MASTER THESIS

How to manage the effect of outsourcing from original equipment manufacturers to contract manufacturers on innovation capacity

MASTER THESIS BY BJORN STOKMAN

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There's a way to do it better. Find it! *Thomas Edison (1847–1931)*

Abstract

The purpose of this study is based on the trend that original equipment manufacturers (OEMs) are increasingly outsourcing their (production) processes (Wang, Niu, & Guo, 2013). Outsourcing involves several advantages and disadvantages which must be considered (Kremic, Icmeli Tukel, & Rom, 2006) and generates new challenges for contract manufacturers (CMs) since they were originally established only to fulfil production activities for OEMs. The relevant literature confirms that the trend of outsourcing even more activities from OEMs to CMs has resulted in a decrease in innovation capacity for CMs and OEMs.

The method used in this study is thematic analysis. The data collection for this method was achieved via semi-structured interviews. To operationalize the negative effect of outsourcing on innovation capacity, the researcher used obstacles to innovation from the literature combined with the innovation audit framework of Frishammar et al. (2019). These obstacles were processed in the interview questions so that judgement based on the data became possible. The study consists of one carefully selected case, and within this case, the sample consists of one CM and three OEMs. Three employees from the CM and at least one employee from each OEM were interviewed. The CM and OEMs in the case each have at least 500 employees.

The findings of the study are based on the outcomes of the thematic analysis. This analysis resulted in thematic maps which facilitated forming conclusions about the potential obstacles. For instance, it can be concluded that outsourcing from OEMs to CMs has a hampering effect on innovation capacity, which can be decreased when CMs and OEMs anticipate the results of the thematic analysis. Indeed, the data confirms that CMs and OEMs can decrease this effect on innovation capacity by improving the conditions of human resources and capabilities. Furthermore, if OEMs adjusted their culture towards innovation in their relationship with CMs (e.g., flexibility), this could lead to increased innovation capacity. The data implies that relationship management is another important aspect of enhancing innovation capacity which could supplement the current obstacles to innovation; however, further research is necessary to generalize this finding. This study corroborates Plambeck and Taylor (2005)'s statement that outsourcing from OEMs to CMs has a hampering effect on innovation capacity.

The value of this study can be divided into practical and theoretical value. The practical value is specific: This research concerns one CM and three OEMs with at least 500 employees. These companies can use the study to improve their current relationships with one another to enhance their innovation capacities. The theoretical value of this study is that it supports Plambeck and Taylor (2005)'s study, which indicates that innovation capacity decreases when OEMs outsource to CMs. In addition, this research supplements the literature on innovation obstacles with a potential obstacle (i.e., relationship management) which necessitates further research.

Keywords

Concept	Definition
Original equipment manufacturer	An original equipment manufacturer is 'an organization that makes devices from parts bought from other organizations' (Oxford, 2020).
Contract manufacturer	Contract manufacturers can be described as companies which arrange a supply chain arrangement that offers production companies the chance to outsource some production activities, such as the assembly to contract manufacturers (B. Kim, 2003; B. Kim, Leung, Park, Zhang, & Lee, 2002).
Innovation	'Innovation is a process of turning opportunity into new ideas and of putting these into widely used practice' (Tidd & Bessant, 2018).
Outsourcing	'Outsourcing occurs when an organization contracts with another organization to provide services or products of a major function or activity. Work that is traditionally done internally is shifted to an external provider, and the employees of the original organization are often transferred to the service provider' (Belcourt, 2006).

List of abbreviations

Abbreviation	Meaning
CM	Contract manufacturer
OEM	Original equipment manufacturer
R&D	Research and development
IP	Intellectual property
SME	Small and medium enterprises

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1 – Introduction

It was once common for companies to manage the complete supply chain, from product or service development to aftersales services, alone. As a result, companies performed all the relevant processes on their own. However, due to this vertical integration and companies using their own production capacities to produce demanded products, their available capacities were used inefficiently (Plambeck & Taylor, 2005). Original equipment manufacturers (OEMs) thus began to outsource their production to contract manufacturers (CMs) to focus on their core competences (Arruñada & Vázquez, 2006; Plambeck & Taylor, 2005).

Plambeck and Taylor (2005) concluded that when OEMs outsource to CMs, a decrease in innovation capacity occurs. Contract manufacturers and OEMs must remain innovative, for instance, by staying economically healthy and ahead of their competitors (Soumodip, 2007; Tidd & Bessant, 2018). Furthermore, according to Nobel Prize-winning economist Robert Solow, as cited in Soumodip (2007), technological innovations are strongly related to economic growth. It is therefore essential to enhance innovation capacity. The main difficulty is that outsourcing from OEMs to CMs causes a decrease in innovation capacity, and innovation capacity is key for successful innovations, which in turn result in successful companies.

