, Chen, & Lin, 2014, p. 738). Lastly, a firm also gets more visibility and access to other actors in the business ecosystem, such as governments, when it is part of a cluster (Jaegersberg & Ure, 2011; Lai et al., 2014). In sum, clusters are seen as beneficial for the competitive advantage of firms and regions (Lima & Carpinetti, 2012).

However, it is also known that the literature about clusters’ role in promoting learning is limited, especially the practical recommendations given to cluster managers (Ketels, 2013). Cluster-based human resource management has been given some attention in the form of shared talent management (Chabault, Hulin, & Soparnot, 2012). Knowledge management has also received attention as an area of cluster management (Lai et al., 2014; Lima & Carpinetti, 2012; Perez-Soltero, Barcelo-Valenzuela, Castillo-Navarro, & Leon-Duarte, 2009; Ryan & Phillips, 2004; Zanzouri & Pluchart, 2009). However, the role of clusters in facilitating the implementation of the learning strategies is not yet discussed, while it is said it can increase the quality of their knowledge management (Ryan & Phillips, 2004), enhance organizational learning and creativity (Zanzouri & Pluchart, 2009) and innovation performance (Lai et al., 2014).

Lastly, the opinions of firms on the importance, use and implementation of the learning strategies of the learning organization is not sufficiently researched (Stiglitz & Greenwald., 2014).

![Figure 5: Literature gaps in the literature about the learning organization](image-url)
3. Theoretical Framework

This section describes the specific theoretical framework of the learning organization that will be used in this research project. In it, answers will be given to sub-research questions 1 and 2:

**RQ1:** What is the definition of the learning organization?

**RQ2:** What internal and external learning strategies does the learning organization framework suggest?

3.1. The Learning Organization

To situate the learning organization as a model of organizational learning and to understand better what it aims to do, it is important to understand what determines models of organizational learning in general and what other type of models there are. This is firstly shortly discussed in this section based on the work of Lam (2000). It is then followed by the explanation of the learning organization itself.

A model for organizational learning is particularly determined by what type of knowledge it intends to increase. There are four different types of knowledge, as Table 1 shows. Firstly, there is ‘embrained knowledge’ when explicit knowledge resides on an individual level. This knowledge is based on an “individual’s conceptual skills and cognitive abilities, and is formal, abstract or theoretical” (p.490). Secondly, when an individual possesses tacit knowledge there is a form of ‘embodied knowledge’. This type is a “practical and action-oriented type of knowledge that comes from doing and experience” (p.490). Thirdly, ‘encoded knowledge’ exists when an organization possesses explicit knowledge. This is the case when there is knowledge that is “conveyed in signs and symbols and can be codified and stored” (p.491). Fourthly, ‘embedded knowledge’ exists in organizations with a lot of tacit knowledge. This knowledge has the form of organizational routines and shared norms. Complex processes and interactions can be supported and guided by these in the absence of explicit, written, rules.

<table>
<thead>
<tr>
<th>Ontological dimension</th>
<th>Individual</th>
<th>Collective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epistemological dimension</td>
<td>Embrained knowledge: based on individuals’ conceptual skills and cognitive abilities, and is formal, abstract, or theoretical (scientific) knowledge</td>
<td>Encoded knowledge: ‘information’, as in knowledge that is conveyed by signs and symbols and can be codified and stored</td>
</tr>
<tr>
<td>Tacit</td>
<td>Embodied knowledge: a practical and individual, action-oriented type of knowledge that comes from doing and experience</td>
<td>Embedded knowledge: collective form of tacit knowledge residing in organizational routines and shared norms, that is capable of supporting complex patterns of interaction in the absence of written rules</td>
</tr>
</tbody>
</table>

Table 1: Four knowledge types by combining level and type of knowledge based on Lam (2000).
As Lam (2000) points out: “there is an interactive relationship between dominant knowledge types and organizational forms” (p. 488). And although “all organizations contain a mixture of knowledge types” (p. 493), certain organizational designs go hand in hand with particular types of knowledge that are dominant in an organization. Table 2 gives the overview of this relationship. Table 3 gives a summary of the two most important characteristics of each of these models of organizational learning.

<table>
<thead>
<tr>
<th>Knowledge form:</th>
<th>Professional bureaucracy</th>
<th>Machine bureaucracy</th>
<th>The learning organization’ / operating adhocracy / discretionary learning</th>
<th>The Japanese style ‘lean organization’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embraided knowledge</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encoded knowledge</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Embodied knowledge</td>
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<td></td>
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<tr>
<td>Embedded knowledge</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Table 2: Relationship between knowledge form and organizational design based on Lam (2000).

What Table 2 shows, firstly, is that embrained knowledge (individual – explicit) is central and nurtured in a ‘professional bureaucracy’ organization. There, the individual employees are the primary knowledge agents in the role of ‘experts in their field’. Interestingly, they generally do not overlap in their expertise and the organization is therefore also “individualistic, functionally segmented and hierarchical” (p.495). Indeed, they therefore rarely work together and the “learning focus of a professional bureaucracy tends to be narrow and constrained within the boundary of formal specialist knowledge” (p.495). The nature of their expertise is of an analytical, rather than an operational, form, which allows for standardization of knowledge and work. It also implies that “tacit knowledge is circumscribed and contained and plays a limited role” (p.495).

Secondly, encoded knowledge (organization – explicit) is the dominant knowledge type in a ‘machine bureaucracy’. This organizational learning model pivots around explicit work procedures, such as sharp division of tasks and controlled, specialized and standardized knowledge and work routines in order to reduce the uncertainty in operating tasks. The organization does this through “a continuous effort to formalize operating skills and experience into objective knowledge through codification” (p.495). The knowledge agents in this organization are not the individual employees, however, but the collective of “formal managerial hierarchy responsible for formulating the written rules, procedures and performance standards” (p.495).
Thirdly, the Japanese style ‘lean organization’ is built on embedded knowledge (organization – tacit). In this organization, learning is embedded in the “operating routines, team relationships and shared culture” (p.497). The key knowledge agents is the semi-autonomous team, which can on the one hand be described as organically organized, while it on the other hand is still tied into a larger hierarchical structure. Standardization of knowledge and work is low, as new team challenges appear. Learning occurs through shared work experiences and joint problem solving, and this mostly benefits incremental innovation.

<table>
<thead>
<tr>
<th>Knowledge agent (in terms of autonomy and control)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standardization of knowledge and work</strong></td>
</tr>
<tr>
<td><strong>Individual</strong></td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Professional bureaucracy</td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>The learning organization or operating adhocracy</td>
</tr>
<tr>
<td>or ‘discretionary learning’</td>
</tr>
<tr>
<td>Collective</td>
</tr>
<tr>
<td>Machine bureaucracy</td>
</tr>
<tr>
<td>The Japanese-style ‘lean organization’</td>
</tr>
</tbody>
</table>

Table 3: Characteristics of the various models of organizational learning based on Lam (2000).

Fourthly, the ‘learning organization or the operating adhocracy/discretionary learning’ is built on and stimulates embodied knowledge (individual – tacit) in the organization. As it is a very organic and non-hierarchical organizational form, its capability is mostly derived from the “diverse know-how and practical problem-solving skills embodied in the individual experts” (p.496). They are very autonomous in their work and as such they are also its principal knowledge agents. Learning happens on multiple levels in the organization when tacit knowledge is generated through experimentation and interactive problem solving in shifting compositions of teams. The learning organization is well known for being good in producing more radical innovations.

As economic circumstances and challenges constantly change for firms and the rate of innovation accelerates (WRR, 2015), it is argued that the ‘operating adhocracy’, also known as the ‘discretionary learning organization’ (Arundel, Lorenz, Lundvall, & Valeyre, 2007) is the currently most fitting model for organizational learning (Lundvall, 2006; Stiglitz & Greenwald., 2014; WRR, 2015).

This is firstly the case, because bureaucracies are not designed to deal with such rapid change. As Lundvall (2006) explains: “In a rapidly changing environment it takes too long to respond when the information obtained at the lower levels has to be transmitted to the top and back down to the bottom of the pyramid” (p. 9). Bureaucracies and their corresponding hierarchy, standardization of knowledge and work and focus on explicit knowledge are therefore not the proper model for organizational for in this day and age. Instead, “it is tacit knowledge that is essential for sustaining firm’s competitiveness and its role in technological innovation and organizational learning” ((Nonaka & Takeuchi, 1995; David Teece, Pisano, & Shuen, 1997; Winter, 1987) and others in Lam, 2000, p.487).
Secondly, in order to stay competitive in such a changing economic environment, firms have to innovate themselves and for this the operating adhocracy or discretionary learning model works best. In that organizational learning model individual employees are most empowered to innovate themselves and to innovate radically. Indeed, it is this new form of learning organization which “tend to support competence building through ‘learning by doing’ and ‘learning by interacting’ that enhances the capability to pursue product or service innovation” (Lundvall, 2006, p. 9).

For becoming such a learning organization, firms should design their organization and work systems differently. Broadly speaking, these systems can be categorized into “internal and external” strategies (Cohen and Levinthal, 1990, p.128/p.131-132), also known as “intra- and inter-organizational processes” (Lundvall, 2006, p.11-12).

### 3.2. Internal and External Learning Strategies

To create a theoretical framework of the learning organization that includes an exhaustive set of internal and external learning strategies the choice was made to integrate various existing models and instruments. This was done based because existing measurement instruments either lacked operationalization or were incomplete, missing elements that were indispensable, such as for instance external learning strategies (Tohidi & Jabbari, 2012). In the literature review about the measurement of the learning organization, Goh and Richards (1997) were found to be the most complete model, including an operationalized and validated instrument, of internal learning strategies. External learning strategies were found in a number of highly cited and prominent articles and books that also conducted their own comprehensive literature reviews about the learning organization in a learning region and learning economy. As such, these publications cover many more articles and publications than mentioned here. For an impression, see the *-notes underneath Table 4 and 5. The articles that were eventually selected to build the complete learning organization framework on are: (Arundel et al., 2007; Cohen & Levinthal, 1990; Goh & Richards, 1997; Lund, 2004; Lundvall, 2006; Stiglitz & Greenwald., 2014; WRR, 2015). In line with these readings, the learning strategies in the framework all promote the circulation and absorption of knowledge inside the firm. For elaborate insights about why I have included the learning strategies below in the theoretical framework, see Appendix 9.4.
<table>
<thead>
<tr>
<th>Domain</th>
<th>Perspective of the learning organization</th>
<th>Characteristic of the learning organization</th>
<th>Mentioned by these author(s):</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal learning (I):</strong></td>
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<td></td>
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<tr>
<td>a) Clarity of purpose and mission</td>
<td>A shared vision of the future desired state creates tension that leads to learning</td>
<td>Widespread support and acceptance of the organization’s mission statement</td>
<td>(Goh &amp; Richards, 1997), (Goh &amp; Richards, 1997), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>IA 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Understanding of how the mission is to be achieved</td>
<td>(Goh &amp; Richards, 1997), (Goh &amp; Richards, 1997), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>IA 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The mission identified values for employees to care about and conform to</td>
<td>(Goh &amp; Richards, 1997), (Lund, 2004), (WRR, 2015)</td>
<td>IA 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Existence of opportunities for self-assessment by the employee with respect to goals attainment</td>
<td>(Goh &amp; Richards, 1997), (Goh &amp; Richards, 1997), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>IA 4</td>
</tr>
<tr>
<td>b) Leadership commitment and empowerment</td>
<td>Leadership commitment to learning is important in fostering a learning climate</td>
<td>Senior managers have positive attitudes towards change and are open to new ideas</td>
<td>(Goh &amp; Richards, 1997), (Goh &amp; Richards, 1997), (WRR, 2015)</td>
<td>IB 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Senior managers and employees share a common vision of what the work should achieve</td>
<td>(Goh &amp; Richards, 1997), (Goh &amp; Richards, 1997), (WRR, 2015)</td>
<td>IB 6</td>
</tr>
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<td></td>
<td></td>
<td>Managers in the organization accept criticism without becoming overly defensive</td>
<td>(Goh &amp; Richards, 1997), (Goh &amp; Richards, 1997), (WRR, 2015)</td>
<td>IB 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Managers in the organization provide useful feedback that helps identify potential problems and opportunities</td>
<td>(Goh &amp; Richards, 1997), (Goh &amp; Richards, 1997), (WRR, 2015)</td>
<td>IB 8</td>
</tr>
<tr>
<td>c) Organizational structure</td>
<td>Create an organic and integrative organization with a focus on internal functional flexibility and group-problem solving</td>
<td>There are multidisciplinary teams</td>
<td>(Lundvall, 2006), (Lund, 2004), (Goh &amp; Richards, 1997), (Lam, 2000), (Cohen &amp; Levinthal, 1990), (WRR, 2015)</td>
<td>IC 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employees with different roles take over tasks of each other</td>
<td>(Lundvall, 2006), (Lund, 2004), (Goh &amp; Richards, 1997), (Lam, 2000), (Cohen &amp; Levinthal, 1990), (WRR, 2015)</td>
<td>IC 11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Different project teams and departments talk and interact with each other</td>
<td>(Lundvall, 2006), (Lund, 2004), (Lam, 2000), (Cohen &amp; Levinthal, 1990), (WRR, 2015)</td>
<td>IC 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Responsibility is delegated to employees</td>
<td>(Lundvall, 2006), (Goh &amp; Richards, 1997), (Lam, 2000), (WRR, 2015)</td>
<td>IC 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teams are allowed to direct their work to a significant degree</td>
<td>(Lundvall, 2006), (Goh &amp; Richards, 1997), (Lam, 2000), (WRR, 2015)</td>
<td>IC 14</td>
</tr>
<tr>
<td>d) Quality management</td>
<td>Focus on engaging employees and making a system of monitoring performance</td>
<td>Small groups of employees regularly check the quality of the product or service</td>
<td>(Lundvall, 2006), (Lam, 2000), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>ID 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is a system for the collection of employee’s proposals and ideas</td>
<td>(Lundvall, 2006), (Lund, 2004), (Lam, 2000), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>ID 16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The firm has metrics to monitor performance and learning</td>
<td>(Lundvall, 2006), (Lam, 2000), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>ID 17</td>
</tr>
<tr>
<td>e) Human Resource Development</td>
<td>Focus on increasing competences</td>
<td>There are education activities that build competences that the firm needs</td>
<td>(Lundvall, 2006), (Lund, 2004), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>IE 18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is a long term educational planning for employees</td>
<td>(Lundvall, 2006), (Lund, 2004), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>IE 19</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>There is substantial on-the job-learning happening</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>23</td>
<td>Teams are composed in order to increase its diversity in terms of gender, age, culture, education background and professional experience.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>IE 20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>(WRR, 2015)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>IE 21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Transfer of knowledge</td>
<td>Transfer knowledge across departmental boundaries and from the external environmental into the firm</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>28</td>
<td>Employees have (informal) opportunities to talk to other staff about successful programs in order to understand why they succeed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>(Goh &amp; Richards, 1997), (Lam, 2000), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>30</td>
<td>IF 22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Failures are constructively discussed in the organization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>(Goh &amp; Richards, 1997), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>IF 23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>New work processes that may be useful to the organization as a whole are usually shared with all employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>(Goh &amp; Richards, 1997), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015) (Arundel et al., 2007)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>IF 24</td>
<td></td>
<td></td>
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<tr>
<td>37</td>
<td>There is a system that allows the organization to learn successful practices from other organizations</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>38</td>
<td>(Goh &amp; Richards, 1997), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015) (Arundel et al., 2007)</td>
<td></td>
<td></td>
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<tr>
<td>39</td>
<td>IF 25</td>
<td></td>
<td></td>
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<tr>
<td>40</td>
<td>Job rotations are done and with a strategic intent and effect in mind</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>41</td>
<td>(WRR, 2015), (Cohen &amp; Levinthal, 1990) (Stiglitz &amp; Greenwald, 2014)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>IF 26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Compensation and budgeting systems</td>
<td>Focus on incentives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Wages are based on qualifications and functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>(Lundvall, 2006), (Stiglitz &amp; Greenwald, 2014)</td>
<td></td>
<td></td>
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<tr>
<td>45</td>
<td>IG 27</td>
<td></td>
<td></td>
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<tr>
<td>46</td>
<td>Wages are based on results</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>(Lundvall, 2006), (Goh &amp; Richards, 1997), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>IG 28</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>49</td>
<td>Innovation and risk-taking is rewarded</td>
<td></td>
<td></td>
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<tr>
<td>50</td>
<td>(Goh &amp; Richards, 1997), (Stiglitz &amp; Greenwald, 2014)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>IG 29</td>
<td></td>
<td></td>
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<tr>
<td>52</td>
<td>Budget systems are designed so that they challenge the need for doing things “because we have always done them”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>(Goh &amp; Richards, 1997), (Stiglitz &amp; Greenwald, 2014)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>IG 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Experimentation</td>
<td>Give freedom to innovate processes and products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Experiments and tests are regularly done and encouraged by management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>(Lund, 2004), (Goh &amp; Richards, 1997), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014, p. 51), (WRR, 2015)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>IH 31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>Employees can bring new ideas into the organization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>(Goh &amp; Richards, 1997), (Stiglitz &amp; Greenwald, 2014)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>IH 32</td>
<td></td>
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</tr>
</tbody>
</table>
Employees who are new in the organization are encouraged to question how things are done (Goh & Richards, 1997), (Stiglitz & Greenwald, 2014).

Table 4: Internal learning strategies of the learning organization

<table>
<thead>
<tr>
<th>Domain</th>
<th>Perspective of the learning organization</th>
<th>Characteristic of the learning organization</th>
<th>Mentioned by these author(s):</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External learning (E):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Cooperation with end-users/customers/product</td>
<td>Focus on external functional</td>
<td>Asking for their market needs</td>
<td>(Lundvall, 2006), (Lund, 2004), (Cohen &amp; Levinthal, 1990)</td>
<td>EA</td>
</tr>
<tr>
<td>market</td>
<td>flexibility</td>
<td>Asking for feedback about a prototype of a new product/service we are developing</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asking for feedback about our product/service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Cooperation with subcontractors and suppliers</td>
<td>Focus on external functional</td>
<td>Asking for feedback about our product/service</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>flexibility</td>
<td>Asking for feedback about a prototype of a new product/service</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conducting a research and development project together</td>
<td>(Lundvall, 2006), (Lund, 2004), (Cohen &amp; Levinthal, 1990), (Stiglitz &amp; Greenwald, 2014), (WRR, 2015)</td>
<td>EB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outsourcing the execution of a particular project</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outsourcing a research and development project</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Cooperation with (regional) universities and</td>
<td>Focus on external functional</td>
<td>Conducting research together</td>
<td>(Lundvall, 2006), (Lund, 2004), (WRR, 2015)</td>
<td>EC</td>
</tr>
<tr>
<td>knowledge institutes</td>
<td>flexibility</td>
<td>Having contacts with knowledge institutes about their patents</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participating together in university spin-offs</td>
<td></td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participation in conferences that are (co-)organized by the university/knowledge institute</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5: External learning strategies of the learning organization

<table>
<thead>
<tr>
<th>d) Support of knowledgeable consultants</th>
<th>Focus on external functional flexibility</th>
<th>To conduct research</th>
<th>(Lund, 2004, p. 140), (WRR, 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>To provide us with advice on external technological developments</td>
<td>EC 50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To reorganize our organization</td>
<td>ED 51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To execute a management project</td>
<td>ED 52</td>
</tr>
<tr>
<td>e) Learning from other firms who are active in the same sector</td>
<td>Focus on external functional flexibility</td>
<td>Conducting research together</td>
<td>(WRR, 2015)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Having contacts with competitors about their patents</td>
<td>EE 54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participating together in corporate ventures</td>
<td>EE 55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sharing knowledge</td>
<td>EE 56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Being member of a cluster organization</td>
<td>EE 57</td>
</tr>
</tbody>
</table>

Accessing knowledge and information databases or documentation
Discussing and agreeing on what knowledge and skills students should learn at the education institutes
To arrange influx of students for internships
To attract recent graduates for employment at your firm

* (Lundvall, 2006) bases his claims on Moss Kanter’s theory of integrative organization, Burn and Stalker’s theory of organic organizations, Nanaka and Takeuchi’s writings about quality management and knowledge management (1995), and Lundvall’s own theory on innovation as an interactive process between users and producers (1992).


4. Methodology

In this methodology section, the research set-up will be explained. This is done by firstly looking at what the research design is and how we arrived there; secondly, how the firms and interviewees that are researched are selected; thirdly, how the data is collected; fourthly, how the data is subsequently analyzed; and lastly, how in that process the research quality is kept sufficiently high.

4.1. Research design

To answer its research question, a research project must be well designed. This research project is first and foremost designed as an exploratory rather than a hypothesis testing research project. This is because answering the research question involves the collection of data and the subsequent analysis into various classifications (Bordens & Abbott, 2008, p. 97).

The data will be collected from multiple cases (i.e. firms) which allows for both intrafirm and interfirm comparisons (Creswell, 2009). The cases will be selected so that they represent the diversity across the selected High Tech Software cluster, which increases the external validity, and so that both the ‘method of difference’ and the ‘method of agreement’ can be followed (Creswell, 2009).

To get a balanced and in-depth understanding of these micro situations this research uses a mixed methods approach, as it collects both quantitative (numerical) and qualitative (written/oral records) data (Bordens & Abbott, 2008). Qualitative research is characterized by a data collection in the natural setting, with the interviewer as a key instrument, using multiple sources of data which are then interpreted, using a theoretical lens, to understand the meanings of participants and build a holistic account of a phenomena (Knutsen & Moses, 2007, pp. 175–176). The advantage of qualitative data is that it represents a fruitful, rich, thick and informative ground for analysis that sheds insight in the experiences of actors in micro-situations (Knutsen & Moses, 2007). Quantitative data is numerical data that is additionally insightful as it provides insights that are more easily aggregated and correlated. Moreover, it can function as an tangible starting point for a more in-depth qualitative interview. It is therefore the first step in the data collection after which qualitative data is collected (Bordens & Abbott, 2008).

The quantitative and qualitative data are retrieved from multiple sources (various levels of staff and general/public firm information) using multiple methods (surveys, interviews and documentation) in order to facilitate the triangulation of data. In terms of sources, both top- and middle managers are interviewed, as they are formally responsible for the learning policies, practices and strategies on the working floor. Employees are interviewed to verify and complement the managers, and to get a better understanding whether what the managers intended is also actually implemented. Public information and internal firm documents are ‘objective’ sources of information that is used to check the comments.
of managers and employees and serve as background information. These three sources are all internal to the firm, because it is believed that these can best shed insight into which learning strategies are used and why (Jaegersberg & Ure, 2011).

The methods chosen to retrieve data from these sources are surveys, interviews and documentation. A survey with Likert Scales is chosen as the method to collect first insights of every interviewee about which learning strategies are used in their firm. The interviewees are asked for their level of agreement with statements about their firm’s practices on the working floor and the corresponding use of learning strategies. Interviewees can answer in a 5-point scale where 1 stands for Strongly Agree until 5 Strongly Disagree (Bordens & Abbott, 2008, p. 141). Likert scales are used when measuring dimensions that are not directly or easily observable (DeVellis, 2003; Jyothibabu, Farooq, & Bhusan Pradhan, 2010). Learning is such a hard to observe dimension that is generally measured by looking at the learning enablers and learning outcomes. Surveys are considered relevant instruments for finding out learning enablers (Jyothibabu et al., 2010). However, surveys are also self-reporting instruments that suffer from reliability and validity problems: a self-report can be inaccurate and invalid (Bordens & Abbott, 2008, p. 141). Therefore surveys always need to be complemented by other measures (Bordens & Abbott, 2008, p. 141).

Interviews are known to be the best method to test learning outcomes (Jyothibabu et al., 2010). This research uses semi-structured face-to-face interviews. In line with such interviews, the same interview protocol with a number of particularly important questions will be asked to all interviewees in the same order (Bordens & Abbott, 2008, p. 264). Their responses can open up new questions for the interviewer, and follow-up questions that are different per interviewee can then be asked. The advantage of face-to-face interviews is that information can be discussed in depth and detail and the interviewer can control the line of questioning (Knutsen & Moses, 2007). A disadvantage is that indirect and filtered information from the interviewees is passed on. This information can be biased, either due to the interviewee’s selective memory or the effect of the interviewer’s presence. Moreover, interviewees with lesser communication skills can have less impact and be less taken into account (Knutsen & Moses, 2007).

Documentation therefore complements the surveys and interviews. This documentation used is publicly available information from the firms’ websites and/or internal firm documentation. The advantages of documentation are that it illustrates both the words and actions of a firm (Knutsen & Moses, 2007). A disadvantage is however, that documentation can be incomplete, inaccurate, inaccessible or non-authentic (Knutsen & Moses, 2007). This creates a bias in favor of the makers of publicly available documentation (Creswell, 2009), which is in the case of high tech software firms generally the firm’s management and board. Nonetheless, as in this research project documentation is only used as a complement to a survey and interviews this disadvantage is relatively small.
When the data is collected, content analysis will be performed on the qualitative data. As content analysis is a descriptive exercise it cannot with certainty establish causal relationships among variables (Bordens & Abbott, 2008, p. 240). It can however establish and identify patterns and propose interpretations (Creswell, 2009).

In sum, the combination of surveys, interviews and documentation fit the purpose when conducting a broad explanatory study about the learning strategies of high tech software studies. The fact that top managers, middle managers and employees provide their accounts and this is checked with each other and firm documentation is triangulating any findings. This ensures that a proper answer to the research question can be given.

4.2. Case selection
Here motivations are given for the selection of the five HTSC firms and the interviewees therein.

4.2.1. Selection of the High Tech Software firms
A wide spectrum of high tech firms had to be selected to have a large pool of data and to be able to analyze and compare a range of different types of high tech software firms with each other (Creswell, 2009). In deliberation with the HTSC coordinator Wim Renders and after consultation with the firm’s contact persons, five companies were selected based upon their firm characteristics. This selection was attempted to representativre of the diversity of the firms in the cluster. Wim Renders who has significant expertise about the sector judged that firms’ size (small, medium, large) and organizational type (product, service and secondments) were the most important dimensions of difference in the overall population of high tech software firms. The selection of the 5 firms was such that the diversity along these two dimensions was ensured. In the process of conducting the research, these indeed turned out to be important. Additionally, the ownership status was found to be important and happily these firms also represented the range of that spectrum. See Table 6 for the complete overview.

<table>
<thead>
<tr>
<th>Firm #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size</td>
<td>Small</td>
<td>Small</td>
<td>Medium</td>
<td>Medium</td>
<td>Large</td>
</tr>
<tr>
<td>Organizational type</td>
<td>Products</td>
<td>Products and secondments</td>
<td>Projects</td>
<td>Projects and secondments</td>
<td>Products, projects and secondments</td>
</tr>
<tr>
<td>Ownership status</td>
<td>B.V. with external investors</td>
<td>BV with ownership by director(s)</td>
<td>BV with ownership by director(s)</td>
<td>BV with ownership by director(s)</td>
<td>Registered on the stock exchange</td>
</tr>
</tbody>
</table>

Table 6: Characteristics of the five selected high tech software firms

4.2.2. Selection of management and employees
Firms that accepted collaboration were asked to provide 3-5 interviewees. Each firm had to provide both managers and employees as interviewees. It was communicated that these interviewees had to
fulfill several criteria. The manager(s) were required to have an overview of the knowledge management, innovation management and/or human resource management in their firm. They also had to be employed in their current position for at least 6 months to ensure that they have had sufficient experiences to base their views upon. In the larger organizations, this generally led to the situation where two managers were interviewed: one for knowledge/innovation management, and one for human resource management. In smaller firms, 1 manager would have strategic oversight over these three domains and it therefore sufficed to only speak to this manager.

The employees had to be knowledge-intensive employees and were preferably involved in new product or service development, or the presentation or sales of these to customers. It was also communicated as a criterion for selection that they also had to be employed for at least 6 months, as a basis for their views about the learning strategies of the firm. In two cases, however, employees were selected although they only worked at their companies for 4 months. Unfortunately, for practical purposes these were the only employees made available. Happily, the interviews turned out to be informative as others and they also proved to have a good overview of their firm’s situation.

For an overview of the managers and employees spoken to per firm, see Table 7.

<table>
<thead>
<tr>
<th>Firm #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Sub-Totals</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Managers</strong></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td><strong>18</strong></td>
</tr>
<tr>
<td><strong>Employees</strong></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Amount of interviewees per firm per category

4.3. Data collection

For the data collection the following four types of sources are used: documentation, questionnaire, interviews on location, and other type of sources. To obtain the data a rigorous, systematic process was clearly set for each of these channels before the actual collection took place. This was a scientific procedure based on scientific procedures (Bordens & Abbott, 2008, p. 239) to avoid confirmation bias (Bordens & Abbott, 2008, p. 5). In all cases informed consent was obtained of the interviewees/responsible persons for the documentation. Anonymity and confidentiality was promised when making the agreement for participation and again before the actual interview took place, upon the terms laid out in the Interview Guide as included in Appendix 9.3.

4.3.1. Questionnaire

As a first step all interviewees filled in a questionnaire. The questionnaire had two sections: some general questions about the organization they work in and their job; and statements regarding the learning strategies of their firm. See Appendix 9.2 for the questionnaire in Dutch that was used. The questionnaire was designed to be coherent and have continuity in its presentation to be effective. (Bordens & Abbott, 2008). The questionnaire was generally filled in online through Google Forms
and at least some hours before the interview took place. In some cases, the interviewees were not able to do so before and filled in the questionnaire in print on location before the actual interview took place. The nonresponse rate was therefore zero. The printed questionnaires were later inserted into Google Forms to collect all the data online. The answers to the questionnaire functioned as the starting point of the interview, see 4.3.2. “Interviews” for more information how this was done.

The online questionnaire was validated (see Section 4.5.1. ‘Validity’) in multiple ways; but it still happened that some interviewees indicated in the interview that they had misunderstood the question or would rather correct their answer after some thoughtful reflection. These correction have been weighed more heavily than the initial questionnaire answer and have been taken into account in the analysis and interpretation of the results (see Chapter 5 ‘Results’).

4.3.2. Interviews

After filling in the questionnaire, a 1-on-1 semi-structured interview with an average duration of 1 hour was conducted with every participant. The interview was done at the firm’s office in a closed off room where the interview could take place without others hearing the answers. The interviews were recorded under the conditions that they are, after transcription, kept in a separate and secret (i.e. only accessible to the student and the supervisors) appendix of the thesis; anonymized for the use in reports; not shared with third parties; and removed after the research project is finalized (also see item 1e of the Interview Guide, Appendix 9.3). In total, 18 of such interviews were conducted. The interview guide used for these interviews fulfilled the criteria laid out in (Knutsen & Moses, 2007). The used questionnaire and interview protocol can be found in Appendix 9.2 and 9.3.

All of the interviews followed the interview protocol as can be seen in Appendix 9.3. For the questions about the remarkable answers relating to specific learning strategies (Question 3b), first the open question “Can you explain why you answered “Strongly agree/agree/neutral/disagree/strongly disagree” to [statement of the questionnaire]?” was always asked. This helps minimizing experimenter’s bias through the expectancy effects of the interviewer (Bordens & Abbott, 2008). After their answer, any additional and more specific questions about their answer were asked to delve deeper into their answers. All the other questions were also first always open, to then ask more specific follow-up questions if needed to get a better or bigger picture. For validation of the interview protocol several steps have been taken. For more information about this, see ‘4.5.1. Validity’.

In addition to these interviews, two informal, non-structured interviews were conducted with HTSC coordinator Wim Renders. Through the first informal interview, more information was gathered to understand the challenges as HTSC firms are facing them. This was essential in defining a research project that was of actual interest to the HTSC firms. After all the interviews were conducted with the high tech software firms, a final interview was conducted with Wim Renders to let him respond to the
preliminary findings and put some of these into context. For more information about the validating character of these interviews, see ‘4.5.1. Validity’.

4.3.3. Documentation
To find documentation that is insightful about the learning strategies of the high tech software firms the firms’ organizational information, news items and annual reports were checked on their website. Moreover, after the interviews some documentation was received from the firms that shed light into their learning strategies and practices, such as overviews of trainings given and internal newsletters. Lastly, HTSC documents concerning their aims and projects aimed at increasing learning, both public and private, were analyzed. For a complete overview, see Table 8.

<table>
<thead>
<tr>
<th>High Tech Software Cluster</th>
<th>Firms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factsheet</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Cluster description</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Business plan</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Minutes of committees</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Internal newsletter</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Internal decisionmaking process document</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Internal overview of education followed</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Blog about annual plan</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Subtotal HTSC</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Subtotal Firms</td>
<td>14</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 8: Documentation used in this research project

The data derived from the documentation was used as a triangulation source to verify, correct and complement the data coming from the online questionnaire and the interviews. See more in section 4.5.1. ‘Validity’ and section 4.5.2. ‘Reliability’.

4.3.4. Other data sources
Additionally to the interviews and documentation, in an early stage I have visited a conference about “Top Technology Cluster”, of which the Brainport Region is part. On this conference, various high tech companies, including high tech software companies, were present and able to talk about their innovations, the challenges they were facing and the specifics of their collaborations with other (cross-border) high tech firms. Additionally, in one instance, a tour was given through the firm’s online knowledge and learning management system to get a better impression on how they manage their knowledge and learning. Both the event and the tour helped to grasp more of the context of high-tech software companies in this region.

4.4. Data analysis
For the data coming from the interviews and the documentation a coding protocol was designed and for the online questionnaire data an operationalization protocol was developed. This was done before the actual data collection to ensure a process to go soundly from source to respectively analytical outcome and descriptive statistics. The qualitative interview was particularly rich data that was useful for understanding what learning strategies the firms actually use and why. The quantitative
questionnaire data was helpful to give an aggregate numerical value to the performance of the firms. The two were used in parallel for coming to results and conclusions. Both the coding and operationalization protocols are written out below.

4.4.1. Coding protocol for interviews and documentation

A first step, after having produced fully written out transcripts of the interviews, was the selection of the statements of the interviewees/actors that touch upon the research question and the elements of the theoretical framework. These had to be labelled with the right code(s). The following approach was followed to ensure it happened in a systematic and sound way.

Firstly, coding is done according to the “template analysis method” (Van Aken et. al., 2012): a template of codes is generated based on the literature review and the theoretical framework that flows from that. In this project, the template codes were determined by the theoretical framework Table 4 and 5. The codes corresponding to individual learning strategies are found in the last column of the table.

Secondly, additional to the codes generated before the actual coding, “open coding” allowed to add new concepts and codes to the text based on insights coming up during the coding process (Boeije, 2005). This is useful, as the interviews may display themes and topics that are not captured by the codes coming from theoretical framework, but still are relevant in answering the research question. Therefore they should have an influence on the analytical and research outcome by being given a code and being taken into account in the analysis. The codes that came from that process can be seen in Appendix 9.5.

In addition to open coding, segments were coded with the name of the interviewee or the firm of the interviewee. This categorization ensured every segment said by an interviewee of a certain firm could be compared with every other interesting segment of that interviewee and with any segments stated by any other interviewee of the same firm. This was done to ease the interpretation process that would follow. Codes with the names of firms/participants have been deleted in this report, however.

The third step was “axial coding” (Boeije, 2005). This comes down to checking whether the codes that came from the open coding process cover all the most important themes of the interviews, and do so without unnecessary overlap or complexity. In order to use a most efficient and effective coding system, codes were merged, simplified or added. The final list of codes is shown in Appendix 9.6.

Practically, coding was done using a pen to write codes in the sidelines of every printed interview when I came across a segment relevant to the research question or a learning strategy specified in the theoretical framework. Segments could be coded with multiple codes. These segments were then checked and complemented with codes until the moment of saturation (i.e. no more codes came up) when inserting it into the NViVo software on the computer.
The fifth step was “selective coding” (Boeije, 2005), a process of looking at the patterns and meanings of the coded fragments. To first deduce interpretations and conclusions with respect to the situation of individual HTSC firms’ learning strategies an overview document was composed where the situation of each firm per learning strategy was summarized. See the result in Appendix 9.15. This overview was then used to discover and identify patterns, similarities and differences between each firm’s learning strategy situation. The conclusions thereof were written down in Chapter 5 “Results” with the corresponding and supportive quantitative data derived from the questionnaire.

The final step was discussing the outcomes with HTSC coordinator and two supervisors to verify whether they too can be content with the coding process and analytical outcomes. In the initial phase of analyzing supervisors gave various tips to improve the overall analytical outcome by adding 4 new analyses, which are all added and conducted. The HTSC coordinator was also contacted after the first complete analysis had been done and he expressed positive remarks about the results in an informal interview. Taken all these responses and the fact that the protocol and suggestions were strictly followed into account, the conclusion is drawn that the analytical process was conducted carefully.

4.4.2. Operationalization protocol to turn the questionnaire into descriptive statistics
The online questionnaire consisted of 8 thematic sections with 3 – 5 statements each about learning strategies of a firm, equaling a total number of 38 quantitative statements the interviewees responded to. As the interviewees were given the choice to select an answer from a 5-point Likert scale system (strongly agree/1 until strongly disagree/5), their numerical answers provides interesting insight about the aggregate performance of each firm, as perceived by their employees and management.

To reach such aggregates, the quantitative data were first downloaded in an Excel file from Google Forms. The variables were then aggregated into the variables of interest. This included for the internal learning strategies for instance the average of a firm per learning strategy (excluding the answers that were left blank) as well as the total average; internal vs. external learning strategy averages; the average per interviewee group (top management, middle management, employees) per firm per learning strategy and in total; and lastly, averages of domains per firm and in total.

For the external learning strategies the statements about the degree of cooperation with various external actors were transfigured in a similar way as above, but the option to tick off the various options needed a different approach. Through transformation, categorization and Excel formula’s the amount of times a specific option was ticked-off was calculated per firm, and in total.

The aggregate values were then selected for display in a various visual representations. These were used in the powerpoint presentations for the various firms, the Chapter 5 “Results” and in various Appendices (9.7., 9.8. and 9.9.) shedding more insight into the learning strategy situations of firms and in general.
4.5. Research Quality
To keep the research quality sufficiently high, the research study had to keep into account both validity and reliability concerns. This section explains which steps have been taken to do this.

4.5.1. Validity
Validity is the extent to which a research study measures what it sets out to measure (Gravetter & Forzano, 2015). Various types of validity exist, which either fall in the domain of internal validity or external validity.

4.5.1.1. Internal validity
Internal validity refers to the validity of the measurement and test itself. In other words, whether the measurement tools are measuring what it intends to measure. As our study is not a study looking for causality, criterion-related validity – that looks at the predictive value of tests – was not taken into account. Instead face validity, construct validity and sample validity were the types of validity that had to be considered and increased. Face validity is whether the measurement tool appears to test the intended construct. Construct validity simply measures whether the measurement tool also really measures that construct. Sample validity, lastly, checks whether all domains of a concept are tested by a measurement tool (Gravetter & Forzano, 2015).

In our case, these three types of validity were kept in mind when designing the questionnaire and the interview guide. Three main actions have been taken to optimize the tools along these lines. Firstly, expert-generated and elaborately validated questionnaires about the learning organization were the basis and starting point of the questionnaire (Arundel et. al., 2007; Lundvall, 2006; Goh and Richards, 1997). This had as the benefit that these questionnaires were already validated and appeared to be of a quality minimally necessary to work with. Secondly, meetings with the supervisors and the HSTC coordinator were conducted to give input about the fine-tuning and design of the questionnaire and interview in order to increase the appropriateness of the tools for this research project. Thirdly, test interviews with a strategy consultant and an information manager with affiliation with software were conducted to trace the challenges and effectiveness of the questionnaire and the interview guide. These were then fed back into the talks with experts and the design of the tools. Additionally to these validity measures, Table 9 further summarizes what actions have been taken to optimize the research and tool design, the use of the tool, the translation of the tools’ results into conclusions and a report.

<table>
<thead>
<tr>
<th>Optimization phase</th>
<th>Actions taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research design phase</td>
<td>Triangulation of different data sources ensured</td>
</tr>
<tr>
<td>Tool design phase</td>
<td>Questionnaire’s statements in the thematic sections are based on validated questionnaires</td>
</tr>
<tr>
<td></td>
<td>Input on the questionnaire’s and interview guide set-up from two supervisors</td>
</tr>
<tr>
<td></td>
<td>Input from high tech software cluster coordinator on the understandability of the questionnaire</td>
</tr>
<tr>
<td>Tool use phase</td>
<td>Test interview with a strategy consultant working on performance management</td>
</tr>
</tbody>
</table>
4.5.1.2. External validity

External validity refers to the ability to generalize the findings to the target population (Gravetter & Forzano, 2015). This is generally only possible to very similar situations. To increase the external validity the spectrum of companies selected for this research project was intentionally made as broad as possible, while still being representative of the type of firms in the cluster. In this way, the findings based on common factors across the firms are also applicable to similar firms in other locations. Concretely, in the case of the findings about the learning strategies of the HTSC firms, these can first and foremost be generalized to other high tech software firms in the Netherlands and Western-Europe, as they commonly know some similar macro-working cultures (Arundel et al., 2007). More broadly, the findings about the learning strategies and the learning challenges may indicate – within limits – some broader strengths and weaknesses of other high-tech companies that work in sectors faced with similar challenges in the Western-European world.

4.5.2. Reliability

Reliability is defined as the extent to which a measurement tool produces stable and consistent results (Bordens & Abbott, 2008). For a questionnaire and interview guide to achieve this, it is important to have clear and precise statements and questions.

The first step was the use of statements of relevant questionnaires that were tested, validated and developed for reliability (Arundel et al., 2007; Lundvall, 2006; Goh and Richards, 1997) as the basis of the final questionnaire used in this research project. These other questionnaires already included tests on test-retest reliability, parallel forms reliability (in which the questionnaire was compared to other questionnaires), inter-rater reliability and internal consistency reliability. The sample populations on which the instruments were used/validated included the thousands of firms participating in the third Community Innovation Survey (CIS-3), 6991 Danish firms and 100+ participants of 7 firms respectively. They were combined with each other, and extended with statements that were not yet captured by the questionnaires.

A second step to ensure a reasonable level of reliability for the combined and extended questionnaire was the request for input of the two supervisors with an expertise in the use of questionnaires, as well

| Analytic phase | Outcomes of each source triangulated with other data sources | Outcomes checked on validity by asking the view of two experts at university | Outcomes checked on validity by asking the view of the HTSC coordinator | Outcomes checked on validity by asking the contact persons of each participating firm for their impression of the findings and recommendations for that firm | “Spending time in the field” by visiting high tech-conference and receiving a tour through the firms |

| Reporting phase | Clarifying the bias of the researcher |

Table 9: Actions taken for the validity of measurement tools and research outcomes
as from the HTSC coordinator who is familiar with the contexts and attitudes of the HTSC firms was taken in. The most important feedback here consisted of the simplification of words, the division of concepts to test a single concept per statement, and the suggestion to keep the subject words (‘I’, ‘We’, ‘Managers’, ‘Managers and employees’) the same. All input was used, but in the latter case it was argued that the research intended to test the experience of the interviewee about all of these groups. Therefore these subject words were kept; instead, a note was added under the introductory text to highlight the fact that the statements that followed in the questionnaire would be asking about various subject groups. By doing this, more awareness was created that various groups had to be taken into account in different settings.

As a third step, for both the questionnaire and the interview guide, two test interviews and two test questionnaires were conducted. This was done with a strategy consultant and an information manager with affiliation with software systems. Also the opinion of the two test subjects was asked about the clarity of the statements and questions. Finally, one test-retest was also performed on the questionnaire. These all produced insights in which questions worked and didn’t work. Most importantly, it was said that the interest of the interviewer for the interviewee helped the conversation forward. By asking follow-up questions and summarizing what the other has said, the interviewees felt heard and the conversation was able to move towards the most interesting experiences regarding learning strategies. This was contrasted with sticking to the online questionnaire results very tightly. This feedback was used to redesign the questionnaire and interview guide and in the interviews itself.

In addition to the three aforementioned steps to come to precise questionnaire statements, two more elements helped the reliability of the questionnaire: the high number of items on the questionnaire and the standardization of the administration procedure (Bordens & Abbott, 2008). See Table 10 for a summary of all actions taken.

<table>
<thead>
<tr>
<th>Optimization phase</th>
<th>Tool design phase</th>
<th>Actions taken</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Questionnaire’s statements in the thematic sections are based on validated questionnaires</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input on the questionnaire’s and interview guide set-up from two supervisors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input from high tech software cluster coordinator on the understandability of the questionnaire</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input asked of the two test interviewees</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A high number of items on the questionnaire</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test-retest of the questionnaire with the information management officer in a government agency</td>
<td></td>
</tr>
<tr>
<td>Tool use phase</td>
<td>Test questionnaire and interview guide with a strategy consultant working on performance management models</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test questionnaire and interview guide with a document management officer in a government agency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standardization of the administration procedure</td>
<td></td>
</tr>
</tbody>
</table>

Table 10: Actions taken for the reliability of the measurement tools
5. Results

5.1. Introduction
This chapter presents the results and findings of the empirical data collection, analysis and interpretation of the learning strategies of the 5 high tech software companies under research. As outlined in section 1.2. “Research Questions”, it answers research questions 3 and 4:

RQ3: What learning strategies of the learning organization framework are employed by high-tech firms, most notably in the case of the High Tech Software Cluster in the Brainport region?

RQ4: What are the drivers of these learning strategies?

Section 5.2 “Learning strategies of HTSC firms” answers research question 3. This section looks at overall performance, differences in performance reported per interviewee group, internal vs. external learning strategy results and domain results. Together this gives an comprehensive overview of what is the general picture regarding the use of learning organization’s strategies for high tech software firms, including interpretations what seem to influence these learning strategies. More in-depth reporting about this can be found in Appendices 9.9, 9.12 and 9.15. Section 5.3 “Driving forces behind learning strategies” picks up these findings and delves even deeper into the dynamics and drivers behind the general outcomes. It as such answers research question 4. Additionally, it also provides static and dynamic models for lines of reasoning behind the level, type and amount of learning strategies that are employed in a firm.

5.2. Learning strategies of HTSC companies

5.2.1. Overall outcome
Firstly, the ratings coming forth out of the survey – and which results are virtually all backed by the gathered documentation and interview data – show that the HTSC firms practice the learning organization “to some degree”. As can be seen in Table 11, the exact average score for all firms for all strategies is a 3.4, in between “neutral” and “agree”. This comes down to the situation that most firms have implemented some of the prescribed learning strategies of the learning organization, or have implemented them to a large extent, but not in all areas of the organization.

As the distribution of firm scores ranges from 3.2 to 3.8 this outcome is largely true for all firms, with lower rated firms and higher scoring firms having implemented learning strategies respectively less and more seriously throughout the organization. Moreover, as Figure 6 shows, of the 38 statements examined 28 score between “neutral” and “agree” and only 3 rate higher than “agree” and 7 lower rate lower than “neutral”. Appendix 9.7 shows that the distribution of firm scores producing these averages do not show any extremely distorting outliers. This means that the aforementioned qualification also describes the large majority of specific learning strategies examined in the firms.
The qualitative data – the interviews and documentation – supports and illustrates this thesis. For Firm 1, the best scoring small firm focused on a product, the situation is such that “some procedures are implemented, so that we have a certain structural way of working” (board room level manager), but “this mostly revolves around documenting knowledge” (employee) and this and other learning strategies “which they just started” (manager) can be improved.

<table>
<thead>
<tr>
<th>Firm #</th>
<th>Size of the firm</th>
<th>Type of organization</th>
<th>Average score (on a scale of 1-5)</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small</td>
<td>Product</td>
<td>3.6</td>
<td>2nd</td>
</tr>
<tr>
<td>2</td>
<td>Small</td>
<td>Product, secondments</td>
<td>3.3</td>
<td>3rd/4th</td>
</tr>
<tr>
<td>3</td>
<td>Medium</td>
<td>Projects</td>
<td>3.2</td>
<td>5th</td>
</tr>
<tr>
<td>4</td>
<td>Medium</td>
<td>Secondments, projects</td>
<td>3.8</td>
<td>1st</td>
</tr>
<tr>
<td>5</td>
<td>Large</td>
<td>Secondments, projects, products</td>
<td>3.3</td>
<td>3rd/4th</td>
</tr>
</tbody>
</table>

**Average firm** 3.4

Table 11: Average rating of each high tech software firm and the overall average firm rating

For Firm 2 - the other small firm, which is specialized in a product and places employees at firms to help use the product well - the somewhat lower score is also reflected in the learning strategies situation. “We learn, we search and find new knowledge, we call experts in our network”, but this is all done in an informal way, as “there are no standard routines for this” (board room level manager) and “little is done in this area, besides the form of telling each other what we know” (employee).

_The HTSC companies practice the learning organization “to some degree”_

The medium sized service-oriented Firm 3 has a similarly low rating and this is accounted for by the boardroom, middle management and employee level interviews. While the board room level manager does strongly acknowledge the importance of learning – i.e. “We have to stay-on-top of the game, because if we don’t we will end up behind” – the manager says that “besides the important issues, such as performance and appraisal interviews, the lack of time amongst software developers and managers doesn’t allow” learning strategies beyond that. In line with this, one employee remarks that “there is little change organizationally” and “we have to make a step there”.

![Figure 6: Average firm score on dimensions of the learning organization framework](image-url)
The medium-sized Firm 4 that specializes in secondments and projects scores best overall and this clearly comes back throughout the organization. Learning is essential for them, because “staying ahead makes us interesting for both customers and employees” (boardroom level manager). This center stage position for learning in their corporate philosophy originated from two inspiring HR-professionals in earlier stages of the firm. Although there are improvement points they have in mind, such as “better mechanisms for sharing knowledge and making their systems more person-independent” (manager), the strategy is said to have paid off with amongst others “low employee turnover” (board room level manager).

“Staying ahead makes us interesting for both customers and employees”

Firm 5 is a large firm that recently shifted from merely doing outplacements to projects and products. The 3.3 score reflects that they are currently attempting to let the learning strategies that are now needed land in the whole organization. As a value, the interviewees all acknowledged knowledge and learning to be essential for their firm. Indeed, “the only thing we have is knowledge” (boardroom level manager), but they are currently “mostly focused on training and education activities” (manager) and “share too little with each other” (employee) and “don’t do any project evaluations” (employee). They expressed an interest in improving their knowledge management and learning strategies overall.

**Key Findings about “Learning strategies of HTSC Firms – Overall Outcome”**

- The five firm accounts show that “some degree” of learning strategies are implemented
- Most boardroom level managers, managers and employees expressed it is desirable to see an improvement in the learning strategies of their firms
- The best scoring firm has - influenced by two HR managers in the early phases of the firm - made personal and organizational learning a key pillar of their organizational culture and practices

5.2.2. Differences between the board room, middle management and employees

To understand the learning strategy situation in the high tech software firms their board room manager, middle management and employees were surveyed and interviewed. There are two reasons why it is interesting to compare the ratings of these three interviewee groups. Firstly, it is valuable for knowing how uniformly shared and representative the outcomes of these data collections are. Secondly, it is useful for this and future research about learning strategies to know whether any (reverse) hierarchy bias exists when collecting data. If it exists, this can be taken into account in making conclusions. Moreover, it can be used in further research, for instance to investigate why learning strategies may only slowly get investments from higher management.

As can be deduced from Figure 7, some hierarchical bias is observed in the average scores. Of the six potential combinations of an ‘order’, the rating order of “board room manager > middle manager(s) >
employee(s)” appears more than proportionally: in 12 out of the 38 situations. This implies a strict hierarchical bias. (Also, the order “middle manager > board room manager > employee” happens 6 times. Together with the 12 instances, this can imply some softer version of hierarchical bias: “management scores higher than employees”).

![Bar graph showing average learning strategy scores per interviewee group](image)

**Figure 7: Average learning strategy scores per interviewee group**

Interestingly, deducing from the scores per interviewee group per firm – see Appendix 9.8 – it becomes clear that the hierarchical bias only exists in the three lowest scoring firms, Firm #2, #3 and #5. These three firms extra-proportionally display hierarchical bias. Firm #2 displays 24 times a strict hierarchical bias, although it has to be noted that no middle management exists there and was therefore interviewed. Firm #3 only displays a strict hierarchical bias two times, but for the large part of the board room management gives the best ratings (13x, which is followed by employees (8x) and then by middle management (4x)). The large Firm #5, registered on the stock exchange, is the most striking example of strict hierarchical bias: 13 times a ‘board room manager > middle managers > employees” order exists. Twenty times the top manager scores the firm’s learning strategies highest of all interviewees.

Contrary to the low scoring firms, the overall best scoring Firm #2 actually gets most of its highest scores from its employees: 7 times they were the single best raters of the learning strategies followed by middle managers (5x) before board room managers (4x). Also impressive, Firm #1 *never* has a learning strategy situation where the board room manager rates the firm better than its manager or employee do. It can therefore be stated that a *reverse* hierarchy bias exists in the best two firms.

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**Key Findings about “Differences between the board room, middle management and employees”**

- A hierarchical bias exists in the three lowest scoring firms when rating learning strategy situations.
- The *largest hierarchical bias* occurs in the *largest firm* that is also *registered on the stock exchange*.
- A *reverse hierarchical bias* is observed in the *best two scoring firms*, Firm #1 and #4.
5.2.3. Internal and external learning

As the literature review showed, a great surge in attention for *internal* organizational learning came in the 1980’s, whereas *external* organizational learning only started to be added after the 2000’s. From that perspective, it is interesting to question whether the high tech software firms score higher or lower for internal and external learning. Have they built up internal learning structures in the 1990s and only recently started to also implement external learning strategies?

As Table 12 shows, on first sight – on an aggregate level – the opposite is the case: all firms and also therefore the average firm have higher ratings for external learning (3.7/to a certain degree) than internal learning (3.4/to some degree). It is, however, important to note that scoring higher on external learning might have been a bit easier from the start. External learning strategies that got scores only required ‘cooperation with [an external actor]’ and the concrete forms of cooperation could be ticked off rather than rated. The rated internal learning required firms to implement more refined strategies, and might have therefore scored lower.

<table>
<thead>
<tr>
<th>Firm #</th>
<th>Size of the firm</th>
<th>Type of organization</th>
<th>Internal learning score</th>
<th>External learning score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small</td>
<td>Product</td>
<td>3,6</td>
<td>3,7</td>
</tr>
<tr>
<td>2</td>
<td>Small</td>
<td>Product, secondments</td>
<td>3,2</td>
<td>3,7</td>
</tr>
<tr>
<td>3</td>
<td>Medium</td>
<td>Projects</td>
<td>3,2</td>
<td>3,4</td>
</tr>
<tr>
<td>4</td>
<td>Medium</td>
<td>Secondments, projects</td>
<td>3,8</td>
<td>3,9</td>
</tr>
<tr>
<td>5</td>
<td>Large</td>
<td>Secondments, projects, products</td>
<td>3,3</td>
<td>3,6</td>
</tr>
<tr>
<td><strong>Average firm</strong></td>
<td><strong>Large</strong></td>
<td><strong>Secondments, projects, products</strong></td>
<td><strong>3,4</strong></td>
<td><strong>3,7</strong></td>
</tr>
</tbody>
</table>

Table 12: Internal and external learning scores of all firms and the average firm

Moreover, it should not be forgotten that the averages do not represent every area of internal and external learning. Many internal learning strategies for instance scored higher than all but one external learning strategy. The exception, ‘cooperating with customers’ (4.6), strongly increased the average external learning score. Lastly, factors such as organizational type or innovative/follower-focus can be responsible for driving performances across the divide of internal/external learning.