While the Plambeck and Taylor (2005) study confirms that outsourcing leads to a decrease in innovation capacity at CMs and OEMs, these authors did not investigate which obstacles cause this decrease. The current study thus aims to investigate which innovation obstacles cause a decrease in innovation capacity at CMs and OEMs and how these companies can manage such obstacles to increase their innovation capacities.

This thesis was achieved using a qualitative case study based on one case. The following research question and sub-questions were formulated for this purpose:

Which innovation obstacles cause a decrease in innovation capacity in the outsourcing relationship between CMs and OEMs, and how can these companies increase their innovation capacities?

- What are CMs and OEMs, and what is the current relationship between CMs and OEMs?
- What is innovation (capacity), and why is innovation capacity important for CMs and OEMs?
- What are the reasons for and (dis)advantages of outsourcing?
- What are the obstacles that hamper innovation capacity?

Data were collected via semi-structured interviews which were conducted with employees from the CM and OEMs involved in the case. After the data was collected, it was analyzed using a thematic

analysis together with the framework of Frishammar, Richtnér, Brattström, Magnusson and Björk (2019), which is based on the obstacles included in the literature. These led to thematic maps and an overall results table.

As to the theoretical relevance of this study, it should enhance the Plambeck and Taylor (2005) study with insights into which obstacles cause a decrease in the innovation capacity in the outsourcing relationship between CMs and OEMs. Moreover, it seems that more innovation obstacles exist than are mentioned in the relevant literature. Concerning its practical relevance, this study should clarify how managers can adjust their current innovation policies to increase their innovation capacities.

This master thesis is structured as follows: The second chapter presents a literature review of the relevant concepts, as well as the theoretical framework. The third chapter describes the data collection method and data analysis, including the results of the data analysis. Finally, the last chapter comprises the conclusion and discussion, which answers the research question, addresses the theoretical and practical implications and ultimately not only elaborates the limitations of the study but also provides directions for further research.

2 – Literature review

This chapter addresses the concepts used for the study and thus serves as the foundation of the study. First, it describes the review strategy which was used to formulate the theoretical framework. Second, it generally defines CMs and OEMs, clarifies what innovation capacity is and why it is significant and elaborates the advantages and disadvantages of outsourcing. Finally, it concentrates on the existing concepts and the theoretical concepts used during the study.

2.1 – Review strategy

A great deal of literature is currently available. It is, therefore, crucial to design a review strategy which aims to obtain all the data necessary for the study (Bell, Bryman, & Harley, 2019). The review strategy for this study is based on the PICO model, which consists of four components: population, intervention, comparison and outcome. These components generate search engine terms that help researchers find the required data most efficiently.

The PICO model collects data with the following steps: First, the search terms for the different components are formulated; researchers must be accurate and formulate search terms that fit in the components (the P, I, C or O) and should deliver the desired data. It is also vital that synonyms of the main search terms are formulated in the PICO model. These measures create a research strategy that is resistant to the bias of not examining all relevant literature that uses synonyms.

Second, this model necessitates the use of Boolean operators. While the separate search terms are broad, with Boolean operators, it is possible to focus the search. The Boolean operators include AND, OR and NOT.[1] Figure 2.1 exemplifies a combination with Boolean operators for the population.

P = (contract manufacturers) AND (original equipment manufacturers) OR (CMs) AND (OEMs)

The last step involves combining the four components of the PICO model to complete the search strategy in such a way that all of them are bonded together: (P) AND (I) AND (C) AND (O). Researchers can use this finalized search strategy on different search engines to collect data (Santos, Pimenta, & Nobre, 2007).

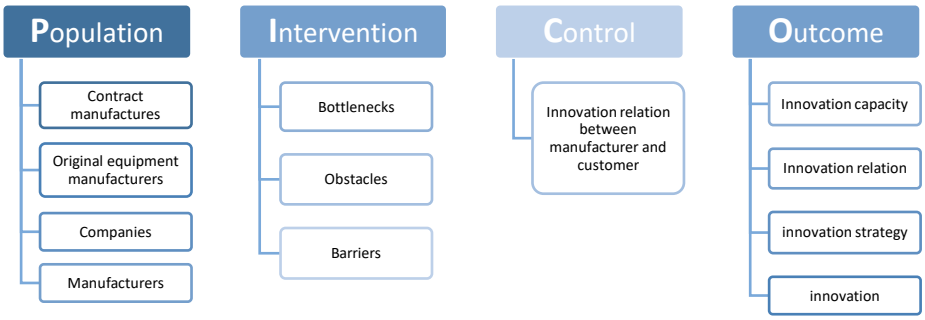

Figure 2.1 – PICO search strategy model

[1] https://libguides.mit.edu/c.php?g=175963&p=1158594

The following electronic databases were used to find relevant literature for the study: Google Scholar, the UTwente Library, ResearchGate and Elsevier. Some of the sources used in the study were discovered by searching for relevant articles in the articles which were found via the search strategy.

2.2 – Key concepts

2.2.1 – Contract manufacturers and original equipment manufacturers

For a while, companies were developing, manufacturing and selling their products. In short, carrying out the entire supply chain themselves. However, over time, this practise became obsolete, and companies began to outsource various activities.

Not only do retailers, wholesalers and dealers now sell products on behalf of companies, but they are also involved in earlier stages of the supply chain. This trend has led to the rise of CMs, which are defined as companies that sell their production capacities to production companies to manufacture products for these production companies. Furthermore, contract manufacturing can be described as a supply chain arrangement that offers production companies the chance to outsource some production activities to CMs (B. Kim, 2003; B. Kim et al., 2002), which provides the production companies (i.e., OEMs) with the space to focus on their core competencies and outsource simple but time-consuming production processes.

Original equipment manufacturers are defined as companies that manufacture end products from different subsystems that other companies (e.g., CMs) produce. In this situation, the OEM purchases critical or complex equipment from suppliers to produce complex new products and works closely together with these suppliers to determine whether they can meet the OEM's needs for the new products (Lambert & Cooper, 2000).[2]

Several industries, including the automotive, semiconductor, aerospace, health care, and defence industries, use contract manufacturing due to the benefits that it offers (Pandya & Shah, 2013). Section 2.2.4 provides an overview of all the advantages and disadvantages of outsourcing from OEMs to CMs. For instance, companies do not have to invest in equipment for the production activities that CMs perform. Moreover, companies can save on labour and training costs by employing CMs from low-wage countries. A mutual benefit developed between the companies. Since contracts between CMs and OEMs are based on the long term, this practice leads to a constant business flow for the CM and OEM—a characteristic of the outsourcing relationship between CMs and OEMs. Furthermore, the OEM can utilize the skills that the CM alone can offer. The quality of CM production processes is frequently high, and these companies often have their own quality control, which results in the early detection of damaged products (Cohen & Roussel, 2005).

As mentioned before, the main benefit of contract manufacturing is the option for companies to focus more on their core competencies and outsource their standard production processes to CMs.

[2] https://www.investopedia.com/terms/o/oem.asp

The CMs' production scales are also beneficial for their customers: the more CMs produce the same product, the more raw material is required, which results in lower acquiring costs for the total amount of raw material and lowers the price per product for the customers (Cohen & Roussel, 2005; Y. H. Kim & Schoenherr, 2018; Pandya & Shah, 2013).

2.2.2 – Innovation and innovation capacity

Innovation is one of the most common concepts in business. Multiple definitions have thus been formulated for this concept over time (Soumodip, 2007). Historically, innovation was defined as technological change which was responsible for industrial transformation, new product development and inventive management theories (J. A. Schumpeter, 1939). However, Tidd and Bessant (2018) suggest that one of the main difficulties of innovation is that different views on the concept have emerged. Furthermore, they state that innovation is often confused with invention. 'Innovation' originates from the Latin word *innovare*, which means 'creating something new'.

Table 2.1 presents multiple definitions of innovation. Tidd and Bessant (2018)'s definition was used to generate one clear definition of innovation for this research since this definition considers most of the other researchers and the several citations (over 10,000) included in Tidd and Bessant (2018)'s work, which indicates its trustworthiness.

Innovation capacity is the extent to which a company exploits new ideas, services or processes over a long period given the abilities available. The three forms of innovation capacity are as follows (Wilkinson, 2018):

- national innovation capacity
- industrial innovation capacity
- organizational innovation capacity

National innovation capacity refers to one country's ability to develop new products, services and processes, while organizational innovation capacity refers to one company's ability to develop new products, services and processes on their own and the extent to which the company can exploit or explore new ideas. Industrial innovation capacity, which is the focus of the current study, concerns the extent to which companies can exploit new products, services and processes while working together (Wilkinson, 2018).