One potential reason, however, for the discrepancy in internal and external learning scores can be found: a bias/focus towards technological knowledge. All firms, but particularly the lower scoring ones #2, #3 and #5 emphasized the fact that they predominantly focused on technology, for instance “within a technological company the emphasis is naturally on technological skills” (Manager, Firm #5). Firm #1 and #4 emphasized this much less, with the latter even making social and communication skills a cornerstone of its corporate philosophy and 50% of its mission. Not surprisingly, these two overall best performing firms had the smallest discrepancy between internal and external learning. One reason for the difference between internal and external learning can therefore be that external learning has generally happened to fill in for technological knowledge the firm doesn’t have. With its focus on technological rather than organizational matters, there is a
stronger incentive to collaborate externally in order to get such knowledge than to focus on internal organizational learning. This can explain why less attention, effort and resources are spent on internal learning strategies and why it consequently performs less well. More about the bias/focus towards technological rather than organizational knowledge can be read in Section 5.3.4. ‘Firm culture and market position’.

Key Findings about “Differences between internal and external learning”
- All firms perform better on external learning strategies than on internal learning strategies
- The discrepancy between these two is lowest with the overall best performing firms (#1 and #4)
- One explanation for the gap between internal and external learning can be a bias/focus on technological learning, especially in the three lower scoring firms, as external collaborations generally help with this and internal learning especially helps to improve organizational matters.
- Other explanations include that external learning strategies are more easily fulfilled than internal learning strategies and that third variables drive the results.

5.2.4. Domain results
As Figure 8 shows, the domain results scored between a 3.0 and 3.7 on the 5-point scale. Most domains are therefore on average implemented or practiced “to some degree”. The highest scoring domain is ‘Leadership commitment and empowerment’ (3.7), followed by ‘External cooperation’ (3.67), ‘Experimentation (3.6) and ‘Organizational structure’ (3.6). The lowest scoring domains are ‘Quality Management’ (3.0), ‘Transfer of knowledge’ (3.1) and ‘Reward and compensation systems’ (3.3.). Is it possible to account for why the domains are performing as they do?

![Figure 8: Average firm domain results](image)

As Figure 6 in section 5.2.1. shows, the individual learning strategies within a domain differ strongly. Deductions are therefore hard to make and hard to substantiate. However, under these notifications,
when looking closer at the content of the learning strategies of each domain some sort of pattern does appear. The better performing domains have more learning strategies that are relatively simple and/or require management to do something top-down, such as introducing oneself to external partners, welcoming new ideas from (new) employees, being constructively open to feedback or announcing a new organizational structure. This is relatively straightforward: it only requires some attention and time of the top layer of the organization. Lower performing domains on the other hand require a more long-term development of an explicit and formal system. Indeed, quality circles, systems to evaluate employee’s proposals and metrics to monitor learning are all more complex and time- and effort-consuming. Mechanisms for the transfer of knowledge need to be maintained. Reward and compensation systems have to be designed, upheld and invested in. It thus seems that the more resources the domain-set of learning strategies costs, the weaker firms perform on it.

The further in-depth analysis of individual domains in Appendix 9.9 also supports this mechanism. When individual learning strategies cost more resources, they get less quickly developed. There are, however, also other drivers that influence which learning strategies are used in a firm and important when wanting to perform well. The next section illustrates which factors drive which learning strategies.

Key Findings about “Domain results”

- The more resources a domain of learning strategies costs, the less the firms implement the domains’ learning strategies.
5.3. Drivers of learning strategies

The extent to which HTSC firms have incorporated the learning strategies is found to be influenced by five main drivers. These include “ownership model”, “size of the firm”, “focus of the firm”, “firm culture and position in the market place” and “organizational type”. These are found amongst others through the in-depth analysis of the domains in Appendix 9.9 in which particular attention is given to the drivers that influence the learning strategies observed inside the firms.

The first three factors are found to be situated in a stable context, whereas the latter two are currently under pressure of a changing context. This has the effect that certain conducts and related learning strategies are under pressure, whereas others are more in line with that context and can therefore be called ‘promoted’. These are the conducts that the first firms shift towards. In the figures, to be found in the sections, that visually illustrate the relationships between certain conducts and the subsequent focus on particular learning strategies, the boxes of pressurized conducts are colored in red and the promoted conducts in green.

![Diagram of Drivers of Learning Strategies]

Figure 9: Drivers of the level, number and type of learning strategies implemented in a firm
5.3.1. Size of the firm

The first reasoning given for a learning strategy situation of various firms is the size of the firm. It is argued that a small firm size drives, firstly, high performances on the learning strategies that can be arranged through an informal system. Strategies that are reported to be part of this category include sharing knowledge, including about successful programs; giving feedback and discussing failures; and open communication between teams and with management, helping support for the firm’s mission. On the other hand, it is also claimed that a small firm size can limit the performance on more formalized learning strategies, i.e. strategies that are made more explicit and therefore also require, in absolute terms, a considerable amount of resources - time, effort or money - to build:

“If we would allocate learning to one person [in our small firm, red.] and let that person be busy with that very often, it is a huge proportion of our total working time. That makes it difficult” – Employee, Firm 2

Interestingly, interviewees have argued the exact opposite for large firms. Firstly, the informal strategies and systems, such as the one mentioned before, are said to be harder to implement in a larger firm, therefore driving low performance on that strategy. Indeed, it is reported that larger departments and firms often “can do everything by themselves” (Employee, Firm #5). This is backed-up by the fact that the small firms engage themselves in more innovative and far-reaching external collaborations than large firms. Large firm #5 has instead as a focus to develop better ties between its departments. Secondly, large firms can more easily develop more formal learning strategies, such as organizing educational activities, than small firms.

![Figure 10: Influence of firm size on the type of learning strategies used by the firm](image)

The debate about the driving effect of size is not completely settled though. Many believe that small firms indeed fulfill more ‘learning needs’ by informal systems: “small firms have a very different learning model than large firms” (Board room manager, Firm #2). The seeming lack of resources is also often mentioned as the reason for the difficulty in developing formal systems.

However, it is said by an employee of Firm #2 as well that “even a small firm can win a lot by thinking about these things [...] we can use some light-weight processes”. The responses about the
role of size by interviewees of the medium firms, Firm #3 and #4, are interesting in this light. The best scoring Firm #4 reports that “even though they are a relatively small organization, they are organized as a matrix organization” (Manager) and even more interestingly credit for their high performance on organizational learning is given to a HR officer that joined the firm when they were very little:

“\textit{When we started our company we were with just two people. We needed someone at the office to make the invoices for us. We hired an older woman who found it amazing to work in a small firm. She also went to study Human Resource Management, and she subsequently came with fantastic ideas. People talked with her, and she brought expertise about how a firm has to deal with Human Resource Management. This was actually far too early – we were with just 10 employees at the time – but it was fantastic nonetheless and she also did a lot of other tasks, so that was very good.}” – Board room manager, Firm 4

This history and firm strategy – as it was a choice to subsidize her to study HRM and be open for her ideas – is somewhat different from what the other medium firm experiences. As they are many times larger than the Firm #4 was when the HR officer started implementing her ideas, they currently have a part time office manager who also needs to do all the HR work for a 50+ organization and they do not have a full time HR Manager. This is also due to their views about when learning and HR needs to be worked on in the firm’s growth:

“I think we can gain in the area of managing our employees. I think it would be good, when we are yet a little bit larger, to hire a HR officer. So that when I do an appraisal meeting this HR officer can say to me afterwards: ‘maybe this wasn’t that smart’ or ‘pay attention to this next time’. – Manager, Firm 3

The difference between medium sized firms #3 and #4 shows that even in smaller firms it is seemingly possible to ‘do’ learning strategies, whether they are formal or informal and while paying attention to the firm’s context, even if they cost some resources. However, the degree of light-weight processes that do not require many resources versus the formalized and resource-heavy strategies will differ, as many interviewees said, between small and large firms.

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**Key Findings about “Size of the firm”**

- Smaller firms can more easily fulfill learning needs through informal learning strategies
- Larger firms can better fulfill learning needs that require formal and resource-heavy strategies
- Differences between the medium firms suggest that it is possible to specifically invest in learning as a small firm and that this pays-off even in terms of high learning performance in the long term
5.3.2. Ownership model

The second driver behind learning strategy situations is the firm’s ownership model. This term refers to the financial ownership of the firm, which can either mean that the founders and directors own their own firm; that external investors do (partially), as they have invested in the firm; or that the firm is registered on the stock exchange and is owned by a multitude of shareholders, who get public financial updates every quarter. What is found to be the influence of this on learning strategies?

Firstly, there are suggestions made that self-ownership of the firm enables a firm to also invest in learning strategies that do not immediately or clearly pay themselves out financially. This can be helpful for the job satisfaction of employees with the work and of course with long term (innovative) performance. A director explains:

“The advantage of having your own firm is that don’t have to commercially exploit it. We want to build a firm that also has values for its employees.” – Board room manager, Firm 4

However, only having one’s own investments as a director can also be a limiting factor for learning strategies. This is particularly the case when (financial) resources are slim, which is sometimes the case in a smaller organization and often the case in a start-up phase of the firm. Having investors could then mean more resources are available to spend on operationalizing learning strategies in one’s firm. A director elaborates on how his self-ownership model influences how he can run the firm:

“I am the only owner [...] I chose to grow organically [as compared to getting investors on board, red.], so that goes much slower. I first have to earn money before I can spend it. The projects I do give me the capital to grow” – Board room manager, Firm 2

On the other side of the spectrum, a registration on the stock exchange enables a firm to spend a lot of resources, but also pressurizes a firm to maintain good financial records and produce some returns at virtually all times. This short term pressure is also said to be present in the largest firm, Firm #5. It reports that it has a negative influence on various aspects of the learning organization, such as the communication with employees, because of the sensitive information; the openness towards new ideas, due to tight financial rules; and the evaluation of projects’ quality:

“The projects are budgeted very tightly towards the client. So there is no time or money to build it up [an evaluation cycle, red.]. A project is just done, and when it is finished it is gone. And again, no time is spent on quality improvements’ – Employee, Firm 5

Moreover, the willingness to invest in experimentation is also limited “as every hour spent on experimentation is a decrease of our revenues” (Manager, Firm 5). There is a short term perspective being observed that eventually also damages some of the innovations that can happen:
“Most of what I can see is short-term focused. Because next month the numbers have to be submitted to the board and we have to have billed as many hours as possible. And if you then have a product that would create 10x as much revenues in two years they will say ‘but what about the numbers of last month?’, because those have to be good.” – Employee, Firm 5

Whereas little has been said explicitly in the interviews about the influence of external investors, it is known that investors generally want their investment back with an appropriate financial return in 5 – 7 years (Mazzucato, 2015). This is a relatively short period of time compared to a firm’s life duration. It is therefore assumed that its effect lies somewhat between the effects of a registration on the stock exchange and self-owning one’s firm.

![Diagram of Ownership Model and Learning Strategies](image)

**Figure 11: Influence of ownership model on the learning strategies used by the firm**

In sum, self-ownership can give – when sufficient resources are present – more leeway for investing in learning strategies with a long term pay-off, whereas externally invested and stock-exchange registered firms will be driven towards only investing in strategies that pay off financially in the short or middle term respectively.

### Key Findings about “Ownership model”

-> **Self-ownership can** – when sufficient resources exist – **allow for investment in learning strategies that pay off, financially or otherwise, in the long term**

-> **A registration on the stock exchange as well as getting investment of external investors** drives a focus on learning strategies that pay off on the short/middle term and **limit longer-term investments**
5.3.3. Focus of the organization

The third driver of learning strategy situations is the focus of the organization. The focus has two aspects. It includes the scope of the firm, i.e. the focus on either a single niche market vs. multiple, more broad markets as well as the ambition level of the firm, i.e. the focus on innovating yourself or following the sector’s trends.

The firm’s scope has an overall influence on the necessity a firm feels to own a broad knowledge base and to keep on learning, throughout time, about such a diverse range of issues. Broad firms, such as Firm #4 and #5, show that need through for instance a wide range of technological and non-technological training for their employees. More focused firms such as Firm #2 and #3 display much less diversity in their training. Additionally, the diversity in teams and the organization also diverges between specialist and broad firms:

“We are no diverse group, all software engineers here” - Employee, Firm 2

“Because we now do more projects and products, we have to approach it more broadly. We need more broad expertise. Other skills, such as writing down the requirements analyses [...] or] the skills to lead a workshop are necessary too.” – Board room manager, Firm 5

The demand for multidisciplinary teams is therefore less in specialist firms than in broad firms and having various backgrounds in terms of gender, nationality, culture or character in the organization is not as strongly pursued.

The innovative ambition level has as a main influence in the sense that it drives the use of learning strategies that are focused on experimentation and innovation. This innovative focus also drives such firms more easily to collaborate with other firms in order to deliver real innovative solutions, as the corporate ventures and collaborations that innovative firms #1 (with a technological supplier) , #2 (with two other firms/suppliers) and #3 (in consortium projects) show. On the other hand, innovative firms report that its focus on own knowledge creation through experimentation also decreases their desire to have more general, broad training:

“As we pioneer, the knowledge we need can’t be found by following general pre-planned training” – Board room manager, Firm 2

Moreover, the innovative focus and emphasis on experimentation also positively correlates with openness for new (technological) ideas. The (technologically) open communication climate in Firm #1 and #2, and the Innovation Challenges and Special Interest Group of medium firm #2 illustrate this as well. Firm’s #5 recent initiative to become more innovative is also seen in its development of better collection mechanisms for technological and business ideas, the ‘IDEA-to-go-process’.
The ‘following the trend’-ambition level drives higher performance on a firm’s learning strategies that increase the organization’s absorption of external knowledge (and lower performance on other strategies). This attention for absorption is shown through offerings more broadly set-up educational activities, often with external speakers, as well as through regular conference visits, magazines and scanning websites to stay up to date. The elaborate activities in this domain, as Appendix 9.15 shows, of follower Firm #3 and Firm #5, a follower to the largest extent, illustrate this. A board room manager explains how absorbing external knowledge is part of its philosophy:

“We take the best there is. We don’t go invent it ourselves any more. [...] On a certain moment, a product comes on the market that is the standard. [...] The technology goes so fast. In our philosophy we believe that it best to take these best solutions and apply them for our clients.” – Board room manager, Firm 3

Even though the strategies surrounding absorption of external knowledge perform well, external cooperation that is innovative and focused on creating new solutions is not – contrary to the innovative firms - very present in the follower firms.

Even though the strategies surrounding absorption of external knowledge perform well, external cooperation that is innovative and focused on creating new solutions is not – contrary to the innovative firms - very present in the follower firms.

Figure 12: Influence of organizational focus on the learning strategies used by the firm

In conclusion, the focus of the organization can have influence on the learning strategies that engage themselves with the diversity, creation and novelty of knowledge.

Key Findings about “Focus of the organization”

- A focus on multiple broad markets drives high performance on learning strategies that increase the firm’s diversity of knowledge.
- A focus on niche markets drives learning strategies that aim to increase one type of knowledge.
- A focus on innovating drives learning strategies that are useful for experiments and innovations.
- A focus on following the trends of a sector drive high performance on learning strategies that help absorb external knowledge.
5.3.4. Firm’s culture and position in the market

The fourth driver of specific learning strategies is the firm’s culture and position in the market. With the firm’s *culture* is meant what the firm finds important and what it is interested in. This is found to be mostly expressed through what employees and managers talk about, spend resources on and want to improve in. Two versions were found: being mainly interested in technology and being interested in both technology and organizational matters. The firm’s *position* refers to the way it is related to other firms in the sector: either as an actor in a value chain or in a network where collaborations are done through more equal partnerships. As was said before, these themes are under pressure of a changing environment, which will be explained first.

The first landscape pressure is the increase in the complexity of the technologies used in the High Tech Software sector, a trend that is also identified by the High Tech Software Cluster as a whole. One firm describes it as such: “*complexity will be added due to the multitude of automated systems that increasingly communicate and exchange more and more data with each other*” (Report, Firm #5). Interestingly, this trend is believed to only accelerate and speed up in the next years:

“In the new world of Internet of Things, Industry 4.0 and Big Data more and more sensors and actuators appear around us. Such developments will go faster and faster in the upcoming years” - Report, Firm 4

The second landscape pressure – the increase in the complexity of the market demands – stands in relation with this technological progress. In light of societal challenges, such as sustainability and an ageing population, society starts demanding the use of these advanced technologies for more integrative and smart solutions. Interestingly, this also has an implication for the way firms operate. The following quote illustrates this:

“At everything what is about smarter solutions is actually an integration challenge. How do we integrate the ‘smart-ness’ of market 1 with the ‘smart-ness’ of market 2 within a city, an industry etc. So it is essential that we [the various departments] will find each other soon” - Employee, Firm 5

When one doesn’t have all the expertise within a firm, it becomes important to find the ‘smart-ness of another market’ in other firms or organizations: “*We participate in a consortium project to learn more about the software involved in the smart energy market. There are multiple parties in that consortium: from software to hardware, to energy companies and a knowledge institute*” (Manager, Firm #4). As even reports of the large firm #5 suggests, eventually all firms need external knowledge.

Therefore, the two landscape pressures together can be said to form a direct pressure on the firm: the rise of the “Network Economy”. As the technologies and market demands become increasingly complex, one firm cannot master or govern these issues alone and complementary expertise is needed.
All firms, except medium firm #3 focusing on services, report that a network structure, where collaborations with other firms as equal partners can be started, is the most likely form to come up: “It will become a network of suppliers that work for themselves rather than for a head-supplier” (Manager, Firm 1).

The first concrete implication of the network economy is that there is pressure to move the position of the firm in the market from a place in the value-chain where there is a hierarchical chain of suppliers to a place in a more egalitarian network. Firm #1 and #4 already collaborate in that way, as well as Firm #2 who say this about it:

> “If we had to make the tools we use now without the expertise of the other firms we wouldn’t have achieved 10% of what we have achieved together now”
> – Employee, Firm 2

Firm #3 and #5 have reported much less of such activity; the explanation may be that they do not move yet, because the former firm isn’t focused on pioneering and the latter is a large firm that at the moment tries to deal with this trend primarily by letting departments work better together.

The second reported implication of the network economy is that - if it wants to succeed in working as equal partners - high-tech software companies’ culture need to shift. From only valuing technological improvements to one that also include an interest in social an communication skills, personal development, new form of collaborating and organizational learning more generally:

> “The world has changed enormously in the last 10 to 20 years. Social skills have become much more important. [...] You are with so many parties and there is so much data traffic left and right, that it has to go smooth.”
> – Board room manager, Firm 4

Firm #4 has understood this and has put organizational (i.e. social and communication skills) learning at the center of its organizational philosophy and have implemented learning strategies to achieve this. They therefore perform high on such learning strategies. Firm #5 has some eye for it in the sense that they offer voluntary training in non-technological areas, such as professional leadership and conflict mediation. They perform medium. Firm #1, #2 and #3 have a technologically focused culture, put very little resources in organizational learning strategies and therefore perform lower.

**Key Findings about “Firm’s culture and position in the market”**

- The sector is subject to an increase in technological and market demands’ complexity.
- The pressure on the firm is to shift to working with firms as equal partners in a network.
- To let this succeed, the firms’ corporate culture is pressured to change: from valuing and being interested in technology to include interest in improving the organization, e.g. the employees’ social, personal development and communication skills and better ways of organizing and collaborating.
Firm’s culture and position in the market
Learning strategies
Position
Culture
Actor in a value chain
Actor in a network of equal partners
Strategies that foster technological learning in employees
Strategies that increase the social, communication and personal development skills of virtually all employees
Strategies that foster technological learning
Strategies that foster technological and organizational learning

Network economy
shift towards closer cooperation between actors as equal partners
Strategies for the increase in individual learning, including from other seconded employees
Strategies for the increase in collective technological and organizational learning
Strategies for the increase in collective technological and organizational learning, incl. experimentation

Technological complexity ↑
IoT, Big Data, Industry 4.0
Market demands’ complexity ↑
Integrated technological solutions, such as ‘Smart Cities’

Figure 13: Influence of firm’s culture and market position on the learning strategies used by a firm

Figure 14: Influence of organizational type on the learning strategies used by a firm

Technological complexity ↑
IoT, Big Data, Industry 4.0
Market demands’ complexity ↑
Integrated technological solutions, such as ‘Smart Cities’

Profit maximization

Learning strategies
Secondments
Input agreement
Low risk, low margins
Projects
Output agreement
Higher risks, higher margins
Products
Best output necessary
Highest risks, highest rewards

Options
Effect: focus and resources spent on

Focus and resources spent on

Learning strategies
Technological complexity ↑
IoT, Big Data, Industry 4.0
Market demands’ complexity ↑
Integrated technological solutions, such as ‘Smart Cities’

Network economy
shift towards closer cooperation between actors as equal partners
Strategies for the increase in individual learning, including from other seconded employees
Strategies for the increase in collective technological and organizational learning
Strategies for the increase in collective technological and organizational learning, incl. experimentation

Figure 14: Influence of organizational type on the learning strategies used by a firm
5.3.5. Organizational type

The fifth driver of implemented learning strategies within the firm is the firm’s organizational type. This category is composed of three elements: being a secondment organization, a project organization and/or a product organization. A firm’s organizational type can be any of these three or a combination of the above. As Table 6 showed the firms all represent a different variation. It is found that these three options all influence in a different way – how will be explained shortly – what type, level and number of learning strategies are implemented.

A secondment organization’s business model is seconding individual qualified employees at firms that need them temporarily. The term ‘temporarily’ ranges from 3 months to 5 years in the case of the high tech software sector’s customers. The basis is that the seconded employee works at the customer’s office for that time. These three elements – individual secondments, temporarily up to 5 years and at the customer’s location – drive the learning strategies that secondments (can) put in place. The aim of their learning strategies is generally to increase the level of necessary technological and non-technological knowledge of the seconded employees. This mainly happens through tailor-made training from the secondment organization and “often they also get training at the customers” (Board room manager, Firm #4). Learning strategies that are less desirable or possible to initiate in a secondment organization are for instance a strongly supported shared mission statement, supportive management, experimentation and mechanisms for the transfer of knowledge. A manager explains the latter in more detail:

“A large part of your knowledge is permanently borrowed to other parties. The knowledge is with the people that accumulate it and these people are not at our own office. This makes knowledge sharing more difficult [...] Additionally, some of the knowledge they possess is proprietary information so that we are not allowed to share this with others.” – Manager, Firm 4

The project organization’s core business is doing projects in their own firm for external customers. There are two advantages for the customer that the project organization holds over the secondment organization. Firstly, the risk that something goes wrong is lower for the customer. This is mainly due to the fact that “projects are generally done for a fixed-price or under a fixed budget” (Manager, Firm #5). This lowers the risk that the end result will require more input (i.e. hours of work) and thus more money. Instead, this risk is on the shoulders of the project organization. However, this can mean that any additional costs will incur losses on the project organization, but it can also mean that when the costs turn out lower it receives the left-over budget in the form of additional rewards. Another reason for the lower risk for the customer is the fact that the guidance of otherwise seconded employees now is the responsibility of the project organization, not the customer. When someone falls ill or doesn’t function well the project organization is responsible for solving it without billing the customer extra. Secondly, project organizations will ensure that the solutions are the products of group work, not
individual work, generally producing higher quality work. This also has an influence on the learning strategies that the project organization focuses on:

“[Projects are] about the collective [knowledge] which you also have to secure in the organization, specifically for the high number of new employees coming in [to start a new project]. You have to institutionalize that. You have to make it individual-independent.” – Manager, Firm 5

Concretely, this means that a clear understanding and support for the mission, including how to achieve goals; motivating and enabling leadership, including giving feedback and discussing failures; organizational structure, such as multidisciplinary teams and the rotating of tasks; and quality management, such as quality circles and mechanisms to evaluate (organizational) ideas all become more important. In short, the learning strategies project organizations implement and are interested in are more about collective technological and organizational learning.

Product organizations are focused on making a product within the limits of their resources. A high quality is extra important for (innovative) high tech software products, because that is the criterion - besides price - they compete on (while secondment or project organizations also get assignments by just being nearby or having capacity). Making products require high investments, but when successful translate into very high rewards as well, interviewees say, because with licensing “[The firm] also get paid for the hour the product is used, but [we] still lay in our beds” (Employee, Firm #5). The product organization’s employees generally divide the work, but almost always have a collaborative phase in their work as well. They mostly work on one location. These three defining elements – striving for excellence, team work and on one location – drive the product organization to focus and spend resources on learning strategies that help experimentation as well as technological and organizational learning that are similar to the project organization.

The advantages of project and product organizations – that they take away risks of customers and give higher profits to the organization themselves – are the reason that with the increase in technological and market demand’s complexity and with the ever-lasting search for more profits, more high tech software firms move away from secondments to projects and products.

**Key Findings about “Organizational type”**

- Secondment organizations focus, spent resources and perform well on learning strategies that increase the knowledge level of the individual employee, also via contact with other employees;
- Project and product organizations do so on learning strategies that increase the collective technological and organizational learning, while experimentation also gets attention in product org’s
- The increase in technological and market demand’s complexity and the search for profit pressures firms to shift from being a secondment organization to being a project and/or product organization.
6. Discussion

This Discussion chapter answers the sub-research question 5:

RQ5: What practical recommendations and theoretical implications can be given based on the findings about the learning strategies and their driving factors?

This is done by first discussing the theoretical contributions (Section 6.1) and then the practical recommendations (Section 6.2). Moreover, the strengths, weaknesses and limits of the current research (Section 6.3) and the suggestions for future research (Section 6.4) are also discussed.

6.1. Scientific contributions

Five scientific contributions of the current research project are presented. First two theoretical contributions are presented and then three empirical contributions are explained.

a) An integrated model for the learning organization is developed

Based on a range of highly referenced and prominent books and articles that have all conducted extensive literature reviews in different subfields, an integrated and up-to-date theoretical model of the learning organization has been developed (summarized in Table 4-5). This model is the most complete model currently existent. It includes learning strategies for 8 internal and 5 external learning domains of the firm. It has been used and applied in the high tech software sector and if it will be used and validated in other sector after the recommendations for further improvement (see ‘f’) have been taken into account, this model and the corresponding measurement instrument (in Appendix 9.2. and 9.3.) provides an impressively complete and updated model of the learning organization. As theoretical models are better when they “proceed to better testable theories, which means proceeding to theories of ever richer content, of a higher degree of universality, and an all higher degree of precision” (Popper, 1972, p. 193), this theoretical model has improved the literature’s standards.

b) Insights obtained how the learning organization framework can further be improved

The second theoretical contribution of this research project relates to suggestions for improvement of the learning organization framework. As Appendix 9.11 “Learning strategies not fully covered by the theoretical framework” shows, the learning strategies enhancing the employees’ motivation, building their social network, and standardization of the recording of existent and valuable knowledge were not fully covered by the current theoretical framework. In addition, buying knowledge in the form of acquisitions, treating employees with high regard and giving them a high status/weight in the organization and managing a desirable in- and outflow of employees were all learning strategies in the high tech software sector that weren’t covered at all by the framework. The learning organization
framework would be strengthened when it would include these learning strategies as well – while simultaneously testing and considering whether all other learning strategies remain valid in the future.

c) Learning strategies of high tech software firms are indicated

This research is filling the empirical gap in literature that the presence of the learning organization within high tech software firms’ learning strategies had not yet been researched. This research shows that high tech software firms’ implementation of the learning strategies of the learning organization framework corresponds, on average, to ‘some degree’ and that there are significant differences in the (best) practices that are employees in the highest and lowest scoring high tech software firms.

The three lowest scoring firms, representing 60% of the sample, scored just above ‘neutral’ and cannot yet be considered a learning organization. The two top scoring firms, 40% of the sample, came on average closer to fulfilling the criteria of the learning organization. Whereas the second best firm scored overall just towards a positive evaluation, illustrating the informal nature of its learning organization, the best scoring firm has intentionally put learning in the core of its organization, works hard to formally develop it and therefore fully qualifies as a learning organization. The ratio of learning organization versus non-learning organization, 40 vs. 60%, in the high tech software sector is in line with the empirical findings of the general economy in The Netherlands and across Europe as found by Arundel et. al (2007).