Table 2.1 – Definitions of innovation

Author(s)	Definition of innovation
Joseph A. Schumpeter (1943)	The 'process of industrial mutation that incessantly revolutionizes the economic structure from within'.
Drucker (1985)	The 'specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service. It is capable

	of being presented as a discipline, capable of being learned, capable of being practised'.
Porter (1990)	'Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things'.
Branson (1998), as cited in Tidd & Bessant (2018)	'An innovative business is one which lives and breathes "outside the box". It is not just good ideas, it is a combination of good ideas, motivated staff and an instinctive understanding of what your customer wants'.
Soumodip (2007)	The 'exploitation of new ideas which find market acceptance'.
Tidd and Bessant (2018)	'Innovation is a process of turning opportunity into new ideas and of putting these into widely used practice'.

2.2.3 – Outsourcing

The relationship between CMs and OEMs is based on outsourcing, which Belcourt (2006) describes as follows:

> *Outsourcing occurs when an organization contracts with another organization to provide services or products of a major function or activity. Work that is traditionally done internally is shifted to an external provider, and the employees of the original organization are often transferred to the service provider.*

When OEMs have particular activities or processes that they want to outsource, they contract CMs. Contract manufacturers and OEMs, therefore, depend on each other due to these outsourcing processes. Many studies address OEMs' reasoning for outsourcing. The study by Kremic, Icmeli Tukel and Rom (2006), for instance, includes a literature review based on 210 studies, the outcomes of which can be found in Table 2.2. Original equipment manufacturers have several reasons for outsourcing their (production) processes. For example, most studies in the literature review indicate that cost saving is an important reason to outsource. Others include attaining more skills, talent and technological knowledge.

However, outsourcing also has disadvantages that concern innovation capacity, which suggests that the relationship between the companies involved in the outsourcing processes is essential. Indeed, Harland, Knight, Lamming and Walker (2005) state that failure to manage the outsourcing relationship can lead to reductions in customer service, contact with the customers and the level of control over the processes. Plambeck and Taylor (2005) strengthen this assertion, indicating that the innovation capacities of CMs and OEMs decrease when OEMs outsource.

One example of a disadvantage is the lack of control. When a contract is signed with a CM, the customer loses control over the production of their products. The customer can propose ideas to the CM to improve production; however, the CM is in charge and decides how to proceed. Another disadvantage is the relationships between CMs and customers. Companies must have an excellent relationship with

one another so that production can be as efficient as possible. The customer (i.e., OEM) loses control over production insofar as it cannot determine which products the CM produces at what time since the CM also has other customers which want their products to be produced as fast as possible. To avoid this disadvantage, companies attempt to collaborate and reward CMs for exceptional work with potential new business projects. The customer must also consider quality concerns when entering a contract with a CM, ensuring that the CM is meeting all quality standards.

Another disadvantage of outsourcing is that companies lose their intellectual properties; it is thus important that companies do not outsource their core competencies to CMs. When entering a contract with a CM, a company exposes its technologies and procedures, which can result in copying. Capacity can also be a disadvantage when a company does not provide enough business to the CM compared to the CM's other customers. Insufficient amount of business can lead to deprioritization, which means that the company will not receive their ordered products when they need them. Outsourcing the production activities to CMs makes the OEMs less flexible in their production process. Since companies are under contract, a company which outsources to a CM cannot respond to fluctuations in the environment directly (Cohen & Roussel, 2005; Pandya & Shah, 2013). Table 2.2 presents an overview of the benefits and disadvantages of outsourcing.

Table 2.2 – Potential advantages and disadvantages of outsourcing (Kremic et al., 2006)

Benefits of outsourcing	Disadvantages of outsourcing
• Cost saving	• Hidden costs and unrealized savings
• Reduced capital expenditures	• Poor contracts or partners
• Increased speed	• Loss of control
• Enhanced staff	• Loss of knowledge
• Capital infusion	• Power transition to partners
• Transfer of fixed costs	• Loss of customers
• Quality injection	• Less flexibility
• Flexibility	• Employee problems
• More skills and talent	• Uncertainty
• More technological knowledge	• Loss of synergy
• Focus on core competences	• Skill erosion
• Fewer problems	• Legal obstacles
• Copy competitors	• Conflicts of interest
• Legal issues	• Competitor and security issues
• More manageable	• False sense of irresponsibility
• Fewer political problems	• Innovation capacity

2.2.4 – Current relationship between CMs and OEMs

Tully (1994), as cited in Plambeck and Taylor (2005), states that the use of contract manufacturing is significant and increasing in several industries, including the automotive, pharmaceutical, food and

beverage processing, and electronics industries. Plambeck and Taylor (2005) refer to Boase (2001) to demonstrate that OEMs outsourced $75 billion to CMs, which is 10% of the total electronics production worldwide. Furthermore, Han, Porterfield and Li (2012) note that in the current situation in the United States, 30% of the processes at large pharmaceutical companies are outsourced, while 70% remain in house. However, Auerbach (2011) predicts that large OEMs in the American pharmaceutical industry will raise their outsourcing to CMs to 70%.