Moreover, the research found some interesting indications about which learning strategies get priority in their development in the firms. Firstly, external learning strategies of high tech software firms are generally found to be implemented more than the internal learning strategies. This gap exists for all firms, but interestingly the two best performing firms have the smallest gap. Secondly, there is an indication that the domains of learning strategies that cost relatively little are more used than the ones that are relatively more resource-intensive to implement. It seems that firms go for the “low hanging fruit” first. These two trends were not found in the literature review conducted.

d) Drivers of high tech software firms’ learning strategies are indicated

This research also brings an empirical contribution about the drivers of high tech software firm’s learning strategies. The main drivers that are found to influence the use of certain learning strategies are: firm size, ownership status, the innovative/following and generalist/specialist focus of the firm, organizational type, a firm’s culture and the firm’s position in the market.

Firstly, the firm size’s effect is different than described by (Lundvall, 2006). Lundvall describes that the learning organization is less present among smaller firms than among larger firms. This research indicates that small size can enable firms to have learning created, consciously, through informal mechanisms whereas larger firms have to do it with formal systems (see Figure 10). So small firms
find their own smart and informal ways to get the same result as large firms try to get through larger, formal measures. The 2nd and shared 3rd position of the two small firms indicate that small firms do not necessarily have less chance to be a learning organization as stated by Lundvall (2006).

Secondly, *ownership status* is found to be a driver (see Figure 11). Stock exchange registration drives the large firm of the sample to only take measures that have a positive return within one or two months. Investors show a little more patience, but also want financial return in the medium term. Individual ownership of the firm by the directors is said to also focus on non-financial gains and long term gains. While no literature is found that confirms ownership as a driver of the learning strategies it is states in the work of (Mazzucato, 2015) that investors and the stock exchange have a similar ‘short term focus’ on R&D strategy.

Thirdly, the *focus* of the firm matters too (see Figure 12). The fact that different learning strategies become important when a firm either wants to innovate or follow innovations on a later moment is in line with Dittrich and Duyster’s (2007) finding that innovation focus matters for what type of open innovation networks come about and what capabilities are needed to work in them, as well as Bierly and Hamalainen (1995) and Meeus et. al. (2001) findings that an innovative market/sector induces a higher level of interactive learning. Moreover, the effect of either a generalist or a specialist focus on the learning strategies is new, but has some overlap with the effect of having a differentiation strategy based on multiple offerings versus a cost-based leadership strategy, as found by (Kharabsheh et al., 2015).

Fourthly, this research found that the *type of organization* – project, product or secondment – mattered (see Figure 14). Though there is some insight about the role of focusing on process or product innovation (Cavaliere & Sarti, 2011), the found effect of being a project or secondment organization is relatively new to the field of the learning organization literature.

Fifthly, the effect of a *firm’s culture* and whether this is focused on organizational learning or not (see Figure 13) is in line with and confirms Martensen and Dahlgaard (1999) in their finding that in the West the organizational learning culture is crucial in establishing a learning organization.

Lastly, the effect of the *firm’s position in the market* is found to influence the use of learning strategies. When a firm sees itself as part of a value chain different learning strategies are used than when it positions itself an actor in a broader network of equal partners. Whereas these findings are related to acknowledgments about the new loci of innovation (WRR, 2015) and the so called equal partnership model of the so called ‘network economy’ has gotten (skeptical) attention before (Hudson, 1999; Jaegersberg & Ure, 2011) the effect of these trends and strategic choices in the marketplace on learning strategies has not been researched before. It is therefore a new contribution to the literature.
Importantly, in all these driving factors, it is information of the participants that has been central in modelling their influence. However, “every observation is preceded by a problem, a hypothesis, [...] By something theoretical or speculative” (Popper, 1972, p. 343). This also applies to the influence of these driving factors. These indicative models should therefore be seen as rooted in the interviews, but brought together by the interviewer’s view. As such, it belongs to the type of qualitative research where, with inductive logic, a generalized theoretical model/broader explanation becomes an endpoint (Knutsen & Moses, 2007). The steps for this analysis to work, as described in (Knutsen & Moses, 2007, p. 63), include gathering information via interviews, asking a number of open-ended questions, analyzing data to form themes and categories, looking for broader patterns and discussing the outcomes, as done in aforementioned paragraphs, as opposed to the literature.

**e) The importance high tech software firms attach to learning is indicated**

The research project also sheds more empirical light into the reasons why learning strategies are seen as important by high tech software firms. The participants have recognized the importance of learning and learning strategies for their firms, as can be seen in Appendix 9.12. Their responses can be divided into three categories: “enlarging profits”, “increasing the ability to (necessary) change” and “enhancing the ability to attract and retain high quality employees”. These broader categories are composed of multiple sub-reasons for why learning and learning strategies can be invested in.

In the existing literature the three broader categories are described and most of the subcategories are too. The literature distinguishes: increasing the organizational performance (Cegarra-Navarro & Dewhurst, 2007; Hult, Ketchen, & Nichols, 2003; Ji Hoon Song & Chermack, 2008; Kharabsheh et al., 2015; Lundvall, 2006; Santos-Vijande, López-Sánchez, & Trespalacios, 2012); competitiveness; innovation; adaptability; productivity; growth; and employment (Lundvall, 2009). However, the ‘it increases a firm’s adaptability’ does not refer to the adaptability needed when a firm’s mission or organizational structure changes or when the inflow and outflow of employees has to be managed. These reasons for why learning and learning strategies are important are thus new in the literature.

Moreover, it is also reported (see Section 5.3.4., p.121 and Figure 13 and 14) that learning strategies will become more important because of an increase in the technological and market demands’ complexity in the sector. In the literature this dynamic is already acknowledged: the complexity of the technology and of the innovations that are successful in the market influence the need for external collaboration and the level of learning (capacity) (Bierly & Hämäläinen, 1995; Meeus et al., 2001). Interesting is, however, that most literature about the need for a learning organization points at the increases rate of change as a reason for learning strategies to become more important. This research indicates that it is not so much the accelerated speed of change, as (Lundvall, 2006, 2009; Lundvall & Johnson, 1994) state, that forces firms in the high tech software sector to get better learning strategies, but the increased complexity of the technology and market demands.
6.2. Practical recommendations

6.2.1. Recommendations for firms

Dear high-tech software firms,

This research project has been set up to review the literature about the importance of learning for firms’ business performance and innovation, and give recommendations based on the findings about the (drivers of) learning strategies the researched high tech software firms currently use.

The interviewees are clear about the added value of learning strategies: it is essential for improving performance and productivity, it increases innovation and adaptability, and it helps create a competitive advantage both in the software market and on the labor market when attracting staff (Appendix 9.12).

The research about the firms used learning strategies draws attention to the statements by various interviewees that learning strategies will get more important as the complexity of the technology and the complexity of market demands increases. Indeed, with the rise of the technologies such as the Internet of Things, Big Data and Internet 4.0 and the call for integrated market solutions, such as the Smart City, collaboration with others firms as ‘partners in a network economy’ becomes more important (Figure 13 and 14).

To be successful in such partnerships virtually all employees of high tech software firms are required to (further) develop their social, communication, leadership and personal development skills. Learning strategies of the firm are needed to achieve this.

The how-to-possibly-do-this question can be answered by looking at the reasons why the best performing high tech software firm managed to implement so many more learning strategies than most firms. Their success originated in having employees with a social skills background that are on human resource management. The firm’s management made the wellbeing and social skills of its people part of its mission and has put resources on the table for its further development. The recommendation to high tech software firms therefore is:

Scale up your attention to learning strategies:

a. Make organizational innovation and learning a management priority
b. Invest in staff with a social background for human resource-, knowledge- and innovation management to coordinate the development of learning strategies
c. Improve the learning happening on the work floor by adopting the relevant best practices of other high tech software firms, see Appendix 9.13.
6.2.2. Recommendations for clusters

Dear high-tech software cluster,

The aforementioned described how learning strategies in a firm are incredibly important for maintaining high performance over time and enhance adaptability to deal with (un)foreseen changes. The most important foreseen change is the increase in complexity of the technology and the market demands. As Figure 13 shows, it will increase the need in most firms to implement learning strategies that further develop employees’ social, communicative, leadership and personal development skills.

High tech software firms, however, do not need to invent these learning strategies by themselves. Collaboration through the cluster can spread best practices quickly and spiral the overall learning performance of all members upwards. To facilitate this this research project recommends:

Make organizational innovation and learning a priority within your cluster:

a. Set up a working group to share knowledge about learning and how to increase it
b. Let members share their best practices within the working group to inspire others
c. Invite external experts about learning and organizational innovation to inspire members

Appendix 9.14. includes suggestions made by the interviewees themselves for the HTSC board.

6.2.3. Recommendations for regional development boards

Dear regional development boards,

In this research it is shown that learning has been recognized as conducive for business performance and innovation, the majority of high tech software firms have not optimally implemented learning strategies and technological and market demand complexity is set to increase, so that learning strategies become more important. When these conditions also apply for other (high tech) clusters, this research recommends:

Create awareness about the importance of organizational innovation and learning in clusters

a. Go to cluster boards and its members and investigate the need for learning strategies
b. Spread the message that a technological focus alone will not suffice for surviving the future
c. Create an “Organizational Innovation and Learning Academy” where multiple clusters and their members can increase and share their knowledge
6.3. Strengths, weaknesses and limitations of the research

The strengths, weaknesses and limitations of this study are important to discuss to weigh the findings of the research.

Strengths
There are a number of strong points about the research project. Firstly, the spectrum of the high tech software firms researched was very diverse: there were purposefully 2 small, 2 medium and 1 large firm selected, as well as a nice range of product, project and secondment type organizations. Moreover, in the interview analysis phase it turned out that there was a diversity in ownership status, as well as in innovating/following focus and technology/technology and organization focused-culture. This diversity of the high tech software firms enables a broader analysis to be made of multiple drivers. The generalizability of the general conclusions drawn from the 5 firms to the wider high tech software firms’ population is also consequently better.

Secondly, there was a strong triangulation of data. Surveys first gave a quick insight about the learning strategies used according to the interviewees, interviews asked for in-depth explanations of this conduct and documentation was used to check whether this was backed up and documented. Moreover, claims by interviewees were checked by asking other staff about their experiences in the firm. Smartly, this always included at least 1 top manager, middle manager and employee of each firm. In the interviews a confidentiality agreement was made to only refer to the people with their role and firm number. This and the general atmosphere created turned out to infer strong cooperation from the interviewees, and many personal stories came up. Both the triangulation and cooperation of stakeholders contributed to producing an accurate picture of the learning strategies in use.

Thirdly, a great number of thorough, detailed and extensive analyses have been made with the data obtained. In total seven different analyses have given insight into the level and type of learning strategies high tech software firms use and which drivers of learning strategies exist. This has provided a high-quality description of the learning strategies and insight into the most prominent processes at play. The fact that the analysis was both containing quantitative statistics as well as qualitative statements and analyses also contributed to a broad and deep understanding of the learning strategies in the high tech software sector’s.

Fourthly, the research has produced strong contributions to the literature, filling various research gaps, and to the professional domains of high tech software firms, clusters and regional development agencies. As the practical recommendations are mostly based upon three building blocks that are more broadly present, namely that learning is conducive to performance and innovation, increasing complexity makes learning more important and most of the firms in a sector can still gain in learning
strategies, the practical recommendations apply more broadly. This generalizability of the outcomes is another strength of this research.

Weaknesses and limitations

There are also some weaknesses and limitations of the research project. Interestingly, the weaknesses primarily originate in the focus of the research project on the practical realities of the high tech software firms. The effect of this initial focus was that the research was more designed to produce practical recommendations than to fill scientific gaps in the literature. The latter was only taken into account later in the process. The first weakness is therefore that the effect of this research on the literature and the positioning within the literature landscape is less strong than it could have been in the case the literature had been taken as the starting point.

Moreover, the practical focus also had the effect on the creation of the theoretical framework. The choice was made to build an integrated theoretical framework based on both organizational learning literature and literature related to the learning economy/organization. This was done in order to produce an almost all encompassing model that was more complete than any of the existing measurement instruments. As such, it was able to represent the reality in the most complete way and guaranteed a sufficient number of recommendations. However, a disadvantage is then that the integrated framework builds on various traditions that may not always be completely consistent with each other.

Additionally, the tendency to end up with a most complete framework also led to the choice to use Goh & Richards (1997) as a starting point, because it was the most extensive and a well operationalized model. Its survey thus functioned as a core building block of the final survey. The survey was strong in the sense that it was based on an extensive literature review of measurement instruments and it was validated and simplified. Most of the survey questions were without flaws and interpretation difficulties. However, some questions turned out to be confusing or somewhat multi-interpretable by the participants. This limits the view that the quantitative ratings give. This is the third weakness. Fortunately, the fact that many participants only filled in the survey just before the interview and their answers were discussed helped limit the effect of this flaw. When after asking for an explanation for their answer, they expressed confusion about the question, this was noted and the more elaborate qualitative answer was taken even more strongly into account. Happily, it seemed that this confusion was occurring only in a small number of cases (3-4 participants).

In addition to some research weaknesses due to the focus of the research, the design of the research also has some implications on the limits of this research. This includes the method of case selection and the method of data collection. For the method of case selection, the participants, both the firms and the interviewees, consented, after being informed, to participate in this research. In the case of voluntarism, it always “raises an important question: are voluntary participants representative of the
“general election?” (Bordens & Abbott, 2008, p. 165). The external validity may, if this is the case, be at risk. However, in order to prevent that the findings are solely applicable to these participants, a number of steps can be been taken that remedy the potential bias. As Bordens & Abbott (2008, p. 171) suggest, the call for participation has to be made as interesting and non-threatening (e.g. through promises of confidentiality) as possible; the practical and theoretical relevance have to be stated; no tasks must be psychologically or biologically burdensome; and let someone with high status known to the interviewee request for their participation. These steps have all been taken in both involving the firms and interviewees in the research. Taking these steps into account, it can therefore be said that the weakness is therefore largely neutralized.

For the method of data collection, the interviewer’s probes and follow-up questions in the some interviews may have had a more encouraging tone than in other interviews. This, potentially, has created some “interviewer’s bias” when participants responded more strongly if they were greeted with more enthusiasm. Future research will benefit if potentially probes and sub-questions are worked on before the interview as well.

Lastly, the fact that this research project is an explorative study also brings some last limiting points about the generalizations the study can make. Firstly, the fact that it an explorative study means that the findings are indications and require more and repeated study. Secondly, the research was applied to high tech software firms in the Netherlands in 2016. The generalizability and applicability of its findings in other contexts, such other times, countries and other type of clusters, still remains to be seen. The findings are therefore limited to be an indication of Dutch high tech software firms.

6.4. Suggestions for future research
In light of the strengths, weaknesses and limitations of the research project, as well as the research findings, what suggestions for future research can be given? Firstly, it is helpful if more research is done about the learning strategies of high tech software firms to confirm the findings of this research. This can be best done by researching the current high tech software cluster more elaborately – more firms, more sources, more participants – or by exploratively researching similar high tech software firms and clusters in other (Western-European) countries.

Secondly, the findings of these research can be used as inspiration to further investigate learning strategies in other contexts. Research can be done in other (high tech) clusters to see whether the current findings apply: is there also a large difference between firms in the attention for organizational innovation and learning? And are the learning strategies also predominantly driven the technology and market demand complexity rather than the rate of change? For the body of knowledge as well as practical recommendations to firms, clusters and regional development agencies, the answers to these questions are valuable to know.
7. Conclusion

The objectives of this research were to find out what learning strategies high tech software firms employ, what drivers lie behind this behavior, and what recommendations can be given to firms, clusters and regional development agencies on the basis of these insights and findings.

The main research findings are:

1. The level of learning strategies that is, on average, implemented by the high tech software firms correspond to ‘somewhat’ (Figure 6, p. 36), whereas the level of learning strategies that are employed in the highest and lowest scoring high tech software firms differ significantly indicating there is room for improvement for most firms (Appendix 9.7, p. 95)

2. The type of learning strategies that are implemented and used are predominantly learning strategies that are more easily implemented. It is also the case that the firm implement external learning strategies more than internal learning strategies, although this gap is smaller for the better performing firms (Section 5.2.3. and 5.2.4., p.39-41).

3. The drivers of learning strategies that influence the interest in certain learning strategies in high tech software firms are: firm size, ownership status, the innovative/following and generalist/specialist focus of the firm, organizational type, a firm’s culture and position in the market (Figure 10 until 14, p. 43-51)

4. The importance of learning strategies is clear for participants as it enlarges profits, increases adaptability to technology and market development, and helps to deal internally with employee turnover and organizational change (Appendix 9.12, p. 113). Moreover, participants report learning strategies importance will increase due to the increase in the complexity of technologies and market demands (Figure 13 and 14, p. 51).

The main recommendations to firms, clusters, and regional development agencies are:

A. To high tech software firms: increase your attention to implementing learning strategies. Your organizational learning, adaptability and performance can improve by adapting the design of your firm in line with the relevant best practices of other firms (Appendix 9.13, p.115). Moreover, the importance of learning strategies is reported to increases due to the increase in the complexity of technology and market demands in your sector (Figure 13-14, p. 51)

B. To high tech software clusters: make organizational innovation and learning a priority. Set up a working group to increase the knowledge about organizational innovation and learning strategies and in this way help your members to increase their learning strategies (p. 59).

C. To regional development boards: create awareness and increase knowledge about the importance of learning strategies for clusters that are faced with increasing complexity (p.59).
8. Reference list


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9. Appendices

9.1. Literature review search terms and found and selected articles

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*After having taken out articles that were selected more than once, through various search terms.

Note: 'ATKA' means that the term is only search in the Article Title, Keywords, and Abstract.

Note: this overview reflects the literature searched, found and used of the extensive literature review that can be found in the document "Literature Review". If desired, the researcher is happy to send this over.
9.2. Questionnaire

**Vragenlijst over kennismanagement en leerstrategieën bij High Tech Software bedrijven in de regio Eindhoven**

Deze vragenlijst bestaat uit twee delen:

a) een aantal algemene vragen over het bedrijf waar u werkt, en uw positie
b) 11 thematische secties met statements over onderwerpen die gerelateerd zijn aan kennismanagement en leer-strategieën van uw bedrijf


Thuis eten we vaak hamburgers.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

Als je vindt dat je niet genoeg kennis beschikt om op deze vraag te beantwoorden, dan kun je ‘Niet toepasbaar’ aanvinken of de vraag open laten.

Vul a.u.b. de vragenlijst in met de kernactiviteit van uw bedrijf in het achterhoofd. Als er meerdere kernactiviteiten zijn (bv. detachering en interne projecten), vul ze dan in op basis van de kernactiviteit waar u het meeste van weet en geef bij vraag 1c aan op welke kernactiviteit u focust.

Vul de vragenlijst in op basis van uw ervaringen in het afgelopen jaar. Als u korter in uw huidige rol werkt, neemt u de periode dat u in de huidige rol werkt.

Het invullen van de vragenlijst kost ongeveer 10 minuten.

Let op:
- waar de statements verwijzen naar ‘senior managers’, je kan ook ‘senior manager’, ‘directeur’ of ‘eigenaar’ lezen als dit relevanter is in uw bedrijfscontext.
- waar er meervoud staat, zoals ‘werknemers’ of ‘managers’ kan ook altijd het enkelvoud, dus ‘werknemer’ of ‘manager’ gelezen worden als dit beter past in uw bedrijfscontext
- er wordt gevraagd naar uw mening over u eigen positie, (senior) managers, werknemers in het algemeen en de organisatie als geheel, let erop dat u goed nadenkt of u denkt dat de statements waar of niet waar zijn voor deze groepen; ook als u zelf deel uitmaakt van een groep (bv. ‘managers’) mag u de statements invullen die over deze groep gaan.
A) Algemene vragen over het bedrijf waarin u werkt en uw positie

1. Bedrijfsgegevens

a. Wat is de naam van uw bedrijf?

b. Hoeveel mensen werken in totaal als werknemer voor de vestiging van het bedrijf waar u werkt?

- 1 - 5
- 5 – 10
- 10 – 25
- 25 – 50
- 50 – 250
- 250 or more

c. Wat is kernactiviteit van het bedrijf waarin u werkt?

d. Werkt u bedrijf aan software, embedded software, middleware of hardware? Meerdere antwoorden zijn mogelijk.

- Software
- Embedded software
- Middleware
- Hardware
- Anders, namelijk:

Als uw bedrijf werkt in de (embedded) software, hoe zou u uw bedrijf kwalificeren: als eens software dienstverlener, een software product ontwikkelaar of beiden?

- Software dienstverlener
- Software product ontwikkelaar
- Software dienstverlener en software product ontwikkelaar
- Anders, namelijk:

2. Persoonlijke gegevens

a. Wat is uw leeftijd?

b. Wat is de naam van de functie die u bekleedt?

c. Hoeveel jaar werkt u nu uw huidige positie? (Als het minder dan 1 jaar is, hoeveel maanden?)

d. Hoeveel jaar werkt u nu in het bedrijf? (Als het minder dan 1 jaar is, hoeveel maanden?)

e. Hoeveel uur werkt u per week in uw positie?

- Voltijds
- Deeltijds, namelijk ...

f. Geeft u leiding aan werknemers binnen het bedrijf? Zo ja, hoeveel?

- 1 - 5
- 5 – 10
- 10 – 25
- 25 – 50
- 50 – 250
- 250 or more

g. Welke verantwoordelijkheden heeft u in uw huidige positie? Vink a.u.b. alle relevante boxjes aan; meerdere antwoorden zijn nodig.

- Kennismanagement
- Innovatie management (=het management van het ontwikkelen van nieuwe producten, diensten, processen of business modellen)
Human resource management
Leren binnen de organisatie
Anders, namelijk:

_B) Statements over thema's die relateren aan kennismanagement en leer-strategieën_

3. _Helderheid van missie en doelen_

a. Er is steun voor en acceptatie van ons bedrijf haar missie statement.

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

b. Ik begrijp hoe we de missie van ons bedrijf kunnen bereiken.

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

c. Ons bedrijf haar missie statement identificeert waarden waar alle werknemers zich aan moeten houden.

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

d. We hebben tools om onszelf te beoordelen op essentiële presentatie indicatoren (“key performance indicatoren”)

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

4. _Leiderschapcommitment en empowerment_

a. Senior managers in ons bedrijf staan open voor verandering en nieuwe ideeën.

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

b. Senior managers en werknemers in ons bedrijf delen een gemeenschappelijke visie over wat ons werk moet bereiken.

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

c. Managers in ons bedrijf kunnen kritiek accepteren zonder zich te defensief op te stellen.

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

d. Managers in ons bedrijf geven feedback die helpt om potentiële problemen en kansen teidentificeren.

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

e. Managers in ons bedrijf betrekken werknemers bij belangrijke beslissingen.

- sterk oneens
- oneens
- neutraal
- eens
- sterk eens
- Niet toepasbaar

5. _Organisatie structuur_

a. Project-teams in ons bedrijf bestaan uit werknemers met een verscheidenheid aan achtergronden.
b. Werknemers in één functie categorie nemen verantwoordelijkheden en taken over van werknemers uit een andere functie-categorie, en vice versa.

Niet toepasbaar

6. Kwaliteitsmanagement:

a. We komen geregeld in kleine groepen samen om kwaliteitschecks te doen van ons product of onze dienst.

Niet toepasbaar

b. We hebben een systeem om werknemers hun ideeën en voorstellen te verzamelen.

Niet toepasbaar

c. We monitoren wat we leren in ons bedrijf.

Niet toepasbaar

7. Human Resource ontwikkeling:

a. Dit bedrijf biedt trainingen aan de werknemers aan op basis van de behoeften van ons bedrijf.

Niet toepasbaar

b. We plannen de trainingen van onze werknemers op de lange termijn.

Niet toepasbaar

c. Ik leer veel van het uitvoeren van mijn taken.

Niet toepasbaar
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d. We proberen bewust onze teams zo samen te stellen dat de teamleden divers in hun achtergrond zijn.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

8. Transfer van kennis

a. Ik heb vaak de kans met andere werknemers te praten over succesvolle projecten of werkactiviteiten met als doel te begrijpen waarom ze succesvol zijn.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

b. Fouten worden constructief besproken in ons bedrijf.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

c. Nieuwe werkprocessen die waardevol kunnen zijn voor de organisatie als geheel worden normaliter gedeeld met alle werknemers.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

d. We hebben een systeem dat ons helpt te leren van het succes van andere organisaties.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

e. Mijn werk wordt bepaald door het roteren van taken tussen mij en mijn collega’s.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

9. Beloning en budget systemen

a. Salarissen in ons bedrijf zijn gebaseerd op persoonlijke kwalificaties en functie-categorien.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

b. Salarissen in ons bedrijf zijn gebaseerd op resultaten.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

c. Innovatieve ideeën die werken worden beloond door het management.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

d. Er is een fase in ons budget proces waar we ons afvragen of we middelen moeten uittrekken voor de geplande activiteiten.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar
10. Experimenteren

a. Managers in ons bedrijf moedigen werknemers regelmatig aan te experimenteren om zo werk processen te verbeteren.

[ ] sterk oneens  [ ] oneens  [ ] neutraal  [ ] eens  [ ] sterk eens  [ ] Niet toepasbaar

b. Ik kan vaak nieuwe ideeën inbrengen in ons bedrijf.

[ ] sterk oneens  [ ] oneens  [ ] neutraal  [ ] eens  [ ] sterk eens  [ ] Niet toepasbaar

c. Nieuwe werknemers worden aangemoedigd aan de kaak te stellen hoe we zaken in ons bedrijf aanpakken.

[ ] sterk oneens  [ ] oneens  [ ] neutraal  [ ] eens  [ ] sterk eens  [ ] Niet toepasbaar

11. Externe samenwerking

a. Ons bedrijf werkt samen met klanten.

[ ] sterk oneens  [ ] oneens  [ ] neutraal  [ ] eens  [ ] sterk eens  [ ] Niet toepasbaar

Als ‘sterk eens’ of ‘eens’ is ingevuld, vink a.u.b. de box aan welke activiteit(en) jullie ondernemen met klanten:

[ ] vragen wat hun markt behoeften zijn
[ ] vragen om feedback op een bestaand product/dienst
[ ] vragen om feedback op een prototype van een nieuw product/dienst van het bedrijf
[ ] anders, namelijk:

b. Ons bedrijf werkt samen met toeleveranciers.

[ ] sterk oneens  [ ] oneens  [ ] neutraal  [ ] eens  [ ] sterk eens  [ ] Niet toepasbaar

Als ‘sterk eens’ of ‘eens’ is ingevuld, vink a.u.b. de box aan welke activiteit(en) jullie ondernemen met toeleveranciers:

[ ] vragen om feedback op een bestaand product/dienst
[ ] vragen om feedback op een prototype van een nieuw product/dienst van het bedrijf
[ ] samen een R&D project ondernemen
[ ] we outsourcen de uitvoering van een bepaald project aan hen
[ ] we outsources een R&D project aan hen
[ ] anders, namelijk:

c. Ons bedrijf werkt samen met universiteiten en/of kennisinstellingen.

[ ] sterk oneens  [ ] oneens  [ ] neutraal  [ ] eens  [ ] sterk eens  [ ] Niet toepasbaar

Als ‘sterk eens’ of ‘eens’ is ingevuld, vink a.u.b. de box aan welke activiteit(en) jullie ondernemen met universiteiten en/of kennisinstellingen:

[ ] samen onderzoek doen
☐ contact onderhouden over de patenten van de universiteiten/kennisinstellingen
☐ deelnemen aan de spinoffs van universiteiten/kennisinstellingen
☐ deelnemen aan conferenties die (mede) georganiseerd worden door universiteiten/kennisinstellingen
☐ gebruik maken van kennis en informatie bestanden of documenten van universiteiten/kennisinstellingen
☐ overleggen en overeenkomen welke kennis en vaardigheden studenten moeten leren op onderwijsinstellingen
☐ het werven van studenten als stagairs in het bedrijf
☐ afgestudeerde studenten aantrekken als nieuwe werknemers
☐ anders, namelijk:

d. Ons bedrijf werkt samen met consultants.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

Als ‘sterk eens’ of ‘eens’ is ingevuld, vink a.u.b. de box aan welke activiteit(en) jullie ondernemen met consultants:

☐ samen onderzoek doen
☐ ons van advies voorzien over externe technologische ontwikkelingen
☐ om onze organisatie te reorganiseren
☐ om het management van een project uit te voeren
☐ anders, namelijk:

e. Ons bedrijf werkt samen met bedrijven die werkzaam zijn in dezelfde sector als de onze.

☐ sterk oneens  ☐ oneens  ☐ neutraal  ☐ eens  ☐ sterk eens  ☐ Niet toepasbaar

Als ‘sterk eens’ of ‘eens’ is ingevuld, vink a.u.b. de box aan welke activiteit(en) jullie ondernemen met bedrijven werkzaam in dezelfde sector als de onze:

☐ samen onderzoek doen
☐ contact hebben over elkaars patenten
☐ gezamenlijk deelnemen in een ‘corporate venture’
☐ delen van kennis
☐ anders, namelijk:
9.3. Interview Guide

1. Introduction and explanation of the interview (5 mins):
   a. Put the interviewee at ease
   b. Introduce yourself
      i. BA in Maastricht in Social Sciences
      ii. MSc Innovation Sciences at the TU/e, electives entrepreneurship and management minor in HRM and labor market issues at KU Leuven
      iii. Interest in transformation of the economy and the social organization of business organizations
      iv. Hobbies: soccer, running, hiking
   c. Explain the purpose of this study
      i. This research is my graduation project
      ii. Academic purpose is to find out what type of knowledge management and learning strategies high tech software companies have
      iii. Professional purpose is to do a benchmarking study of high tech software companies: the research shows what sort of KM and LS they have in comparison with other companies and compared to the literature, with some suggestions for alternative KM and LS.
   d. Announce the format of the interview
      i. First, ask you to introduce yourself
      ii. Second, talk about your view of KM + LS situation, in general and using remarkable results from the online questionnaire; I will ask follow-up questions about these
      iii. Third, talk about your view about what the role of a cluster is for KM + LS and what you think of the desirability of the learning organization
   e. Emphasize the anonymity and terms of confidentiality of the responses
      i. Your name and the name of your firm will not come back in our report. They will be coded as ‘employee’ or ‘manager’ of company X, Y or Z.
      ii. The tapes of the interviews will not be shared with third parties, and will be removed after the research has fully been rounded off.
      iii. You can get a version of the tape yourself
      iv. Get permission to tape interview
2. Introduction of the interviewee (5 - 10 mins):
   a. Can you introduce yourself: what your job entails in terms of tasks and responsibilities and why you are participating with this interview?
   b. What is the position of your job in the organization? How is your business organized?
   c. And how are you involved in knowledge management and learning within your organization?

3. Interviewee’s view on knowledge management and learning strategies in the firm using the results from the online questionnaire (25 – 50 mins)
   a. What is your personal opinion on the overall knowledge management situation in your firm?
   b. Ask the reasoning behind remarkable (i.e. high or low) ratings for the questionnaire items: “why did you score [answer] for [item]? Ask follow-up questions when needed.
   c. What can the cluster organization HTSC potentially do for your knowledge management?
   d. What is your personal opinion about the attractiveness of the ‘learning organization’?
      First explain the three core features of the learning organization:
      i. Trigger: world changes faster
      ii. Companies stay innovative and competitive by learning from other’s knowledge
      iii. The whole organization – specifically all 9 dimensions mentioned in the online questionnaire - contributes to the learning happening

4. If he/she is a manager, ask whether they have documents about KM and LS that I can receive as a support for my analysis. It can be agreed that these documents can or cannot be quoted in the actual analysis; also if quoting is not possible, it is useful to get a grasp of the situation.

5. Summarize and round off the interview (2 mins)
   i. Thank him/her for the interesting interview
   ii. Explain when you will come back to her/him and thank the interviewee for her/his time.
9.4. In-depth and elaborate description of the theoretical framework

**Internal learning strategies**

The internal learning strategies of the learning organization are firstly driven by the increasing the absorptive and creative capacity of the organization, and, secondly, by increasing the knowledge circulation within the organization in order to get particular knowledge on the right position. These two dimensions need to be sufficiently present to make the actual learning take place. The two dimensions impact the following technology and non-technology domains:

**A. Clarity of purpose and mission**

The first feature of the internal learning strategies of the learning organization are clarity of purpose and mission. As Senge (1990) and others have said, having a shared vision of where the organization wants to go to creates a mental tension that leads to more and better learning. When there is a disparity between the current state and the vision that employees grasp, they can better work towards overcoming that disparity (Goh & Richards, 1997). For this, however, a “belief that change is possible and important – and can be shaped and advanced by deliberate activities” are necessary as well, as Stiglitz & Greenwald (2014, p. 61) point out. Moreover, a common set of values that describes how to come there is important as well (WRR, 2015), although if corporate values are shared too broadly a problem may arise with a lack of “cultural differentiation that may be seen as significant for learning” (Lund, 2004, p. 151). Lastly, if an individual can assess its own contribution in line of these corporate values and the mission and vision, this can help improve his or her learning as well (Goh & Richards, 1997). In sum, the clarity of purpose and mission – including everyone’s role in it – is essential in a learning organization.

**B. Leadership commitment and empowerment**

The second feature of the learning organization is leadership commitment and their empowerment of employees. As Goh & Richards (1997, p. 578) share: “leadership is mentioned by virtually all writers as an important element in fostering a learning climate through their behaviors, such as seeking feedback, being open to criticisms, admitting mistakes and empowering their employees to make decisions and take some risks (Garvin, 1993; Slocum, J. W., McGill, M., & Lei, 1994)” . Moreover, leadership and managers also have a possibility to provide “play, passion and purpose” through their vision, conduct and feedback in order to transform their employees in successful innovators (WRR, 2015, p.264). Without support of management, it is very hard for employees to learn and to substantially change their work according to their newly learned views. Therefore, a learning organization possesses a leadership that is committed to learning, creates a learning climate and actively facilitates learning.
C. Organizational structure

The third feature of the learning organization is its particular organizational structure. Organizational structures matter very much for learning and thus innovation. The reason for this is that the organization’s absorptive capacity is not just “resident in any single individual, but depends on the links across a mosaic of individual capabilities” (Cohen & Levinthal, 1990, p. 133). This — unsurprisingly — is for instance in line with Nelson & Winter’s (1982) famous view of organizational capabilities.

The organization of work includes amongst others job design, organizational design and how decision-making is distributed (Lundvall, 2006). For job-design, the learning organization is somewhat skewed towards an integration or “fusion” of functions (Lam, 2000, p. 496); rotation of tasks and jobs, including “more systematic internal mobility” (WRR, 2015, p. 303); and softened demarcations in general, although that can sometimes proof more difficult in practice or in light of power struggles (Lund, 2004).

For organizational design, learning organizations focus on cross- and multi-functional teamwork (Goh & Richards, 1997; Lundvall, 2006). This includes group-problem solving by employees without the interference of upper management. Cross-functional teams are so important, because they enable that employees build up new knowledge and gain knowledge where complementary expertise is located — and this goes beyond substantive, technical knowledge that some might consider solely important for the product or service that is being provided (WRR, 2015). As Goh & Richards (1997, p. 578) describe it: “By working in teams, knowledge can be shared among organizational members and there is also a better understanding of other individuals, their needs and how they work in different parts of the organization, encouraging knowledge transfer as well”.

For the distribution of decision-making power, the learning organization generally stresses the autonomy of the employees. This is so because in light of rapid change the autonomy enables more efficient and effective problem solving on the level where the problems are faced, rather than the level of management that does not know all the specifics of the situation. Or, in the words of Lundvall (2006): “Within firms, the accelerating rate of change makes multi-level hierarchies and strict borders between functions and departments inefficient. It makes decentralization of responsibility to lower-level employees and formation of multi-functional teams a necessity” (p. 11).

Thus, in summary: the learning organization’s organizational structure focuses on making an organically functioning organization with integration and flexibility of internal functions. It incorporates the integration of functions, softened demarcations between jobs, and cross-functional, self-directed and autonomous teams.

D. Quality management:

A comprehensive system of quality management is the fourth feature of the learning organization
(Lam, 2000). For quality management, firstly the systematic engagement of employees and secondly a system of monitoring performance are essential to keep learning.

The engagement of employees can get multiple forms. Firstly, for key product or process improvements, it can get the form of quality circles, which in the sector of high tech software companies often gets called ‘code reviewing’. In it experts work together to solve shared problems. It is important that there are “shifting teams of experts who regroup in line with market-based problems” (Lam, 2000, p. 497). Secondly, for more peripheral issues in the organization, it is important that a system for the collection of ideas and proposals is set up for the employees (Lam, 2000; Lund, 2004; Lundvall, 2006). In this way, everyone in the organization can contribute to the improvements of the quality of the work organization.

A monitoring system of performance and what is learned is essential as an important step for more structural learning. As the WRR (2015) emphasizes: “If you can’t measure it, you can’t manage it” (p. 331). Only by having information and intelligence the absorptive capacity and eventually innovation and earning capacity of the firm can be improved (WRR, 2015).

All in all, the learning organization’s quality management is comprised of quality circles; a system for the collection of employee’s ideas and proposals; and a monitoring system of performance.

E. Human Resource Development
The fifth feature of the learning organization is a HR development and management system that is focused on increasing competences. Such competences are crucial for the absorptive capacity and thus the learning of any organization. The WRR explains this contextually (2015): “The most Western countries have arrived at the frontiers of knowledge. On this level, it is not the use of extra capital or labor power that is the most important stimulus of growth, but working smartly [across the organization]. Whether this happens is mostly determined by the education level of the individual employees (Aghion & Boustan & Houxby & Vandenbussche, 2009)” (p. 263). This quote illustrates that investments in education as well as other ways to increase the competence level of the employee, a team and the organization as a whole are an important strategy to grow, stay competitive and remain innovative.

HR Development entails education offerings; job design; the management of diversity of employees; and recruitment and retention policy. For the first, education offerings, the learning organization assesses employee’s performance “in terms of market outcomes; the ultimate judges of their expertise are their clients, and not the professional bodies” (Lam, 2000, p. 496). This is why there is a strong incentive to engage in ‘extended occupational learning’ and the accumulation of tacit skills beyond the pursuit of formal knowledge” (p. 497). It is then, however, important that the educational training is set up well: “it needs to manage talent, by providing good feedback, set clear tasks, connect well to prior knowledge and motivate the participants” (WRR, 2015, p. 264). If this is done, educational trainings can contribute a lot to learning.
For the area of job-design, the learning organization is focused on providing autonomy and challenging and diverse tasks in order to create a lot of ‘on the job learning’. Generally, “employees in the Netherlands, having a lot of autonomy, also have many opportunities to learn and develop themselves on the working floor” (WRR, 2015, p. 311). The learning that happens on-the-job has the advantage of having immediate effect on the performance, and the link with the daily work is more ensured than in the case of external trainings. The on-the-job learning does require support and openness of the employer and colleagues for learning and making mistakes; when this is not there, it is hard to learn for (new) employees. If the job-design is done well, on-the-job learning can occur and also contribute to the learning of the organization as whole.

In the area of the management of diversity the learning organization is characterized by the active attempt to try to maintain “sufficiently diverse perspectives and approaches”, with the reasoning that “diversity in the workplace contributes to entrepreneurship and innovation” (WRR, 2015, p. 253). This diversity can be broadly understood: gender, age and education background for instance matter and contribute to fresh perspectives. It is also proven that cultural background can help: “Research has shown that […] the productivity increases in firms where knowledge migrants are hired” (WRR, 2015, p. 253). Thus, diversity in the workplace helps organizational learning and can as such improve performance and increase innovation.

The last area of HR development and management is the recruitment and retention (or letting go) policies. For the learning organization - that builds on embodied and thus most prominently individual knowledge - this is a weak spot. As Lam (2000) describes it: “Individual knowledge is also transferable, [i.e.] moving with the person, giving rise to potential problems of retention” (p. 491). The threat of individuals leaving can even have the effect that some employers do not invest in the education, skills and competences of their employees. According to the (WRR, 2015) “Still, 20 to 30% of employers [in the Netherlands] do not send any employee to follow an educational activity” (p. 310). Even if there is no retention problem, there can be a knowledge accumulation problem: “The frequent re-structuring and shifting of individuals between project teams means that tacit knowledge may not be fully and adequately articulated before an individual moves on” (Lam, 2000, p. 497). An improvement point for learning organizations is to find a smart way of maintaining autonomy and learning of individuals, while also doing something about maintaining that knowledge in the organization.

Concluding, HR development in a learning organization ensures extended occupation training, with a focus on building tacit knowledge occurs; learning-on-the-job is facilitated and encouraged; and diversity in the working teams is ensured. Also, as a remaining challenge, attempts should be made to accumulate and retain knowledge.

F. Transfer of knowledge
The necessity of “smart working” as a means to achieve good firm performance, as outlined in the
previous sub-section about HR development, is also applicable for the system of knowledge transfer in the learning organization. Knowledge transfer systems are defined as “the ability of the organization to transfer knowledge across departmental boundaries and to transfer knowledge from the external environment [into the organization]” (Goh & Richards, 1997, p. 578). The knowledge mechanisms involving the external environment include “backward [from the supplier], forward [from the customer] and horizontal [from competitors and co-workers] linkages [of knowledge transmissions]” (Stiglitz & Greenwald, 2014, p. 53-54). As learning organization always want to circulate knowledge in order to let it land in the right place, the knowledge transfer system is very important.

The first characteristic of the learning organization’s knowledge transfer system is the space to have informal conversations with colleagues about successful programs (Cohen & Levinthal, 1990; Goh & Richards, 1997; Lam, 2000; Stiglitz & Greenwald., 2014; WRR, 2015). This is an important way of transferring new insights and helps to develop intuitive, tacit knowledge. A second characteristic is that failures are also constructively discussed (Goh & Richards, 1997; Stiglitz & Greenwald., 2014; WRR, 2015). A feedback culture, where giving and receiving feedback is normal and accepted, helps with this as well. Thirdly, the routine that new work processes that are useful to the whole organization are shared with all employees is another one of the characteristic (Arundel et al., 2007; Cohen & Levinthal, 1990; Goh & Richards, 1997; Stiglitz & Greenwald., 2014; WRR, 2015). Fourthly, more broadly there is a formal or informal system in place that helps the organization to learn from successful practices of other organizations (Arundel et al., 2007; Cohen & Levinthal, 1990; Goh & Richards, 1997; Stiglitz & Greenwald., 2014; WRR, 2015). Lastly, the re-grouping of teams and the subsequent job-rotations are done strategically with a certain knowledge effect in mind (Cohen & Levinthal, 1990; Lam, 2000; Stiglitz & Greenwald., 2014; WRR, 2015), because “regularly shifting employees … facilitates the spread of ideas across the firm and promotes learning with the firm” (Stiglitz & Greenwald, 2014, p. 61).

G. Compensation and budgeting systems
The financial incentive structure in the learning organization is also geared towards stimulating learning. The underlying idea is that financial incentives have an effect on employees their behavior. So, if a compensation and budgeting system “steers on outcomes and less on processes” (WRR, 2015, p. 303), this gives financial reward and support to those who want to achieve a goal in a newly learned way or with a newly developed innovation. Goh and Richards (1997, p. 578) summarize it like this: “budgeting systems can be designed to challenge the need for doing things because ‘we have always done them’”. Moreover, “compensation systems can be designed to reward innovation and risk-taking” (p. 578). Concretely, this means that in the learning organization compensation and budgeting systems challenge the old way of working, reward innovation, results, real qualifications and risk-taking.
H. Experimentation

Experimentation is the last feature of the internal learning strategies of the learning organization. Experimentation is defined as the “freedom to experiment with new work methods and innovative processes” (Goh & Richards, 1997, p. 578). Such experimentation, which includes research and development (R&D), is encouraged and supported in multiple ways.

There are three reasons why this is done and why experimentation matters. Firstly, because it can solve (new) problems the organization is facing (Goh & Richards, 1997). Secondly, because it always broadens the knowledge base and as such the absorptive capacity in the organization. This is particularly desirable if the sector changes due to new technologies or working processes that the firm does not possess yet. Absorptive capacity is normally “a byproduct of routine activity” (Cohen & Levinthal, 1990, p. 150). However, experimentation and R&D can ensure that the firm’s absorptive capacity is made up of some knowledge that is closely related to the new developments, so that it is easier to recognize, adopt and exploit these new practices and technologies (Cohen & Levinthal, 1990). Thirdly, when learning from external sources becomes costly, experimentation can present the cheaper alternative in finding new insights: “as the ease of learning diminishes, learning becomes more dependent on a firm’s own R&D” (p. 142).

The characteristic forms in which a learning organization stimulated experimentation are the encouragement by management and the actual execution of experimentation (Cohen & Levinthal, 1990; Goh & Richards, 1997; Lund, 2004; Stiglitz & Greenwald, 2014; WRR, 2015); a culture where employees can bring in their ideas into the organization (Goh & Richards, 1997; Stiglitz & Greenwald, 2014); and a working climate where new employees are invited and encouraged to question how things are done (Goh & Richards, 1997; Stiglitz & Greenwald, 2014).

External learning strategies

The external learning strategies of the learning organization are most prominently driven, firstly, by the need to achieve knowledge circulation and, secondly, to increase the external functional flexibility of the firm. These help the firm to increase their competence base: “By drawing upon external knowledge the firms got that extra competence which was of importance for their total competence regarding new product development” (Lund, 2004, p. 137). Moreover, this eventually has the benefit that the firm can innovate more and better: “The recent models of innovation emphasize that knowledge production/innovation is an interactive process where the interaction of firms with customers, suppliers and knowledge institutions is crucial for the outcome. Empirical analysis confirms that firms seldom innovate alone (Christensen & Lundvall, 2004)” (Lundvall, 2006, p. 10).

This section looks at how the drivers of knowledge circulation and external functional flexibility translate into the external learning strategies of the firm and what the characteristics of these strategies are.
A. Cooperation with end-users/customers/product market

The first feature of the external learning strategies of the learning organization is close cooperation with customers and end-users, also known as the ‘product market’. This takes the form of asking what the customers market needs are; what they can do and can’t do with the current product and what they think of this; and to test new prototypes of products or services with them (Cohen & Levinthal, 1990; Lund, 2004; Lundvall, 2006).

The advantage of cooperating with customers is that the firm becomes more aware about their wishes and capabilities. Employees that interact with customers have their “awareness of others’ capabilities and knowledge [...] strengthened. As a result, the individual and subsequently organizational absorptive capacity is strengthened” (Cohen & Levinthal, 1990, pp. 133-134). This subsequently is essential in making new innovations successful. As Lund (2004) puts it: “Learning from customers was important for the firms to be able to develop successful products”, also because it is learned that “customers of the same product did not all demand the same.” (p. 137). Collaboration with customers therefore helps understanding the product market and improves the key activity of the firm. Interestingly, it may be that the form of the collaboration with customers has to become more selective and more intense in order to “speed up the response to changes in markets and technologies relationships” (Lundvall, 2006, p. 12). The intensity of this relationship can come in the form of more frequent and more in-depth interaction in order to understand a well selected segment of the market.

In conclusion, a strong and systematic feedback and knowledge connection with customers is part of the learning organization.

B. Cooperation with subcontractors and suppliers

The second feature of the external learning strategies is a close cooperation with suppliers and subcontractors. The most prominent reason for this is that “Knowledge is also embodied in suppliers” (Stiglitz & Greenwald, 2014, p. ~53). Suppliers are in the unique position that they gain knowledge from the operations of multiple clients of theirs, which are often competitors of the firm discussed here. They therefore know how the competitors do things, and this knowledge can be very useful for the firm. Additionally, working with the technologies that they supply they have also build up considerable knowledge technologically. Learning from them in this domain can also be very useful in the sense that this “broad and active network of [...] external relationships [...] strengthens individual and organizational absorptive capacity” (Cohen & Levinthal, 1990, pp. 133-134).

Learning organizations can work together with suppliers by asking them for feedback about current products or services and about prototypes; they can conduct a R&D project together, learning from each other; and they can outsource the execution of operation and R&D project to them (Cohen
C. Cooperation with (regional) universities and knowledge institutes

The third feature of the external learning strategies of a good learning organization is cooperation with (regional) universities and knowledge institutes. The driver of this cooperation is that these knowledge and education institutes are requested to share their knowledge more broadly in society and with firms, whereas for firms a lot of interesting insights can be learned from them. In the words of the WRR (2015, p. 254): “Knowledge institutes will be inspired by, and in turn inspire, the private sector and public organizations”. This mutual potential creates the need for structures of knowledge circulation between firms, universities and knowledge institutes and is the reason why firms want to have a mechanism of knowledge transfer with these institutes (WRR, 2015). Importantly, this should not only involve technical knowledge in the case of the high tech software companies, as generally “the contributions of the softer forms of knowledge transmission are underestimated (Dill & van Vught, 2010)” (WRR, 2015, pp. 249-250).

What forms then does the cooperation take? There is a multitude of cooperation possibilities which are all considered important, but where some can fit better with one firm than another. The first is conducting research together. This contributes to “knowledge development” that can “upgrade existent local and regional capabilities” (WRR, 2015, p. 246). Another channels include collaborating around patents as well as participating in corporate ventures and spinoffs (Bekkers & Freitas, 2008). Thirdly, knowledge can be gathered through the participation in conferences and the access and use of knowledge and information documentation (Bekkers & Freitas, 2008). A fourth category of activities is of an educational nature; it concerns both attracting student interns and graduates as well as more structurally deliberating about what skills and knowledge and attitudes students should learn (Bekkers and Freitas, 2009; WRR, 2015). The former is stressed as important by the WRR (2015) as one of the better ways to stimulate knowledge circulation. The latter, however is not commonplace in the Netherlands (anymore), as “there is no natural deliberation platform between employers and education on a regional level to talk about the skills students should have learned at the end of their study” (WRR, 2015, p. 306).

D. Support of knowledgeable consultants

The fourth feature of the external learning strategies of the learning organization is support of knowledge-intensive consultancy services. As the speed of innovation accelerates, the supply of knowledge intensive services to firms is becoming a more important part of the economy (David & Foray, 2001; WRR, 2015). The consultants can help to let firms adapt to the changes in the technology, being carriers of knowledge built up over projects with various clients in the same sector and the broader economy. Consultants can conduct research for the firm, provide them with advice on
external technological development, help to reorganize the organization and execute management projects for the firm (Lund, 2004; WRR, 2015).

E. Learning from other firms who are active in the same sector

The last feature of the external learning strategies of the learning organization is learning from other firms that are active in the same sector. These may be competitors, but also firms that are not directly competing for the same customers. The contact between competitor/colleagues can be very useful, as the firms can learn from each other’s strategies and operations, and battle common challenges together. “Research about knowledge circulation” actually “shows that contact between employees of different firms happens at least just as much as with university employees; moreover, these inter-firm contacts are often even more important ((Østergaard, 2009) in (WRR, 2015, p. 248)).

What type of activities do learning organizations have with their competitors/colleagues? First, they can conduct research and development projects together. Secondly, they can have contact about each other’s inventions and patents, often with the aim of involving themselves with the technology through a license agreement. Thirdly, they can choose to participate together in a corporate venture, where they bring their own knowledge and expertise to create a successful enterprise together. Fourthly, they can share knowledge about a myriad of topics, such as visibility, recruitment and technical expertise (WRR, 2015).

These sort of contacts often come in the form of activities facilitated by a cluster organization. Cluster organizations often come about because working together as competitors/colleagues can help through scale-up effects (Frenken & Hoekman, 2006) network effects (Groot, 2012) and the transmission of knowledge (Broersma, 2009; WRR, 2015). Additionally, activities in the cluster organization that are faced on trying to smoothen out the labor market in their favor are included. This includes closing vacancy gaps if they are too big, but also ensuring a well working labor market between them: “An appropriate amount of mobility on the labor market is important for the competitiveness of the innovation ecosystem. Mobility can bring new knowledge input to firms, but employees also need to stay long enough inside a firm so that they can create and contribute added value and optimal organizational learning occurs (Asheim & Boschma & Cooke, 2011; Asheim & Lawton Smith & Oughton, 2011) and there isn’t too much external flexibility that is to the detriment of the investment in human capital by the firms (Zhou & Dekker & Kleinknecht, 2011). This balance is different everywhere, and depends partially on the degree that skills used in the first firm will be useful in the second firm an employee works in (R. Boschma, 2009)” (WRR, 2015, p. 321 –).

Whether or these activities happen via a cluster organization, learning organizations are always learning directly from their competitors/colleagues.
9.5. List of codes through open coding
### 9.6. Overview of codes after axial coding/nodes in NVivo and corresponding number of sources and references

<table>
<thead>
<tr>
<th>Name</th>
<th>Sources</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE18 - There are education activities that build competences that the firm needs</td>
<td>22</td>
<td>67</td>
</tr>
<tr>
<td>Belang van KM + LS</td>
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<td>83</td>
</tr>
<tr>
<td>EES8 - Sector - Being member of a cluster organization</td>
<td>20</td>
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<tr>
<td>Lerende organisatie perspectief</td>
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<td>35</td>
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<tr>
<td>IF24 - New work processes that may be useful to the organization as a whole are usually shared with all employees</td>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>IF25 - There is a system that allows the organization to learn successful practices from other organizations</td>
<td>17</td>
<td>51</td>
</tr>
<tr>
<td>IBS - Senior managers have positive attitudes towards change and are open to new ideas</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>IF22 - Employees have (informal) opportunities to talk to other staff about successful programs in order to understand why they succeed</td>
<td>16</td>
<td>53</td>
</tr>
<tr>
<td>IF23 - Failures are constructively discussed in the organization</td>
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<td>41</td>
</tr>
<tr>
<td>EA - Customers - Beyond</td>
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<td>25</td>
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<tr>
<td>EC45 - Universities - Participation in conferences that are (co-)organized by the university or knowledge institute</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>ID15 - Small groups of employees regularly check the quality of the product or service</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>ID16 - There is a system for the collection of employees' proposals and ideas</td>
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<td>29</td>
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<tr>
<td>IA4 - Existence of opportunities for self-assessment by the employee with respect to goals attainment</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>IC12 - Different project teams and departments talk and interact with each other</td>
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<td>24</td>
</tr>
<tr>
<td>Groote</td>
<td>14</td>
<td>29</td>
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<td>ID17 - The firm has metrics to monitor the performance and learning Resources</td>
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<td>Inspierende werknemer met sociale achtergrond</td>
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<td>23</td>
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<tr>
<td>Partners</td>
<td>12</td>
<td>21</td>
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<tr>
<td>IB8 - Managers in the organization provide useful feedback that helps identify potential problems and opportunities</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td>EA34 - Customers - Asking for their market needs</td>
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</tr>
<tr>
<td>EC - Universities - Beyond</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>IC14 - Teams are allowed to direct their work to a significant degree</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>IA1 - Widespread support and acceptance of the organization's mission statement</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>IG29 - Innovation and risk-taking is rewarded</td>
<td>11</td>
<td>17</td>
</tr>
</tbody>
</table>
IC13 - Responsibility is delegated to employees 11 23
IE19 - There is a long term educational planning for employees 11 31
IE20 - There is substantial on-the-job-learning happening 11 14
IA2 - Understanding of how the mission is to be achieved 10 15
IB9 - Managers in the organization frequently involve employees in important decisions 10 24
IH31 - Experiments and tests are regularly done and encouraged by management 10 27
Drivers 10 24
Idee - IF24 New work processes 10 13
IA3 - The mission identifies values for employees to care about and conform to 9 13
EA35 - Customers - Asking for feedback about a prototype of a new product or service we are developing 9 14
EC48 - Universities - To arrange influx of students for internships 9 9
EE56 - Sector - Participating together in corporate ventures 9 18
EE57 - Sector - Sharing knowledge 9 12
Type organisatie 9 25
Sociaal netwerk 9 15
Vastleggen van kennis 9 16
Idee - IE18 Education 9 14
IF26 - Job rotations are done and with a strategic intent and effect in mind 8 10
IH32 - Employees can bring new ideas into the organization 8 14
EA36 - Customers - Asking for feedback about our product or service 8 16
EE - Sector - Beyond 8 10
IC11 - Employees with different roles take over tasks of each other 8 10
IE21 - Teams are composed in order to increase their diversity... 8 11
Cluster context 8 18
Idee - EE58 Cluster 8 27
Idee - IF25 Leren van andere organisaties 8 14
IB6 - Senior managers and employees share a common vision of what the work should achieve 7 11
IB7 - Managers in the organization accept criticism without becoming overly defensive 7 13
IH33 - Employees who are new in the organization are encouraged to question how things are done 7 8
EB - Suppliers - Beyond 7 12
EC49 - Universities - To attract recent graduates for employment at your firm 7 7
IC10 - There are multidisciplinary teams 7 10
Motivatie

Idee - Vastleggen

Idee - IF23 Failures

IG30 - Budget systems are designed so that they challenge the need for doing things “because we have always done them”

Standaardisatie

Idee - IF22 Informal opportunities

IG28 - Wages are based on results

EE54 - Sector - Conducting research together

Idee - EA Klanten

Idee - IH31 R&D

EC42 - Universities - Conducting research together

Ownership status

Lange termijn innovatie-strategie

Idee - IA4

Idee - ID17 Monitoren van leren

EC47 - Discussing and agreeing on what knowledge and skills students should learn at the education institutes

ED51 - Consultants - To provide us with advice on external technological developments

Dilemma's met KM + LS

Werknemers-flow

Acquisities van bedrijven

Diversiteit van kennis - binnen 1 persoon als het niet binnen 1 bedrijf kan

Methodologie

Idee - ID16 Collection of employee proposals

Idee - IB5 Open for change

Idee - IH32 - Bringing in new ideas

Idee - IH33 Nieuwe medewerkers brengen ideeën in

IG27 - Wages are based on qualifications and functions

EC46 - Universities - Accessing knowledge and information databases or documentation

ED - Consultants - Beyond

Netwerk-economie

Idee - IF25 Systeem om te leren van andere succesvolle organisaties

Verandermanagement

Idee - IB9 - Involve employees

Idee - ID17

Idee - IE21 Diverse teams samenstellen

Idee - IF26 Systeem om te leren van andere succesvolle organisaties
<table>
<thead>
<tr>
<th>Werknemers status</th>
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<tr>
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<td>EB40 - Suppliers - Outsourcing the execution of a particular project</td>
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<tr>
<td>EB41 - Suppliers - Outsourcing a research and development project</td>
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<td>ED50 - Consultants - To conduct research</td>
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<td>EE55 - Sector - Having contacts with competitors about their patents</td>
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<td>Kennismanagement en Leerstrategien-Tool</td>
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<td>Idee - IC11 Overnemen van elkaars taken</td>
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<td>Idee - IC49</td>
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<td>Idee - Werknemers-flow</td>
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<td>Idee - Standaardisatie</td>
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<td>Idee - EE56 Corporate Ventures</td>
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<td>Idee - EC45 Conferenties</td>
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<td>Idee - ID15 Quality checks</td>
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<td>Idee - Partners</td>
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<td>Theoretische implicaties</td>
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<td>Idee - IC14 - Self-directed teams</td>
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<td>Idee - IC12 - Different departments talk</td>
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<td>Idee - Motivatie</td>
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<td>Idee - IF26 Strategic Job Rotations</td>
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<td>Beyond de Lerende Organisatie</td>
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<td>Organisatiestructuur</td>
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<td>Idea - Type organisatie</td>
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<td>Idea - IA3 Company values</td>
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<td>Idea - IE19 Long term educational planning</td>
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<td>Government</td>
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<td>EB37 - Suppliers - Asking for feedback about our product or service</td>
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<tr>
<td>EC43 - Universities - Having contacts with knowledge institutes about their patents</td>
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<tr>
<td>EC44 - Universities - Participating together in university spin-offs</td>
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<tr>
<td>ED52 - Consultants - To reorganize our organization</td>
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<td>ED53 - Consultants - To execute a management project</td>
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<td>EB38 - Suppliers - Asking for feedback about a prototype of a new product or service</td>
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</tr>
<tr>
<td>EB39 - Suppliers - Conducting a research and development project together</td>
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</tr>
</tbody>
</table>

Note: the black rows are there to ensure anonymity of the participating interviewees and firms.
9.7. Individual firms learning strategies ratings
9.8. Overview of scores per interviewee group per firm

*Whenever there is no bar, that employee group did not fill in the question related to that characteristic.

**Firm 2 did not have any middle managers so they couldn’t get talked to and are not included in the figure.
9.9. In-depth domain results

A. Clarity of mission and aims

The first domain where the learning organization prescribes specific organizational features, as described in Table 4, is the domain of the firm’s clarity of mission and aims. The average performance of firms in this domain equals the score of 3.5, which is summarized as ‘doing it to a certain degree’. Self-assessment tools are the only learning strategy that does not score positively on average, with only 2 firms out of five having this strategy implemented.

For the small firms (#1 and #2) their size is the driver behind their relatively high scores in mission support and understanding how the mission is achieved, and their low(er) scores in corporate values and self-assessment tools. For the medium firms (#2 and #3) and large firm (#5), what makes the difference for all four learning strategies is the attention and effort that is put in both the communication of management to the rest of the firm as well as the efforts put in the development of a more formal and explicit support system. Firm 4 (Medium; Services and secondments) scores best there: its management explains the mission in-depth on an annual firm event and has recently implemented the Objective and Key Results system to support mission and self-assessment. This system entails every employee to quarterly review and set new ambitious personal objectives and key results in line with the department and firm’s goals. A fragment of a report shows what a difference this made for them:

“Due to the OKR-system we experience more focus, more achievements, more shared understanding and more ambition in our firm” - Report, Firm 4

Overall for this domain, it appears that the more explicit working out the learning strategy requires - such as corporate values that are defined and explained or a system of self-assessment where one compares one own contribution to the firm’s goal - the lower the average performance is.

Key Findings about “Clarity of Mission and Aims”

- The learning strategies that require more worked-out systems consistently score lowest.
- In the small firms, size drives high scores in mission support and understanding, but also creates a low score in self-assessment tools, a system that needs more formal and explicit development.
- In the medium and large firms, attention for elaborate management communication and efforts to develop of an explicit support system, such as ‘Objective and Key Results’, drives high results.
B. Leadership commitment and empowerment

The second domain of the learning organization is “Leadership commitment and empowerment”, and is about the extent to which managers are open to learn themselves and to which extent they support the learning of employees and the organization more broadly. The average score in this domain is 3.7 or “doing it to a certain degree”. All specific learning strategies are, on average, implemented “to a certain degree”. The strategy “senior managers have positive attitudes towards change and are open towards new ideas” scores highest with ‘agree’ (4.0).

Interestingly, one structural reason for the higher and lower performance on management’s openness to learning is the distinction openness/responsiveness in the area of technology vs. openness in the area of organizational ideas:

“The path of technology is open, but the director keeps decisions about the organization to himself” – Employee, Firm 2.

Another structural reason for higher/lower performance is the attention and effort that is put in translating the learning strategies into specific systems and routines in the organization. This distinguishes firms that did project evaluations and feedback events from firms that only attempt to learn informally. Size and organizational type matter in this regard: smaller firms are more able to be responsive to learning opportunities regardless of a formal system, and secondment organizations are less in need of structural systems/routines, as “seconded employees have less interest in decision making at the firm” (Manager, Firm #4) than employees in project or product organizations.

Lastly, in the large firm a limiting effect by the ownership model (i.e. stock exchange) on the ability to follow after having been open/responsive is reported: “there are such tight financial rules that they can’t move anyway [if you would bring forward a new idea]” (Employee, Firm #5).

Key Findings about “Leadership commitment and empowerment”

- Management is generally open to technological ideas, but is less open to organizational ideas
- Beyond small firms, more formal systems and routines a firm are needed to let ideas circulate
- Secondment organizations have less interest in learning routines, “employees work at the client”
- Firms registered on the stock exchange have financial incentives that problematize following up on ideas
C. Organizational structure

The third domain of the learning organization framework concerns the organizational structure of the firm, and whether these promote organizational learning. The average firm score in this domain is 3.6, or “to some degree”. The learning strategy that prescribes interactions across departments ranks highest (3.9/Almost ‘agree’) and the self-direction and ability of employees/teams to form informal groups to solve organizational problems lowest (3.3/Slightly above ‘neutral’).

For the learning strategy ‘diversity/multidisciplinary teams’ and ‘overlap/taking over tasks’ the selected scope of the firms is argued to be essential. Specialist firms, such as Firm #1, #2 and #4 have a more uniform group of personnel and less of a need to take over tasks of employees in other roles than firms with a broader scope, such as #5, who describe themselves as a system integrator and therefore have a broad mission:

“As we work towards more integrated software solutions, our team composition broadens as well” - Employee, Firm 5

The interactions between different departments are said by the interviewees to be caused by organizational type: “Most employees are seconded, so I haven’t seen them yet” (Board room manager, Firm#5). However, Firm #4, although being a secondment organization, manages to organize regular contact moments for its employees and creates a culture where it is normal that “one employee calls the other for advice” (Employee, Firm #4). This suggests it is more determined by the amount of attention that is given to this by the firm.

Whether or not firms supports employees’ empowerment and allow for self-steering teams is mostly explained by management aiming to create as much autonomy as possible – “tasks and responsibilities are delegated” (Employee, Firm #3) – or staying on top of the employees: “Micromanagement” (Employee, Firm #2).

Key Findings about “Organizational structure”

- A firm’s broad (vs. specialist) scope stimulates that it strives for diversity of knowledge
- Attention and effort can create a more networked organization, with all subsequent benefits
- Empowerment and self-steering teams a direct effect of a management style that is more focused on an individual’s autonomy, mastery and purpose versus one focused more on details and control.
D. Quality management

The fourth domain of the learning organization framework features learning strategies surrounding quality management. The overall domain result is, on average, only 3.0 or ‘Neutral’. This is the lowest average domain score, and is mostly due to low scores for “quality checks in small groups” (2.7) and “metrics to monitor learning” (2.8). As can be seen in the distribution of scores, this reflects the situation in the large majority of the firms.

For the “quality checks in small groups”- learning strategy, the existing routines generally lack a structural nature:

“Only 1 project team reviews code structurally” - Manager, Firm 3

The interviewees do stress that attention to quality management becomes increasingly important when they grow in size, when their firms move from secondments to projects and due to the rise of automatic testing.

Relating to the system for the collection of employee’s proposals, there seems to be a bias against and thus particularly limited attention and effort put into such systems when they involve collecting organizational ideas. The exception is Firm #4 where managers speak to employees every 6 weeks to actively try to pick up on employees’ experiences and ideas; where an Innovation Challenge and Special Interest Groups challenge employees for new technical ideas; and there is an annual feedback event where employees, first in groups and then in plenary, share their experiences while management listens.

Firms generally have little routines in place for the monitoring of learning. In small firms (Firm #1 and #2) it is done informally: the director knows what has been learned. They can be asked about whom has learned what. For larger firms, this is not anymore possible. The positive outlier is Firm #4: they monitor what they learned in project evaluations, always store the latter accessibly on Confluence, and keep an overview of every employee’s performance and educational activities.

**Key Findings about ‘Quality Management’**

- Quality checks in small groups lack a structural nature, but become extra important when firms grow in size, when they move to being a project organization, and with the rise in automatic testing.
- There is especially limited attention for a system that collects organizational proposals.
- Monitoring of learning in medium and large firms can benefit from more routines in place.
E. Human Resource Development

The fifth domain of the learning organization framework is called ‘Human Resource Development’. It encompasses learning strategies that focus on ensuring, throughout time, a sufficient level and diversity of competences in the organization. The domain average is 3.4/Some degree, and includes a confident ‘agree’ for “on-the-job learning” and slightly negative scores for “long-term educational planning” and “striving for diversity”.

For training as well as for long-term educational planning, low scores are driven mostly by the size of the firm and the related amount of resources that are available. For Firm #2 their innovative focus (as opposed to being a ‘follower’) arguably causes that “what they try to learn everyday cannot be found in pre-planned training” (Board room manager, Firm #2). The medium and large firms value training. They evaluate which knowledge gaps have to be addressed in the upcoming year and allocate significant resources to organizing trainings for them. They differ in their degree of obligation and focus on technology vs. organization.

On-the-job learning happens in every firm showing the challenging nature of high-tech software. The “secondment trap of doing assignments you learn little from” (Manager, Firm #5) is circumvented actively. However, some employees in the two small firms (#1 and #2) differ from their managers and report “little learning happens” (Employee, Firm #1) in their day-to-day work. In the medium and services-oriented Firm #3 employees actively support each other’s learning, but:

“Currently there is no structural coaching from managers to employees on the working floor [...] It should happen throughout the year” – Employee, Firm 3

Diversity in teams is not actively pursued. The large firm has policy that “embraces the multicultural working floor” (Report, Firm #5), but it is not common to form teams so that the cultural diversity is high. Most firms only pay attention only to skills, while Firm #4 also takes characters into account.

**Key Findings about “Human Resource Development”**

- Level of educational activities and planning positively influenced by firm size, resources available and the following (vs. innovative) focus of the organization
- On-the-job learning is high, especially where it is given attention and work is made challenging
- Diversity – of gender, educational background, nationality, culture – is not actively pursued.
**F. Transfer of Knowledge**

The sixth domain of the learning organization framework is about the transfer of knowledge. These learning strategies aim to create and subsequently circulate valuable knowledge throughout the whole firm. Numerically, this domain scores, on average, low with a 3.1/Neutral; however, the interviews show that strict interpretations of the prescribed learning strategies led to these scores.

Concerning talking about successful projects, better performance depends on the amount of routines that have specifically been developed for this purpose. For small firms, an informal system can compensate for a lack of routines. However, when firms are bigger and when they are secondment organizations, developing routines gets increasingly important. The difference between Firm #4 and #5, both secondment organizations, shows this.

The performance on the strategy of discussing failures constructively depends largely on the corporate culture and whether this includes talking about the failures in the organizations. Interestingly, in some firms the failures of a technology nature are addressed regularly, but little attention seems to be present for organizational failures. Moreover, as before, a small firm informal system can help deliver a higher performance. Larger firms need to develop more explicit and structural routines to do this.

Related to the strategy of sharing work processes, all firms except Firm #4 scored low. This was either because they barely get new work processes (#1 and #3) or because no mechanisms are in place for this (#2 and #4). Firm #4 is a positive outlier, having the routine of a newsletter and of:

> *We invite employees to share their valuable knowledge* - Manager, Firm 4

The strategy of having a system to learn external best practices scored low, mostly because interviewees interpreted system here as not including a person-dependent routine. Strategic job rotations were not favored, but alternatives such as rotating team compositions and tasks were.

### **Key Findings about “Transfer of Knowledge”**

- Small firm informal systems ease talk about successes and failures; larger firms need routines
- Corporate culture sometimes includes talking about technological successes and failures, but not about organizational ones.
- Overall attention and the effort to develop routines for the transfer of knowledge drive results.
**G. Compensation and budgeting systems**

The seventh domain of the learning organization are “the compensations and budgeting systems”. This is fundamentally about (financially) incentivizing the employees to learn. The domain score is relatively low with a 3.3/Slightly positive neutral and it doesn’t have any outlier-strategies.

The first learning strategy – wages are based on qualifications and functions – is about rewarding past learning. It seems to be widely spread: Firm #1, #2, #4 and #5 do this. Firm #3 scores low as with them the labor market situation is more determining the wage an employee gets. The second learning strategy about wages – basing them on results – is about rewarding more recent learning and is also reasonably implemented: 3 firms do so, while Firm #2 and #3 are ideologically against it:

*Innovative ideas always have more than one father*, Manager Firm #2.

The third learning strategy – rewarding innovation and risk-taking – is about giving employees an incentive to learn additionally to what is expected of them. Here too 3 firms do this (#1, #4 and #5), as they believe in it, while the other two have, similarly to rewarding results, ideologically a different stance. The forms of rewarding risk-taking and innovation are quite different in the three firms though: #1 promises external business partners 50% of any additional profit made from getting his firm new clients; #4 organized Innovation Challenges with nice prizes to win; and Firm #5 rewarded an employee with a great business idea with a bonus and compliments.

Lastly, the design of budget systems can also facilitate future learning in the firm. While Firms #1, #2 and #3 are used to discuss openly about the use of resources, no real routine or system exists. Firm #4 discloses that their budgeting is not very transparent, but that this helps to continue funding personal and organizational learning activities. Firm #5 is the positive outlier; they fund the innovation team centrally, so that it doesn’t cost the separate departments anything extra.

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<thead>
<tr>
<th>Key Findings about “Compensation and Budgeting Systems”</th>
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<tbody>
<tr>
<td>-&gt; More than 50% uses financial incentives to reward past, current and additional learning</td>
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<tr>
<td>-&gt; Two firms have ideological positions against rewarding results, risk-taking and innovation</td>
</tr>
<tr>
<td>-&gt; Both purposefully transparent as well as non-transparent budgeting can support innovation</td>
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H. Experimentation

The eighth domain of the learning organization is ‘experimentation’. This domain is about enabling and encouraging new ideas to come into the organization by way of experimentation, the purposeful but uncertain exploration of new ideas. The domain scores above average with a 3.6 / “towards agree”. This is mostly driven by the positive outlier - 4.1/’Certain agree’- of “Employees can bring their ideas into the organization”.

The level of experimentation that is encouraged by management is mostly influenced by the innovative (or ‘follower’) focus of the firm, often also linked with organizational type: Firm #1 and #2 both make a product and have an explicit innovative focus. Firm #4 express they want to be a close follower to the real innovators. They all score high. Firm #3, not scoring well, does not see itself as an innovator: their service is used standard open access software tools to make tailor-made solutions. Firm #5 scores lowest, and this seems to be driven by the fact that they are still in the midst of a transition of a ‘follower’-secondment organization to become an innovator in products and projects. The aims are now incorporated in their management plans, but the culture hasn’t changed yet. This culture change is also harder due to the fact that they are registered on the stock exchange, with subsequent tight financial rules to increase profit making:

“We don’t easily let employees innovate, because every hour they do so diminishes our revenues” – Manager, Firm 5.

The learning strategy of letting employees bring new ideas into the organization is one that all firms do. The positive outlier are Firm #1 and #4, because they respectively see ideas as the core of their business and are also actively open to organizational, and not only technological, ideas. This also results in them performing better in the strategy of involving new employees’ fresh ideas and minds.

Key Findings about “Experimentation”

- A firm’s focus (innovating/following), organizational type (product, project to secondments) and ownership model (‘stock exchange’) influences the level of experimentation conducted in a firm
- Openness and attitude towards new (technological and organizational) ideas critical for performance on bringing ideas of (new) employees into the organization
I. External cooperation

The ninth and last domain of the learning organization framework is the area of ‘external cooperation’. This is about the ways the firm can learn from interaction with external actors, namely customers, suppliers, universities and knowledge institutes, consultants and firms who are active in the same sector. The domain average is 3.7/”towards agree”, a fairly high performance relative to other domain results. The strongest performance lies within ‘cooperation with customers’ (4.6/Strong ‘agree’). Weaker performances are ‘cooperation with suppliers’ (3.1/Neutral) and ‘cooperation with consultants’ (3.2/Neutral†). Appendix 9.10 shows which percentage of the 5 firms conducts which type of collaborations with the different external actors.

For the cooperation with customers, a diverse range of far-reaching cooperation forms are observed in every firm. With medium and large firms, the collaborations are mostly intensive through various forms of regular interactive contact and this has most recently shifted towards not only solving a concrete problem for a customer, but often starting with the paid service to identify its market position, needs and future (IT) strategy:

“We help the customer [...] to take a step back. To think hard how they integrate IT in the rest of their firm” - Board room manager, Firm 3

“What we increasingly do is discuss with the customer how they see the future, and how we can help them make that picture more precise in the realm of technology” - Board room manager, Firm 5

This collaboration in the strategy formation of the customer is done in light of the ever-changing landscape of (high-tech) software with at its driver the increasingly complex technologies that are used to fulfill ever increasingly complex market needs, such as ‘Smart Cities’. Interestingly, smaller firms, such as Firm #1 and #2, also face this context. They, however, do not have the resources or skills to move along with the customer to co-develop their strategy. Instead, they focus more on a niche market (specialize) and they cooperate (through partnerships) with third-parties to deliver the increasingly complex solutions to the customers together.

The cooperation with suppliers is much less extensive than with customers. The difference in performance seems to be mostly due to the type of organization (product, project or secondments) and
particularly the, somewhat related, innovative (or follower) ambition level or ‘focus’ of the firms. Indeed, as Firm #1 and #2 are product organizations that need to stay ahead of competitors and therefore need to innovate, they look for ways to do this together with suppliers. They have either teamed up with suppliers for part of their product (#1), or work closely together with them by embedding the software product in theirs (#2). A little less innovative and cooperative with suppliers, Firm #4 is a project and secondment organization that has expressed the value of being a ‘fast follower’, close behind the real innovators. They ask the suppliers for feedback on their projects and they also do R&D projects together. Firm #3 and Firm #5, however, do not (yet) have such innovative focus. Consequentially, they don’t have such strong ties with suppliers as the other firms.

For the cooperation with knowledge institutes and universities, an enormous amount of activities is currently being done by the five firms (for the specific activities summed up see the in the results’ overview in Appendix 9.15 or the visual representation in Appendix 9.10). The activities are composed of very widely spread activities, such as recruiting students as interns and employees, to more unique activities like advising schools about the skills students need on the labor market, sponsoring events and conferences, investing in spinoffs, sparring with professors, following E-learning modules and participating in research projects. Although many collaborations are undertaken, multiple firms have expressed that they want to do more:

“It would be great for us and them if more research is being done in our sector by knowledge institutes and universities” – Manager, Firm 1

“We can do more to get innovative knowledge from Eindhoven University of Technology” – Manager, Firm 5

The reasons behind the collaborations with universities mostly surround the fact that the firms attach importance in their minds to universities. The more important a firm considers something, the more attention and resources it will spend on them. This subsequently results in a certain amount of cooperation routines. For instance, the labor market for software engineers is very scarce and this is also the area where most actions are taken by the firms: from school presentations to granting a scholarship and job offer to a university student. Interestingly, knowledge institutes are much less valued and considered an interesting partner for the HTSC firms: “Knowledge institutes do not yet make commercially useable services” (Board room manager, Firm #5).

Consultants were collaborated with less often than universities. The reasoning for this lies in line with the reasoning behind the collaborations with universities, although it gives a different outcome in terms of collaborative routines: whereas collaboration with universities is seen as important, collaboration with consultants is not valued very highly across the firms. As a result, less attention for its potential and possible forms is given and fewer resources are allocated to it. This is
particularly the case for smaller firms that do not have as much resources and reportedly also have less faith in what consultants can bring to small firms like them:

“Sparring with other innovative firms and entrepreneurs has my preference [above working with consultants, red.]” - Board room manager, Firm 2

Larger firms, such as Firm #3, #4 and #5, do collaborate with technology and/or organizational consultants. In those larger organizations, there seems to be more of a sense that they can learn from specialist consultants about an array of subjects that is not their core business, although there remains a bias towards a focus on in this area as well. However, the fact that Firm #4 has received advice from consultants about (re)organizing their firm and Firm #3 did not - and as it is relatedly also lacking internal capacity in the area of HR management - appears to be a partial reason for why Firm #4 is overall so much more developed in terms of learning strategies than Firm #3.

The learning strategy ‘cooperate with firms in the same sector’ is arguably the most interesting external learning strategy as it is reportedly the one that most in transition. The driver behind this transition is a (foreseen) increase in technological complexity and market demands’ complexity. Its implication is that firms are less and less able to produce the desired solutions if they don’t manage to combine their expertise with complementary knowledge and skills. These complementary knowledge and skills can be theoretically found inside and outside the own organization. Small firms #1 and #2 and medium firm #4 seek this complementary expertise in partnerships with other firms:

“We sacredly believe that in the future more collaborative partnerships will be set up. What we therefore do is join this wave as early as possible so that we accumulate experiences with it” – Board Room Manager, Firm 4

Firm #5, being the largest firm, mostly wants to find these complementary skills in the own firm by letting departments with complementary technological expertise work together better in the future. Firm #3, however, doesn’t report to see this trend at all and doesn’t act on it either. Subsequently they score low in terms of collaborations surrounding joint corporate ventures.

Moreover, interviews of all firms expressed the desire to work more together in one form or another with firms in the same sector. The Appendix 9.14 shows suggestions they made to the High Tech Software Cluster. One irregular best practice jumps out of the list: cooperation in the field of HR. Firm #3 does this well by having the agreement with other firms in the same sector that whenever they or the same-sector/niche firms have a shortage of personnel they can support each other by seconding each other’s personnel to each other’s project. This means that sometimes employees of theirs work on a project of a competitor and colleague and vice versa. They report they would like to increase such cooperation. As the labor market scarcity of software engineers impacts
the whole sector, this might also be an interesting possibility for the HTSC cluster to continue helping each other.

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<thead>
<tr>
<th>Key Findings about “External cooperation”</th>
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<tbody>
<tr>
<td>-&gt; In general, the perceived importance of a certain collaboration leads to more attention and resources being given to the development of cooperation routines</td>
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<tr>
<td>-&gt; In collaboration with the customer, the increase in market demands’ and technological complexity created a shift towards intensifying the interaction process and collaborating earlier in order to identify the customer’s market needs and co-create the (IT) strategy</td>
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<tr>
<td>-&gt; In collaboration with the supplier, the innovator vs. follower focus of the firm mainly determines whether or not a firm chooses to collaborate more with a supplier to deal with the increase in market demands’ and technological complexity</td>
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<tr>
<td>-&gt; In collaboration with universities, an enormous amount of activities is undertaken, mostly in the area of labor market recruitment, and still, but less, in the area of importing knowledge into the firm. The level of collaboration is determined by the amount of importance and resources given to it.</td>
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<tr>
<td>-&gt; The collaboration with knowledge institutes is viewed as less important, because it is seen as not providing sufficient commercially interesting input. Therefore less attention and resources are spent to develop cooperation routines.</td>
</tr>
<tr>
<td>-&gt; In collaborations with consultants, smaller firms generally have less resources and see it as less valuable than larger firms. They therefore also perform lower on this learning strategy.</td>
</tr>
<tr>
<td>-&gt; In collaborating with firms active in the same sector, small and medium size firms are stronger in their perception that it necessary to partner up with external firms to deal with the increase in market demands’ and technological complexity. They score higher than large firms, who also try to deal with the increased complexity by letting internal departments work more together.</td>
</tr>
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9.10. Detailed forms of cooperation with external actors
9.11. Learning strategies not (fully) covered by the theoretical framework
The interviewees and documentation referred to various learning strategies which were not or not fully covered by the learning organization framework. Moreover, there was an indication of one small driving factor that can have some influence on what type of learning strategies become important in an organization. To give a more complete picture, these themes are presented and explained here. In Chapter 6 “Discussion” the theoretical implications of these findings are discussed.

NOT COVERED:

Acquisitions
The first learning strategy that isn’t covered concerns the strategy of buying knowledge: acquisitions. This strategy is only practiced by the largest firm that is also registered on the stock exchange, Firm #5. They see acquisitions as a faster way to ‘learn’ in a certain technological area: “What we see is that our firm buys companies that are further advanced” (Board room manager). The fact that only Firm #5 displays this behavior is probably, because they have the financial resources, partially given to them by shareholders, and they are the firm that has set the highest growth targets for itself.

High status for employees
The second learning strategy that isn’t covered by the theoretical framework relates to the status employees have within the firm. Firm #4, the best performing firm, attaches considerable importance to the interests and views of their employees. They do so by focusing on attracting permanent staff, who get many benefits, rather than freelancers; by prioritizing employees’ career plans and wishing when matching secondment assignments with employees; and by investing strongly in the collection of employees opinions, views and ideas through feedback moments. Allocating this much importance to employees is done on purpose: “This is one of our unique selling points: when an employee is matched to a secondment assignment they are motivated for, the output of their work is much higher than when they are seconded somewhere against their will” (Employee, Firm #4). This higher motivation doesn’t only lead to higher performance as stated by the interviewee, literature (Ryan, R. M., & Deci, 2000) also suggest that learning happens more when the subjects are internally motivated.

Desirable in- and outflow of employees
The third learning strategy that isn’t covered by the learning organization is the desirable amount of in and outflow of employees in the organization. Already long known, a balance in retaining as well as attracting employees is one of the most effective ways of achieving a high level of knowledge in the organization (Allen, 1977). This is also comes back in interviews: “I think the best way to retain knowledge in the organization is by retaining the existing employees” (Board room manager, Firm #3). Two firms (#3 and #4) explicitly said that they strive for low outflow of employees. However, Firm #2 explicitly shared that the outflow of employees that have been working in the organization for a long time can be beneficial when transitioning the firm into a new direction: “Ever since we
moved to be a product organization three employees left who worked here for over 10 years. [...] I have now hired new employees who like the direction the firm goes into, and this gives new energy and insights for the organization” (Board room manager, Firm #2). This confirms that it can be beneficial when, besides retaining employees with certain knowledge and skills, new employees come in to bring fresh ideas and skills.

NOT SUFFICIENTLY COVERED:

High motivation
Ensuring a high motivation among employees of the organization is one of the learning strategies that is not elaborately prescribed in the learning organization framework. The only learning strategy that, by referring to “support”, has vaguely to do with motivation is IA1: “There is widespread support and acceptance for the mission statement”. As mentioned earlier, motivation for learning increases the amount of learning happening (Ryan, R. M., & Deci, 2000). Firm #4 and #5 both take this into account. The first to decide which secondment assignments will be done, the latter to only support initiatives for the transfer of knowledge that are wanted by the employees themselves: “organizing knowledge sessions has to come out of the people themselves” (Manager, Firm 5). Interestingly, motivation can be triggered. This makes enhancing motivation a learning strategy in itself.

Social network
The social network of employees matters, because, as Granovetter (1973) showed, (weak) ties with others can be a source of new knowledge. The learning organization only half-heartedly stimulates fruitful networking: “IC12: Employees of different departments talk with each other” and “IF22: Employees have (informal) opportunities to talk to other staff about successful programs and why they succeed”. Although they acknowledge the importance of social relations (IC12) and the content of the discussions (IF22), these two learning strategies together do not cover the full spectrum of what networking can bring. It also only refers to internal networking. For Firm #2, the external networks of all employees put together is actually an important source of information when they require something. It is, therefore essential for their learning as a whole. Firm #3 focuses more on internal networking for all matters, including talking about problems: “our greatest strength is that we are all here, on one location, and can tap each other on the shoulder if something goes wrong” (Board room manager). For Firm #5, the largest firm of all, increasing the internal network of employees is an explicit wish. So, when the social network can be a source of learning, one expects this to be part of the strategies of the learning organization.

‘Old topics’: Recording and standardization
Two learning strategies that are more related to old-fashioned knowledge management also came up in the documentation and during the interviews. Recording of knowledge and its standardization are
officially not part of the learning organization. The only learning strategy in which recording is vaguely implied is in IF24: “New work processes that may be useful to the organization as a whole are usually shared with all employees”. It is hard to share such knowledge without recording it. Three references were made to recording knowledge: recording project evaluations (Firm #4), recording CV’s in an internal database (Firm #5) and recording the reasons for choices within the programming code (Firm #1). Recording knowledge can be useful, but only when that knowledge remains relevant in the future. Standardization, on the other hand, is a learning strategy that is focused on a process/a “how-to”. By standardizing the way knowledge is shared clarity is achieved and more learning happens. One employee of Firm #5 wishes to have more standardization: “We now offer too many tools and channels, and this fragments where we store our knowledge”.

SMALL DRIVING FACTOR:

Amount and location of customers
The amount and location of customers influence the way the firm can collaborate and learn from them. In the instance of Firm #3 many customers are located elsewhere in Europe. This makes it more difficult to meet in real, although Firm #3 does go, with a selection of the team, physically to the offices of the customers. Rather than doing that often, they use conference calls intensively. Whereas the distance between firm and customer does not matter much for the three specified learning strategies with customers - asking about their market needs, views on prototypes and current products/services - it can for instance limit the extent to which firms partner up in a joint development of a product. In this case, a feature of the customer relationship limits the learning strategies that are and can be pursued. In the situation of Firm #5, one secondment department works for 90% of the time for one large customer. This allowed the department to set up an academy that thoroughly introduced new employees into the world and work of the large customer. In this way, they come much better prepared to their first day.

Key Findings about “Learning strategies not (fully) covered by the theoretical framework”
-> The learning strategies “Acquisitions”, “High status for employees” and “Desirable in and outflow of employees” were not covered by the theoretical framework, whereas “Motivation”, “Social Network” and “Recording and standardization” weren’t sufficiently covered.
-> The amount and location of customers is a small driving factor for learning strategies.
### 9.12. General importance of learning

Interviewees mention a range of reasons why learning was important for their firm. Importantly, all firms express that it is essential to them. Most interviewees say that their high tech software firm’s core strength is knowledge, and not some sort of infrastructure, physical product or physical resources. Various interviewees share versions of the following statement:

> **“We are a knowledge company. The only thing we have is knowledge” – Board room manager, Firm 5**

As the table on the next page shows more elaborately with exemplary quotes, three main themes appeared in the interviews. They were shared quite broadly. Firstly, learning is stated to be essential for the performance and market position of the firm. More specifically, it is stated that it is good for the quality of their market solutions; the efficiency of the organization; their innovating capacity; and the subsequent added value, competitive advantage and market value they gain from it. Secondly, learning is deemed essential to deal with internal and external changes. Internal changes include a change in the firm’s mission statement, organizational structure or personnel. External changes refer to technological and market changes. Lastly, learning is said to be critical to attract and retain the right personnel. Organizational learning helps to keep their work challenging and interesting. It can improve the way employees are managed. And it can also make employees feel “heard” more, because organizational learning requires their vision and input to grow collectively.

Additionally, interviewees were also asked whether they believed it was useful for their firm to screen its own functioning according to the perspective of ‘does it stimulate learning?’ to adapt the organization to improve learning. All interviewees confirmed this was potentially useful:

> **“Applicable”, “Largely applicable”, “Applicable, if...” – Many interviewees**

The enthusiasm for the learning organization perspective differed, however. Small firms #1 and #2 said the perspective could be applicable under conditions that the model of the learning organization is dependent on the type of employees and the type and size of the firms. Medium firms #3 and #4 respectively said it was largely applicable and that they actively try to do this already. Large firm #5 shared that they were particularly open to it becoming such an organization. What type of learning strategies the firms are interested in and/or implement mostly depends, however, on five main drivers that are explained in Chapter 5 “Results”, section 5.3 “Drivers of Learning Strategies”.

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**Key Findings about “Importance of learning”**

- Learning is deemed important to strengthen their performance and market position, to deal with internal and external changes and to attract and retain employees.
- The learning organization perspective was deemed applicable by all interviewees, more enthusiastically by the medium and large firms. Small firms like to see their contexts taken into account.
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<tr>
<th>Gains</th>
<th>Exemplary quotes</th>
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<tr>
<td><strong>1. Strengthening performance and market position (= enlarging profits)</strong></td>
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<tr>
<td><strong>Performance</strong></td>
<td>- “When [employees] excel to the maximum we can get the maximum out of technology” – Report, Firm 4</td>
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<td>- “Qualified software engineers with good social and communication skills know how to match the technologies to those things that customers and end-users really desire” – Report, Firm 4</td>
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<tr>
<td><strong>Efficiency &amp; Productivity</strong></td>
<td>- “I am a fan of couple the ‘best of breeds’. Don’t go invent everything yourself. Go to other people, they also thought of things. Why would I try to make something if someone else already thought of it?” – Employee, Firm 5</td>
</tr>
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<td></td>
<td>- “We have enough ideas in the pipeline to make customers happy. To do this efficiently, however, it is handy to be up to date of the possibilities in our trade, so that we can use the best of those” – Employee, Firm 2</td>
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<tr>
<td><strong>Innovation</strong></td>
<td>“To find the right things that make a difference for your product, one will have to stay up to date and, even if the market doesn’t ask for it, keep on exploring” – Employee, Firm 2</td>
</tr>
<tr>
<td><strong>Competitive advantage</strong></td>
<td>- “We have to stay ahead in the technology to remain interesting for our customers”, Board room manager, Firm 4</td>
</tr>
<tr>
<td></td>
<td>- “We do customer projects. [...] This means that we work with standard, often open source, tooling to make tailor-made solutions. [...] It is very important to stay up to date with all new tools, technologies and products. We have to stay ahead, otherwise we get behind”. – Board room manager, Firm 3</td>
</tr>
<tr>
<td><strong>Market value &amp; Added value</strong></td>
<td>- “You have to get it from knowledge management: if we don’t improve there then we will become less and less valuable in the market [...] A tariff doesn’t go up by itself.” – Manager, Firm 5</td>
</tr>
<tr>
<td></td>
<td>- “Retaining and sharing knowledge increases the added value that we can offer to our customers” – Report, Firm 5</td>
</tr>
<tr>
<td><strong>2. To better deal with internal and external changes (=ability to change)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>To keep up with technological and market changes</strong></td>
<td>- “When we notice that multicore programming happens more and more, it is time for everyone in the firm to also know that language” – Board room manager, Firm 4</td>
</tr>
<tr>
<td></td>
<td>- “The world has changed enormously over the last 10 – 20 years. Having social skills have become more important. [...] That is why we look for that in new employees [...] and what we educate them on” – Board room manager, Firm 4</td>
</tr>
<tr>
<td><strong>To adapt when the firm’s mission or organizational structure changes</strong></td>
<td>“We want to be a system integrator. [...] so we do more with hardware, with software and with the different parties involved. This means that we therefore have to look beyond what we currently do in software” – Manager, Firm 5</td>
</tr>
<tr>
<td><strong>To manage the flow of incoming- and outgoing employees</strong></td>
<td>“A nice example: last year we had 20 employees in projects. This fell back to 7. Now we have 25 employees working in that specific department on projects again. How do I get these employees quickly on a level that they can succeed within the limits [of time and resources, red.]? I think that depends on the mechanisms your organization has in place to bring employees quickly on a certain level.” – Manager, Firm 5</td>
</tr>
<tr>
<td><strong>3. To attract and retain employees (=creating value for employees)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>To keep work challenging and interesting</strong></td>
<td>- “Attracting and retaining people remains a top priority, and our ability to provide technological challenges [...] will be key factors in the success of this drive” – Report, Firm 5</td>
</tr>
<tr>
<td></td>
<td>- “We do this [put personal learning central] because it is very hard to keep employees interested and in one’s firm. They have to be able to develop themselves. They want to be challenged.” – Board room manager, Firm 4</td>
</tr>
<tr>
<td><strong>To manage employees well</strong></td>
<td>“If you look at how we manage our employees, we could make improvements there” – Manager, Firm 3</td>
</tr>
<tr>
<td><strong>To make employees feel heard</strong></td>
<td>“I find it a particularly beautiful mechanism [a feedback event, red.]. It also works well. I think that some good signals from employees are caught there. Then the employees can finally say what they are thinking about the ways things go” – Employee, Firm 4</td>
</tr>
</tbody>
</table>
## 9.13. Best Practices of HTSC Firms

### Best practices for “Clarity of Mission and Aims”

<table>
<thead>
<tr>
<th>Practice</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is widespread support and acceptance of the mission statement (IA1)</td>
<td>Every year, in a plenary session with the whole firm management explains the mission, the motivation behind it and how it attempts to achieve the mission.</td>
</tr>
<tr>
<td>Understanding how the mission is to be achieved (IA2)</td>
<td>Objective and Key Results (OKR)-system: individuals, and departments identify 3-monthly objectives and key results that support achieving the mission.</td>
</tr>
<tr>
<td>The mission identifies values for employees to care about and conform to (IA3)</td>
<td>Employees describe in their annual personal development plan how and what they contribute to the firm’s values.</td>
</tr>
<tr>
<td>Existence of self-assessment opportunities with regards to goals attainment (IA4)</td>
<td>OKR-system (IA2) Reporting in the annual personal development plan how you plan to contribute to the mission, assignments, firm’s values and your personal development and evaluating this afterwards.</td>
</tr>
</tbody>
</table>

### Best practices for “Leadership commitment and empowerment”

<table>
<thead>
<tr>
<th>Practice</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior managers have positive attitudes towards change and are open to new ideas (IB5)</td>
<td>Session where employees share, first in small groups and then with the firm, what are problems within the firm, why that is a problem, and what can be done (and managers silently listening).</td>
</tr>
<tr>
<td>Senior managers and employees share a common vision of what the work should achieve (IB6)</td>
<td>Periodic “update meetings”/State of the Union conducted by the board to inform, explain and deliberate about the vision with the whole firm.</td>
</tr>
<tr>
<td>Managers in this organization accept criticism without being overly defensive (IB7)</td>
<td>Plenary feedback session with silent managers (IB5-1) Training about each person’s character profile and how communication styles correspond with this.</td>
</tr>
<tr>
<td>Managers provide useful feedback to identify potential problems and opportunities (IB8)</td>
<td>360° feedback: your direct managers, colleagues, external partners and possible subordinates give an employee feedback.</td>
</tr>
<tr>
<td>Managers frequently involve employees in important decisions (IB9)</td>
<td>Workshops to involve employees in the firm’s strategy Annual evaluation of what employees see can be done better and following up on these issues.</td>
</tr>
</tbody>
</table>

### Best practices for “Organizational structure”

<table>
<thead>
<tr>
<th>Practice</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are multidisciplinary teams (IC10)</td>
<td>A business development department with a workshop facilitator, designer, prototype-builder and experts in (visual) communication A developer’s team with back-end and front-end developers, an application architect and a project manager</td>
</tr>
<tr>
<td>Employees in one role take over tasks of employees in other roles (IC11)</td>
<td>Software developers get a role in sales and acquisition as well as in the coaching and training of employees.</td>
</tr>
<tr>
<td>Employees of different departments talk with each other (C12)</td>
<td>An intranet or internal social media platform Knowledge sessions where staff from different teams talk with each other.</td>
</tr>
<tr>
<td>Company policy encourages employees to solve problems before asking management for a solution (IC13)</td>
<td>An “idea to go”-plan indicating how employees can, with support, come up with an own product Encouragement to think of proposals when presenting a problem.</td>
</tr>
<tr>
<td>Employees can form informal groups to solve organizational problems (IC14)</td>
<td>Self-directed teams, steering their own organization and work Culture and practice of “it is normal to co-decide about issues”.</td>
</tr>
</tbody>
</table>
### Best practices for “Quality Management”

**Small groups of employees regularly check the quality of their product or service (ID15)**
- Code review or pair programming by employees
- Master-apprentice relationship where the senior checks the quality of the code of the junior

**There is a system for the collection of employee’s proposals (ID16)**
- Idea-to-go process to collect employees’ ideas about new products or services
- Session where employees share improvement points with each other and (silent) management
- An employee survey to collect opinions on job satisfaction and organizational improvement points
- Employees have input in project evaluations
- A tracking system of issues linked with a list of ideas

**There are metrics to monitor learning (ID17)**
- Organizational “scoreboards” that include learning
- Recording knowledge sessions/update meetings and making these always accessible for employees and management
- Overview of who followed which education activity
- CV Database

### Best practices for “Human Resource Development”

**There are education activities that strengthen the employee’s competences based on the firm’s needs (IE18)**
- Evaluation of knowledge gaps translating into education activities for employees
- An obligatory set of technology, organization and personal development trainings the firm sees as vital for every employee
- Voluntary trainings about technologies and professional leadership and the ability to request specific personal training
- The Objective and Key Results (OKR)-system that helps to put personal education and learning in line with company goals

**There is a long term educational planning (IE19)**
- A fixed two-year education scheme for new employees
- Annual education activities calendar to pre-plan your trainings
- 10% of every employee’s working time for education activities
- A quarterly organized “ASML Academy” with fixed activities
- A 1-(3*) year personal development plan for every employee

**There is significant on-the-job learning happening (IE20)**
- Employees are matched to challenging tasks
- SCRUM’s standups, sprints and retro’s are conducted
- Employees meet with their manager to identify their daily personal development opportunities
- Trying to ensure through talks on the working floor that everyone works from a perspective of “autonomy, mastery and purpose”, following Daniel Pink’s book ‘Management 3.0’
- Encouraging a culture of self-development
- Continuous coaching of employees by managers
- Junior developers are coached by senior developers
- Documenting the ‘how-to-use’ of specific technologies
- Letting HRM professionals discuss and deliberate amongst each other

**Teams are composed in order to increase their diversity (IE21)**
- To create a multicultural working environment and actively strive for more women on the software development teams
- Taking into account the personality of employees when composing a team
- Team and organizational communication happens in English in order to allow international to take part fully and more easily
### Best practices for “Transfer of knowledge”

| Employees have (informal) opportunities to talk to other staff about successful programs and why they succeed (IF22) | • Knowledge sessions/workshops where experienced employees share their insights about a technology and answer questions  
• Webinar where experts interactively share knowledge  
• Technical conference where teams show their latest work*  

| Failures are constructively discussed in the organization (IF23) | • Promote a general culture of asking and giving feedback, by training, regular feedback sessions and leading by example*  
• Employee satisfactions-evaluations and/or events (IB5), including what goes wrong, why this matters and how it can be solved  
• Evaluate projects critically with all stakeholders and sharing these project evaluations with the whole firm  

| New work processes that may be useful for the organization as a whole are shared with all employees (IF24) | • Internal newsletter with updates, trends and events  
• White paper/document about new trends/technologies  
• Project information online available on ‘Confluence’  
• Technical conference where teams show their latest work*  

| There is a system that allows the organization to learn successful practices from other organizations (IF25) | • Technical managers are explicitly allocated with the task to identify valuable external trends, technologies or practices  
• Participate in a consortium project to learn from the external partners and gain expertise in an upcoming technical area  
• External experts share their knowledge with the organization  

| Job rotations are done and with a strategic intent and effect in mind (IF26) | • Composing project teams differently on purpose every time  
• Rotating the type of assignments seconded employees get  
• Employees rotate between thematic departments working on similar software technology, while spreading their knowledge*  

### Best practices for “Compensation and budgeting systems”

| Wages are based on qualifications and functions (IG27) | • Competences and qualifications of the employee are measured and taking into account in appraisal and promotion meetings  

| Wages are based on results (IG28) | • The wages of the employees that perform better than others in the same role increase faster  

| Innovation and risk-taking are rewarded (IG29) | • Innovative ideas are rewarded with a bonus  
• Creativity is taking into account in appraisal meetings  
• The winner of innovation challenges can win nice gadgets  

| Budget systems are designed so that they challenge the need for doing things “as they have always been done” (IG30) | • Routine of openly discussing, between the software developers and sales and management, the necessity of purchasing items  
• Budgets are planned tightly, so to stimulate smart use of funds  

### Best practices for “Experimentation”

| Experimentation and tests are encouraged by managements (IH31) | • Innovation Challenges, such as ‘create something innovative with a Smart Watch’, to mobilize ideas amongst employees and serve as inspiring examples of your capabilities to customers  
• Special interest groups, such as the Linux group, that together work on a high-tech solution for a problem  

| Employees can bring new ideas into the organization (IH32) | • IDEA to-go process to get from idea to prototype, business model and a decision whether or not resources are allocated to the idea  
• Evaluations amongst employees and management about ‘what goes well/wrong and can be done better’  
• Club of Young Employees that are asked to come up with new ideas using their fresh perspective and young mindset  

| Employees who are new in the organization are encouraged to question how things are done (IH33) | • A “Serious Game” where new employees are asked to show with “action-cards” what action path they would take in case of a problem and this is taken into account to improve processes  

**Best practices for “External Cooperation”**

| Cooperation with customers (EA34 - 36) | • Cooperating with the customer to support and develop their view of the future and the firm strategy in the area of technology  
• Issue tracking and ticketing system ‘Jira’ for customers  
• Conducting in-depth customer satisfaction surveys  
• Secondments at the customer to understand their issues better  
• Adapting the business structure to align with customer needs  
• Following training education activities of the customer’s firm, or at a large supplier through the contacts of your own customer  
• Listening to customers’ own ideas about upcoming technological or market trends and ideas about solutions to their problems  
• Organizing an ‘inspiration/demonstration session’ for customers  
• Inviting customers to ‘knowledge sessions’ for your employees |
| --- | --- |
| Cooperation with suppliers (EB37 - 41) | • Helping a supplier reach a new customer through being a “Technology Partner”  
• Getting customized training sessions to ask specific questions  
• Get help and material to test out new technological systems |
| Cooperation with knowledge institutes and universities (EC42 – 49) | • Participate in a consortium project, incl. a knowledge institute  
• Participate in a research product, for instance by letting the use of your product be researched by a university  
• Participate in conferences organized by universities/knowledge I.  
• Accessing technology and market roadmaps of Gardner  
• Participate in a conference Gardner workshop how a technology roadmap will impact your firm  
• Participate in a tour of the TU/e Informatics or Business Faculty  
• Promote the use of your own tool in study programs  
• Allow professors to try out some of the new technologies you use  
• Let graduating student projects always be about new technology  
• Being the sponsor of the introduction week of a university  
• Presenting your work and firm in a workshop  
• Granting a study scholarship to students  
• Organize recruitment events to attract new employees  
• Contribute in support and/or funds to projects like the Robocup  
• Employees follow E-learning modules  
• Have criteria and a strategy for cooperation with Univ./Know. I.* |
| Cooperation with consultants (ED50 – 53) | • Let consultants co-create a product or service with the firm  
• Organizational consultants advice on organizational structure |
| Cooperation with firms in the same sector (EE54 – 58) | • Participate in a consortium project, including same sector firms  
• Cooperate with same sector firms to produce a shared product  
• Develop standard software cooperation contracts  
• Search for market and technology trends together  
• Agreement with same sector firms to share employees and projects when market conditions necessitate this  
• Invite same sector firms to give a technology-based presentation in a knowledge session or workshop for your employees  
• Knowledge matrix to share which firms/experts have which type of knowledge |

Note: Best practices go beyond the usual and average  
Note: The best practices with an asterix* are suggested practices that are, I found, not yet implemented
### 9.14. Interviewees’ suggestions for HTSC’s role in promoting learning

<table>
<thead>
<tr>
<th>Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organize a stronger connection with the TU/e and other universities/knowledge institutes to learn more about their technology and organizational ideas</td>
</tr>
<tr>
<td>Organize a stronger connection with ASML to learn from their stakeholder management expertise</td>
</tr>
<tr>
<td>A shared “Social Skills Academy” for all Young Professionals of HTSC firms where they learn personal development, social, communication and management skills important for their career and their HTSC network is subsequently also strengthened</td>
</tr>
<tr>
<td>Set up a working group in which members can have knowledge sharing sessions about Human Resource Management and Organizational Innovation and Learning</td>
</tr>
<tr>
<td>Send out a regular newsletter to share knowledge about developments related to the HTSC Cluster, including information about learning strategies of firms</td>
</tr>
<tr>
<td>Invest together into modelling/model driven development based on a shared technology roadmap</td>
</tr>
<tr>
<td>Let HTSC be a help-out pool for projects and personnel</td>
</tr>
<tr>
<td>Make standard legal cooperation agreements that can be used as a standard in the sector for data-exchange, data protection and intellectual property regulations</td>
</tr>
<tr>
<td>Involve each other in each other’s training sessions</td>
</tr>
<tr>
<td>Knowledge matrix for firm/experts for network opportunities / knowledge matrix for who knows what</td>
</tr>
</tbody>
</table>
### 9.15. Overview of main results per firm per learning strategy

<table>
<thead>
<tr>
<th>Section</th>
<th>Statement</th>
<th>Firm 1 (Small; products)</th>
<th>Firm 2 (Small; products and secondments)</th>
<th>Firm 3 (Medium; Projects)</th>
<th>Firm 4 (Medium; Projects and Secondments)</th>
<th>Firm 5 (Large; Products, Projects and Secondments)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity of Mission and Aims</td>
<td>There is widespread support and acceptance of the mission statement (IA1)</td>
<td>4.3 – Simple mission statement that is shared amongst employees Small firm where everyone knows what they try to realize as a team</td>
<td>4.0 – Shared understanding of and support for the mission Small firm where everyone knows what they try to realize as a team</td>
<td>3.3 - Little awareness by employees of the (specific) mission statement: “not very conscious of the overall mission” + “mission not well explained” Little communication from management -&gt; attention</td>
<td>4.5 - Awareness and support for the missions statement: “every year there is a meeting where management explains the mission” Elaborate and repeated communication from man.</td>
<td>2.8 - Unknown or multiple mission statements: “technology provider”; “system integrator” and “innovative leader in industrial automation” Little communication from management -&gt; attention</td>
</tr>
<tr>
<td>Understanding how the mission is to be achieved (IA2)</td>
<td>4.3 - Clear roles and tasks per employee; however, the documentation and insight in how these tasks interact can improve Small firm informal system where task interrelationships are not yet clear</td>
<td>4.0 - Much (effective) daily improvisation, little planned-based working: “the last thing my boss sees, gets most attention” Small firm informal system with no structure to hold on to</td>
<td>3.5 - No concrete method of achieving the mission, or managing employees: “employees often do not know where management wants to go to” Little communication from management -&gt; attention</td>
<td>5.0 - The Objective and Key Results (OKR)-system ensures that everyone knows how they contribute to achieving the mission Attention and effort to come up with a well working system</td>
<td>3.6 - Many short term financial targets that have to be reported: “we are searching very hard to translate the mission into interim [non-financial] goals” Ownership model</td>
<td></td>
</tr>
<tr>
<td>The mission identifies values for employee to care about and conform to (IA3)</td>
<td>3.3 - No values identified Small firm informal system</td>
<td>3.0 - No values identified, but there are informal expectations: “this does naturally, by itself” Small firm informal system</td>
<td>3.5 - Values identified, but not defined: “the values are mentioned but not explained” Little communication from management -&gt; attention and commitment of management</td>
<td>4.5 - Values identified and translated into attitudes per function category: “the higher up you get, the more is expected of you” Attention and effort to come up with a well working system</td>
<td>3.2 - Values identified recently, but not yet known: “they still have to land” + “work in progress” Only recently introduced, and spreading new practices takes time due to the large firm size</td>
<td></td>
</tr>
<tr>
<td>Existence of self-assessment opportunities with regards to goals attainment (IA4)</td>
<td>2.3 - No self-assessment opportunities available, the director does so himself directly without a fixed system of progress or appraisal meetings Small firm informal system</td>
<td>2.0 - No self-assessment opportunities available, the director does so himself directly without a fixed structure of progress or appraisal meetings: “I am the only one who measures the quality of the work that people do” Small firm informal system</td>
<td>2.8 - No formal system to assess oneself or get feedback on one’s performance: “we just know when things are a success, because we have 10+ years of experience” Limited attention and commitment to work out a system that helps more</td>
<td>4.0 - Self-assessment via the Objective and Key Results-system: “at the end of each quarter, every employee assesses their own work by comparing them to their OKR’s” Attention and effort to come up with a well working system</td>
<td>3.6 - Employees now have to set an annual goal and report afterwards: “employees rate how they have contributed to the firm, their assignment, their personal growth and their professional attitude” Recently introduced initiative</td>
<td></td>
</tr>
<tr>
<td>Leadership commitment and empowerment</td>
<td>Senior managers have positive attitudes towards change and are open to new ideas (IB5)</td>
<td>4.0 - Ideas welcomed, and management listens to its employees: “some employees told me we had to focus more” [and he did] Open org. mind of M. and direct communication due to small firm size</td>
<td>4.7 - Ideas are welcomed, as “everything can be said”, but some say this only applies to technology: “the path of technology is open, but the director keeps decisions about the organization to himself” “HR is not my thing” Small firm informal system / T. focus / No O. focus</td>
<td>3.8 - Ideas are welcomed, as “everything can be said”, but some say this only applies to technology: “all technical ideas are treated seriously; organizational ones have a harder time” T. focus / No O. focus / insufficient HR resources</td>
<td>4.0 - Once a year there is a plenary feedback session and every 6 weeks a 1-on-1 moment to bring up ideas: “everyone can have the floor to share their experiences” Open mind of management that cares about their staff</td>
<td>3.4 - Due to secondment history little organizational evaluations; technical ideas can be turned into business propositions now, but often tight budgets: “such tight rules they can’t move” Organizational type / Ownership model / Limited Openness ownership model</td>
</tr>
<tr>
<td>Organizational structure</td>
<td>Organizational type</td>
<td>3.7</td>
<td>3.7 – Employees all software developers, but managers have “complementary skills”</td>
<td>Small specialist/niche firm</td>
<td>3.3</td>
<td>3.3 – There are back-end/front-end software engineers, sales manager and project manager in order to deliver a good service to the client</td>
</tr>
<tr>
<td>SENIOR MANAGERS AND EMPLOYEES SHARE A COMMON VISION OF WHAT THE WORK SHOULD ACHIEVE</td>
<td>4.5</td>
<td>The vision is considered plain and simple for management and employees: “we just have to make a product”</td>
<td>Small firm informal system</td>
<td>4.0</td>
<td>The (implicit) vision is shared and broadly understood amongst employees and management</td>
<td>Small firm informal system</td>
</tr>
<tr>
<td>MANAGERS IN THIS ORGANIZATION ACCEPT CRITICISM WITHOUT BEING OVERLY DEFENSIVE</td>
<td>4.0</td>
<td>Managers are open to input of employees, take these seriously and respond to these</td>
<td>Responsive management</td>
<td>3.7</td>
<td>No progress/appraisal meetings so “no calm moments to sit down and give each other feedback”</td>
<td>“HR is not my thing” (M)</td>
</tr>
<tr>
<td>MANAGERS PROVIDE USEFUL FEEDBACK TO IDENTIFY POTENTIAL PROBLEMS AND OPPORTUNITIES</td>
<td>3.7</td>
<td>Individually management provides feedback to all individual employees, and because of the size there is no reported need for more structured feedback moments and plenary feedback</td>
<td>Small firm informal system</td>
<td>3.7</td>
<td>Feedback about the technology happens extensively and is valued, but is also sometimes seen as “micromanagement”; for personal development structural feedback moments are missed: “no appraisal/progress meetings, unfortunately”</td>
<td>Small firm informal system / Insufficient attention to LS</td>
</tr>
<tr>
<td>MANAGERS FREQUENTLY INVOLVE EMPLOYEES IN IMPORTANT DECISIONS</td>
<td>4.0</td>
<td>Management talks often and directly with the employees and discusses decisions with them</td>
<td>Small firm informal system</td>
<td>3.5</td>
<td>Technologically, the discussion is “open, everyone can discuss with each other”. However, organizationally, “how to arrange things with each other, what are the employees involved in, what sort of decisions are made – this the director keeps very much to himself”. While they have valuable experience there is no structural method to collect employees input for organizational matters.</td>
<td>Limited openness / No evaluation system</td>
</tr>
<tr>
<td>ORGANIZATIONAL TYPE</td>
<td>3.7</td>
<td>Employees all software developers, but managers have “complementary skills”</td>
<td>Small specialist/niche firm</td>
<td>3.7 – All high-tech software engineers, but each “with their own expertise”</td>
<td>Small specialist/niche firm</td>
<td>3.3</td>
</tr>
</tbody>
</table>
Employees in one role take over tasks of other roles (IC11)  

4.0 – Managers have taken over tasks in sales and acquisition in the past.  

Practice and experience of taking over tasks from each other in the domain of sales and acquisition  

4.0 – In the development of software, the employees take over tasks regularly and “are expected to do so”. In the management domain, e.g. in sales, coaching or training, “this unfortunately doesn’t happen as much as one would expect from a small firm”  

Openness in the area of management

2.8 – Taking over tasks does not happen with most employees - the software engineers – as “this doesn’t work”, but does occur between project managers, application architects and sales managers. Practice of and support for taking over tasks limited to “where it helps”, e.g. project management  

3.0 – This is not an explicit routine or practice. No practice, experience or intention to take over tasks of each other

3.5 – The fact that every unit is independently responsible for their profits and losses, has led to the situation “where there are employees free in one unit, and there is work somewhere else, but they cannot be matched due to unfavorable financial incentives”

Ownership model/financial incentives

Employees of different departments talk with each other (C12)  

4.0 – As the firm is very small “there are not really different departments”. The CEO speaks with everyone, employees sometimes “communicate freely via Skype” in order to improve the product, but this “does not happen that often, so far”. The external business manager however only speaks with the CEO,  

Organizational type / Small firm size / Limited attention to fully networked organization

3.0 – At the headquarters there is an “open communication situation” to improve functionalities and the product; but one employee says about a seconded employee working directly with their product “we barely speak to him, even though that would be valuable”, and why we don’t speak to him “has never become clear to me”.  

Organizational type / Limited attention to fully networked organization

4.3 – “The biggest strength of the firm is that we are all working on a single location and can tap each other on the shoulder to ask something”. It is an informal, non-hierarchical and non-bureaucratic firm so that “you can directly talk to the person you need”. In their projects they “value this continuous deliberation” and explicitly expect “people to be proactive in solving issues”.  

Importance attached to deliberation / Little hierarchy / Organizational type

4.7 – Regular knowledge sessions are organized “to let seconded software engineers meet and share their knowledge and experiences about their work, its challenges, and their solutions”. Moreover, “every 6 weeks a manager speaks with every seconded employee”, sometimes “resulting in one employee calling the other for advice” or “sharing broadly”.  

Importance attached to discussion / Organizational type / Attention

3.4 – “Most employees are seconded, so I haven’t seen them yet”. “We have no canteen where employees meet, because historically as a secondment organization we didn’t want people to be in the firm”, “Every business unit is busy with itself”, “Yammer helps to connect employees”, “CTO Team moves through the firm”, “People talk, but not about the issues of the firm”.  

Organizational type / Organizational structure / Attention and motivation

Company policy encourages employees to solve problems before asking management for a solution (IC13)  

3.0 – “Most of the time, while working on an issue, I deliberate with the director how it can best be solved”  

Small firm system / Little autonomy

3.7 – “You are expected to take up multiple things when necessary”; however, “the director also likes to talk about the technology issues” sometimes seen to be a case of “micromanagement”  

Small firm system / Little autonomy

4.0 – “There are (too) many management layers”, but “tasks and responsibilities are delegated” and “software developers are active and responsible for intensive customer contact”.  

Organizational structure: many M. layers / High autonomy

3.7 – Employees, when seconded or on a project, are responsible for the end result: “You have to do it on your own [...] with the help of some money, materials and time”, and ability to get advice.  

Organizational type / High Autonomy

3.8 – “Part of the managers take over when employees report a problem”, but “HR coaches them to act differently” and recently initiatives started to increase employees’ empowerment.  

Recently started initiative / Attention to self-reliance

Employees can form informal groups to solve organizational problems (IC14)  

4.0 – “We can directly and informally talk with the director to solve issues”  

3.0 – “On organizational matters we do not really have any influence”  

Openness of management

2.8 – “Organizational issues are solved by the management team”, but “organizational problems are often not dealt with”  

Openness in the area of management

3.7 – For project operations “software engineers come together and solve it”, but “seconded employees don’t do this”  

Openness in the area of management

3.2 – For organizational matters there is little tradition of (informally) solving problems as employees, although now this

business development team e.g. has “a proto-type builder, host of workshops, designer, software developer, visualizing assistants”.

Organizational type / broader market identity
### Quality Management

<table>
<thead>
<tr>
<th>ID</th>
<th>Details</th>
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</table>
| 3.0 | “We try to review each other’s code in order to understand it and be able to replace each other if necessary”. Testing does not happen as elaborately, because “when a product has an infinite amount of combination possibilities, it is hard to test thoroughly”.
Small firm informal system / Product characteristics.                                                                                                                                                                                                 |
| 3.3 | There is exchange of ideas, discussion and code reviewing and testing going on. However, management and employees agree “QM has to improve” and “some more structural light-weight processes are needed”. New routines and automatic testing technology are being desired to improve this. Small firm informal system / Routine / Experimenting. |
| 2.8 | Code reviewing is not systematic part of the software development process throughout the organization. “Only one project team has code reviewing by the application architect as a fixed part of the process” and just “junior developers’ code is generally reviewed by seniors”. Lack of routines / Some light-weight processes. |
| 1.3 | “We use SCRUM, where we talk about what we achieved and how the test results are”, but “we don’t always stick to doing pair programming, particularly in projects. It mostly happens with junior developers”, Management concludes testing, especially module testing, can improve and a plan has already been written for it. (Lack of) Routines / Attention+ |

### Human Resource Development

<table>
<thead>
<tr>
<th>ID</th>
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<tbody>
<tr>
<td>2.5</td>
<td>No training for regular employees, although some new employees will get a Microsoft-run software training. Resources / Small firm</td>
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<td>No training for regular employees, except a tailor-made training at a supplier arranged through an important customer. “As we pioneer, the knowledge we need can’t be found in pre-planned training”.</td>
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<tr>
<td>4.5</td>
<td>All employees get 10% of their working time for study or educational activities, with materials paid for. Moreover there are technology focused knowledge sessions given by and for employees. There is little training in non-T domains.</td>
</tr>
<tr>
<td>4.7</td>
<td>Knowledge sessions given by employees and external experts for technological and non-technological topics. Personal development days every half year. Multiple training activities are required of employees.</td>
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</table>

### There is a system for the collection of employee’s proposals (ID16)

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<tbody>
<tr>
<td>4.3</td>
<td>There is an issue and bug tracker for the software product. Light-weight process for T. / No attention for a system for organizational proposals.</td>
</tr>
<tr>
<td>3.5</td>
<td>There is an issue tracking system for software development; however, organizationally there is no system for the collection of employee’s input. Light-weight process for T. / No attention for a system for organizational proposals.</td>
</tr>
<tr>
<td>2.8</td>
<td>Technologically, there is an open culture of welcoming ideas. Organizationally, there is no idea-box, project evaluations or plenary feedback-day. Light-weight process for T. / No attention for a system for organizational proposals.</td>
</tr>
<tr>
<td>4.7</td>
<td>Every 6 weeks management meets with all of its employees and suggestions can be shared; every year there is a plenary feedback day. Special interest groups and Innovation Challenges collect employee’s innovative ideas. Routines for collecting T. + O. ideas / Attention for LS</td>
</tr>
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</table>

### There are metrics to monitor learning (ID17)

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<tr>
<td>2.7</td>
<td>Solved issues are listed, but not what is learned from them. “The director knows a lot about the product, so always helps to answer questions about that” Lack of routines / Small firm informal system.</td>
</tr>
<tr>
<td>2.3</td>
<td>Issues are tracked, traced and discussed, but what is learned from that is not registered except in the minds of the director and employees. “I also don’t know how this monitoring can be done” Lack of routines / Small firm informal system.</td>
</tr>
<tr>
<td>2.8</td>
<td>“There is an overview of education activities, but not accessible for everyone”. There are no metrics to monitor learning, such as project evaluations. Update Meetings and Knowledge Sessions are not stored, although this is by some desired upon reflection. Lack of routines / Lack of resources*</td>
</tr>
<tr>
<td>4.3</td>
<td>There are project evaluations with lessons learned and a tradition to store these on Confluence for new project teams, as “rotations of employees is inherent in project organizations”. There is an overview of who followed which education activities. Organizational type / Routines / Attention / Resources</td>
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<p>| 4.0 | Technology-focused training, both generic throughout the year as well as specialized on request. Social skills training in a professional leadership course. Mostly voluntary. An intro-Academy to prepare for a large customer.                                                                                                    |</p>
<table>
<thead>
<tr>
<th>Resource Allocation/Small firm</th>
<th>Importance attached to study/Innovative focus</th>
<th>Importance attached to study/Resources/Technology-focus</th>
<th>Importance attached to study/Resources/T- and non-T focus</th>
<th>Importance attached to study/Resources/T- and non-T focus</th>
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<tr>
<td>There is a long term educational planning (IE19)</td>
<td>2.5 – Currently no planning, because no formal training for regular employees. Earlier the long-term requirement that parties involved in making the product had to have Microsoft software courses. Insufficient resources for training and planning</td>
<td>1.7 – No planning, because learning is ad-hoc and instrumental to what they seek and need to know at a specific moment in time. “As we pioneer, the knowledge we need can’t be found in pre-planned training. Innovative focus / T. focus / Little O. focus / Little HR attention + planning</td>
<td>3.8 – There are annual evaluations of knowledge gaps sometimes resulting in specific training for employees. However, there is no long term educational planning for employees; they are requested ad hoc by employees “regularly causing gaps in time when they don’t study”. Planning driven by short-term necessity</td>
<td>3.7 – There are evaluations of knowledge gaps, resulting in training offers for employees. Long-term educational planning is currently made. An overview of training activities is already kept, and employees are expected to do T and non-T training to fill their knowledge gaps: “we believe every employee needs to at least master a number of skills, such as SCRUM master”. Added value / Attention / Effort / T.&amp;O. focus / Recent initiative</td>
</tr>
<tr>
<td>There is significant on-the-job learning happening (IE20)</td>
<td>(4.3) – The work challenges some employees to search for new software knowledge and learn from that. However, after this learning “little learning happens”, also because “I can’t learn much from the available documentation”. Managers report they learn a lot from their jobs. Little focus on designing work for on-the-job-L / Innovative focus</td>
<td>4.0 – Management sees the firm “as a self-learning organization”, where “we discover things and have questions barely anyone can answer”. An employee, however, says: “there is no steep learning curve for me. What I learn goes very incrementally, and I really have to try to drag out information from my colleagues”. Differences between a manager and employee / Innovative focus</td>
<td>3.8 – “When I have questions, I can go to employees with knowledge about it”. For HR matters this is different “I could do with a sparring partner”. Moreover, there is “currently no structural coaching happening on the working floor except for the 6-monthly appraisal meetings. It should actually happen all throughout the year”. Medium firm informal system / No developed system for coaching / No HR colleagues</td>
<td>4.0 – In order to improve performance and on-the-job learning, the firm “always looks further than CV. Who matches with whom? Who is the person behind the IT developer? Who excels where?” People focus / Expertise / Organizational type</td>
</tr>
<tr>
<td>Teams are composed in order to increase their diversity (IE21)</td>
<td>4.0 – The overall firm team is composed based on everyone’s unique and complementary skills. Diversity of skills-vision</td>
<td>2.0 – “It’s not very diverse here – all software engineers”. Diversity also not a goal of management. Specialized firm / No focus</td>
<td>2.5 – “We only look at the diversity of technological expertise”, not nationality, character or gender as a goal. Little O. diversity / No focus</td>
<td>3.0 – Teams are composed based on technological expertise as well as the right combination of characters. Diversity of characters / Focus</td>
</tr>
<tr>
<td>Transfer of knowledge</td>
<td>Employees have (informal) opportunities to talk to other staff about successful programs and why they succeed (IF22)</td>
<td>4.7 – It is reportedly easy to communicate for developers amongst each other, orally or on skype, and with the director. Also the external business manager and the director: “if there is something, we can just call each other directly”. Small firm informal system</td>
<td>3.7 – The office is set up so that sharing information with each other is easy. Employees also say “open communication” exists and is good. However, “there are few structural moments and formats to share knowledge” and “nothing is recorded”. Small firm informal systems /</td>
<td>3.0 – The firm’s informality makes it easy to talk with each other when one has questions. There are knowledge sessions to share knowledge more broadly. Documentation about the use of technologies is shared on the intranet. But there are no project evaluations being done and shared, and</td>
</tr>
<tr>
<td>Failures are constructively discussed in the organization (IF23)</td>
<td>4.0 – Management and employees talk constantly about how to improve the product: “Our work is a continuous process of improving the product”. Moreover, organizationally “We can directly and informally talk with the director to solve issues”. Further no structured moments to discuss failures. Organizational type / Focus / Small firm informal system / Culture / No routines</td>
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<tr>
<td>4.3 – Technologically, there is a very open atmosphere of talking about mistakes: “We try to do a daily round of sharing what problems everyone faces, what they are doing and why”. It is considered to be important “to learn from, and to learn from each other”. Besides this, there are no progress meetings where (non-T) failures are discussed. Routine / Culture / T / Focus.</td>
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<td>3.3 – There is not a strong culture of constructively discussing failures: “When there are failures, they are solved [...] but often the same failures are being made. [...] and this should be discussed”. And: “Last week something went wrong. I shared that with management. They then do as if they don’t hear me or they postpone it”. No culture of constructively discussing failures / Leadership</td>
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<td>3.3 – “It is not as if we are being informed about new developments in the external partnerships”. No sharing mechanisms / Culture / Little HRM</td>
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<td>3.0 – New work processes can be presented in management’s update meetings with the whole firm, but “there are hardly ever new work processes introduced” Routines / No org. innovation</td>
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<td>4.7 – When managers identify interesting knowledge during a meeting with an employee, they invite him/her to share it with the whole firm. A news-letter shares updates. Culture / Routines / Effort / Focus</td>
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<tr>
<td>2.8 – There is a State of the Union every half year, but beyond that “there are no active mechanisms to share new knowledge”. “Although there are many online channels to store information, there is no policy what should be used where”. Policy needed / No routines</td>
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<tr>
<td>New work processes that may be useful for the organization as a whole are shared with all employees (IF24)</td>
<td>3.5 – “There are no work processes – like SCRUM - to share, we don’t have those” Lack of routines / Small firm informal system</td>
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<tr>
<td>There is a system that allows the organization to learn successful practices from other organizations (IF25)</td>
<td>2.0 – The director is mostly gathering new external knowledge “in magazines and newsletters and on websites and conferences”. He also keeps the main competitor in sight: “their pricing, presentation of their product, communication to the market”. Developers search for knowledge online. No person-independent system / Small firm informal system</td>
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<tr>
<td>1.7 – There is no formal ‘system’, but they do use Youtube and their network to search for necessary knowledge when they need it. The director also “talks with professors of universities and other innovative firms”. Magazines are used to keep an eye on competition, but “not to learn things we do”. However, “there might be a trade-off between focusing on innovating ourselves and the knowledge we need for that, and exploring new upcoming trends and technologies”.</td>
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<tr>
<td>2.3 – The sales department talks a lot with competitors; managers and developers go to conferences, read both T- and non-T magazines and follow websites; and there are departmental knowledge groups that come together every couple of weeks to discuss external technological development. (However, “Findings of this kind are not recorded or stored” and employees do not always notice the systems, except for going to conferences: “I haven’t seen it, but this is probably done above me, by management”).</td>
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<tr>
<td>3.0 – Knowledge sessions with external experts are organized to import useful outside knowledge into the organization. Certain managers have the specific task to scan the market for valuable trends and technologies; to pick up new developments in the customer’s work; and to collect useful knowledge of employees seconded at customers. “However, this system is not fully person-independent: if I go, it is not yet picked up automatically”, although it is policy that these managers have that task.</td>
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<tr>
<td>2.6 – To learn, knowledge institute Gardner delivers market and technology analyses to the firm. There are an increasing number of knowledge sessions with external speakers. The main competitors are being “watched”, also in the area of HR. The market is also scanned for valuable firms that can be bought (acquisitions). However, it is claimed that “we don’t have a system [...] it’s not described in a process”. There are for instance, “no elaborate [non-financial] competitors’ analyses”, with the consequence</td>
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</tbody>
</table>
### Job rotations are done and with a strategic intent and effect in mind (IF26)

<table>
<thead>
<tr>
<th>Job rotations are currently not done; in the past with multiple own business managers in the organization tasks were rotated. Desire to do this again in the past. Software development issues are taken up by various developers. No rotation system / Small firm</th>
<th>No job rotations happening, but they are reportedly desired by some: “That it is possibly to do something in the sales and acquisition phase, not just answer service questions”. Others already state “we are required to pick up all sort of tasks”, No full rotation system</th>
</tr>
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<tr>
<td>2.3</td>
<td>3.0</td>
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### Compensation and budgeting systems

<table>
<thead>
<tr>
<th>3.3</th>
<th>Yes. System in place / Small firm informal system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wages are based on qualifications and functions (IG27)</td>
<td>3.5</td>
</tr>
<tr>
<td>2.3</td>
<td>2.5</td>
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<tr>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>3.6</td>
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</tbody>
</table>

### Wages are based on results (IG28)

<table>
<thead>
<tr>
<th>4.0</th>
<th>Yes: external business partners get paid (e.g. x % of the profit) based on their individual performance to sell the product. System in place / Small firm informal system / Business Model Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7</td>
<td>No, wages are based on functions and qualifications. Not a system in place / Ideology of anti-bonus / Small firm informal system</td>
</tr>
<tr>
<td>3.7</td>
<td>“We have a system that prescribes that an employee who performs above average (s)he will get a promotion sooner and goes more quickly through the function salary scales”. They plan to make this in the future even more differentiated to make visible that results are rewarded. Attention / System in place / Effort</td>
</tr>
<tr>
<td>3.4</td>
<td>“Results are taken into account” for everyone in the sense that when you perform badly you will go slower through the function scales. For commercial managers who can and want to work with clear financial targets “there are also specific bonus-arrangements”. System in place / Large firm system / Ownership model</td>
</tr>
</tbody>
</table>

### Innovation and risk-taking are rewarded (IG29)

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<tr>
<th>4.0</th>
<th>When an external business partner has the ability to, through innovative actions and risk-taking, get</th>
</tr>
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<tr>
<td>2.7</td>
<td>No, wages are based on functions and qualifications and there is an ideological position against additional</td>
</tr>
<tr>
<td>2.9</td>
<td>“As far as I know, there are officially no bonus arrangements”, but when the firm makes enough profit</td>
</tr>
<tr>
<td>4.3</td>
<td>Firstly, the reward system takes into account whether one contributes with creative ideas. This is translated into bonuses,</td>
</tr>
<tr>
<td>3.8</td>
<td>“If you have a really good idea, I am sure that you will get a bonus”, but a reward mechanism is not yet in place.</td>
</tr>
<tr>
<td>Experimentation</td>
<td>Budget systems are designed so that they challenge the need for doing things “as they have always been done” (IG30)</td>
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<tr>
<td>Employees can bring new ideas into the organization (IH32)</td>
<td>Budget systems are designed so that they challenge the need for doing things “as they have always been done” (IG30)</td>
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<td>more customers, its absolute reward (X % of the profit) goes up. For employees “innovating is my work, and I don’t need to get encouragements for that”. Implicitly taken into account in part of the reward system / Focus on profit making reward systems: “We don’t have a financial reward system for coming up with good ideas, and also would not want to have one”, as a system can eventually work against cooperation and open communication. Not in value system / Small firm informal system innovative ideas are taken into account as part of performance. This can then lead to a higher salary increase than others. However, most of the innovative ideas “are brainstormed by a group”. Not officially in system, only implicitly / Resources / Value system</td>
<td>Budget systems are designed so that they challenge the need for doing things “as they have always been done” (IG30)</td>
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<td>Experimentation and tests are encouraged by managements (IH31)</td>
<td>3.5 – “We are not yet that far as a venture”, says the external business manager, “to do this structurally”; currently they just question resources for the added value they bring every time; (and “this is also the future in a network economy”). Small firm informal system / Network economy 2.3 – “As employees we don’t have a lot of insight into budgeting, but when funds go to projects there is an open discussion whether it is necessary or whether there are also other possibilities to achieve it”. Small firm informal system / Routines / Culture / Values</td>
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<tr>
<td>Employees who are new in the organization are encouraged to question how things are done (IH33)</td>
<td>4.0 – New employees are hired to come up with new ideas. Culture of co-creation.</td>
</tr>
<tr>
<td>External Cooperation</td>
<td>Cooperation with customers (EA34 - 36)</td>
</tr>
<tr>
<td>Cooperation with suppliers (EB37 - 41)</td>
<td>3.3 – Little cooperation with suppliers, the director specified only “performing R&amp;D together”. As it is a product organization, except for one financial module the product is made by the firm.</td>
</tr>
<tr>
<td>Cooperation with knowledge institutes and universities (EC42 – 49)</td>
<td>Cooperation with consultants (ED50 – 53)</td>
</tr>
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<td>---------------------------------------------------------------</td>
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<tr>
<td>4.3 – “The firm attracts students as fully valued and participating employees”, as interns and cooperates in research projects of the university. Getting more knowledge through visits, networking and research projects are desired. Some cooperation / Open mind to universities</td>
<td>3.3 – External business partners do some consulting for the firm, in the sense that they give advice about the market requirements for the product in a certain sector. They also research the market for this and they also manage part of the acquisitions and sales business. Some consultancy / Small firm and business model innovation</td>
</tr>
<tr>
<td>3.5 – The director (not employees) of the firm takes part in conferences, recruits interns and employees at the universities, sets up research projects and makes use of the knowledge there by sparring with professors. Cooperation / Only for management / Innovation / Open mind / Importance</td>
<td>3.2 – External business partners give reorganization advice and management of a project is further outsourced to them. O. and T. focus</td>
</tr>
<tr>
<td>4.0 – The firm recruits students as interns and employees, gives input about what skills students should learn, invests in spinoffs coming from the universities, makes use of the knowledge and the whole staff regularly visits conferences the universities/K I offer. They also give presentations on schools, sponsor student introductions and give out a scholarship. Cooperation / Attention / Importance / Resources</td>
<td>3.5 – The firm has received reorganization advice from external consultants, and has also outsourced the management of certain projects to consultants. No further research or advice on technological developments has been outsourced to them. Some consultancy / O. focus</td>
</tr>
<tr>
<td>4.0 – They recruit students as employees and interns (with freedom to choose challenging assignments), managers and sometimes employees visit conferences, deliberate about what skills they have to learn at university of applied sciences, are participating in consortium projects together with knowledge institutes, sponsor conference events and give presentations on schools. Cooperation / Importance / Resources / Innovation / Open mind</td>
<td>3.5 – Consultants are hired for reorganization advice and for advice on external technological developments. No R&amp;D or management of a project is further outsourced to them. Some consultancy / Large firm / O. and T. focus</td>
</tr>
<tr>
<td>3.8 – They recruit students as interns and employees, make use of knowledge and insights via the publications of Gardner, participate in conferences and take part in doing research together. Moreover, they also make use of E-learning modules offered by universities and knowledge institutes. However, a manager concludes that “they can do more” to get more innovative knowledge from the technical university. Some cooperation / Open mind</td>
<td>3.4 – Consultants are hired for reorganization advice and for advice on external technological developments. No R&amp;D or management of a project is further outsourced to them. Some consultancy / Large firm / O. and T. focus</td>
</tr>
</tbody>
</table>
Elaborate firm cooperation / Partners / Business model innovation / Cluster

- Active member of HTSC.
- The agreement that they help each other out when they don’t have enough personnel for particular projects. More labor market initiatives wanted. HTSC Member.
- Some firm cooperation / Innovative HR-cooperation / necessity / Cluster.
- Become increasingly important in the future "". They also share knowledge in amongst others the HTSC cluster.
- HTSC Member.
- Investment partners / Cluster / Limited open mind to sharing knowledge / Ownership model.

Elaborate firm cooperation / Partners / Business model innovation / Cluster

- The agreement that they help each other out when they don’t have enough personnel for particular projects. More labor market initiatives wanted. HTSC Member.
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Format in the table:
First line: (survey score) + Summary of findings from the interviews/documentation, potentially with direct quotes
Second line: Short 1/2/3 word-summary of the results and reason(s) for the learning strategy of the firm

Legend:
T= technology; M= management; K=knowledge; L=learning; O=organizational; B = business; E= employee(s)