Wang, Niu and Guo (2013) state that OEMs outsource their production to CMs as often as possible when the price of hiring a CM is lower than that of residual production options. Numerous large companies outsource their production to CMs, such as Hewlett-Packard, who outsource their entire production to CMs (e.g., Foxconn and Flextronics).

As to the advantages that this practise offers, CMs are often specialized in production; nevertheless, nowadays CMs also possess qualified and experienced employees, improved production systems, and high-quality control systems. In some cases, CMs can thus be upstream partners and perhaps even downstream competitors for OEMs (Wang et al., 2013).

2.4 – Key concepts

2.4.1 – Concepts of obstacles to innovation

To begin this study, the researcher needed a clear view of the current obstacles to innovation. To assess the current obstacles, he reviewed the literature and formulated a concept of these obstacles. Multiple studies state that the obstacles to innovation can be divided into four main barrier categories: cost factors, knowledge factors, regulation factors and market factors (Costa-Campi, Duch-Brown, & García-Quevedo, 2014; Galia & Legros, 2004; Galia, Mancini, & Morandi, 2013; Mohnen & Röller, 2005). One obstacle in the cost factors category is having insufficient funds to achieve the goals or results of an innovation project; one obstacle in the knowledge factors category is having insufficient knowledge to achieve the project objectives, which also applies to the market factors category.

These four main barrier categories consist of subcategories (i.e., the obstacles). This study focusses on the obstacles that are mentioned in the literature on innovation obstacles (D'Este, Iammarino, Savona, & Tunzelmann, 2008; D'Este, Iammarino, Savona, & von Tunzelmann, 2012; Galia & Legros, 2004; Galia et al., 2013; Iammarino, Sanna-Randaccio, & Savona, 2007; Schneider & Veugelers, 2008; Tourigny & Le, 2004). Table 2.3 describes the obstacles included in the main barrier categories. Again, these barriers and obstacles are based on relevant literature on the innovation capacities of companies.

Table 2.3 – Innovation barriers and obstacles (Galia et al., 2013)

Barriers	**Nr**	**Obstacles**
Cost factors	1	The lack of internal financial resources
	2	The lack of external financial resources

	3	The high cost of innovation
Knowledge factors	4	The lack of qualified personnel
	5	The lack of technological information
	6	The lack of information on the market
Market factors	7	The difficulty with finding R&D partners
	8	The market domination of established firms
	9	Demand uncertainty
Regulation factors	10	Legislation, regulations, norms and standards

Since the cost factors category is extensive, the literature divides it into three obstacles: The first is **internal finance**, which assesses whether a company has sufficient financial resources to finance all their innovation projects. The second obstacle is **external finance**, which evaluates whether the company has experienced difficulties with their innovation processes due to financial resource problems at the external party (for CMs, the OEMs and vice versa). Finally, the third obstacle is **the high cost of innovation**, which affects the innovation processes when the parties cannot finance the projects or are not satisfied with the regulation of the cost-sharing during these projects.

The knowledge factors category is divided into three obstacles, and the first concerns **qualified personnel**. Companies must consider whether they have sufficient qualified personnel, whether the personnel's average skill level is sufficient, and whether the current personnel can cover all the competencies which concern innovation that the companies want to retain in house. The second obstacle is **the lack of technological information**, which implies that insufficient technological knowledge can result in inefficient innovation processes. Companies must thus have technological information on the capabilities of their personnel. Topics such as market size, potential customers and competitors and innovations on the market are included in **information on the market**. When CMs and OEMs have insufficient knowledge of the market, useless innovations can arise from innovation processes.

Three obstacles combine to form the market factors category. Finding the right **research and development (R&D) partners** for conducting the desired innovation projects is the variable which supplies the innovation strategy. This process can be divided into two parts: finding new R&D partners and securing current R&D partners. One potential problem is that the CM or OEM cannot find the right partners for the desired innovation projects. **The market domination of established firms** is another obstacle to innovation capacity, as it can result in postponed or abandoned innovation projects (Galia et al., 2013). **Uncertain demand** for innovation projects is the variable which indicates whether potential innovations will be rejected due to demand uncertainty.

The regulation factors category includes the obstacle **legislation, regulation, norms and standards**. This obstacle concerns a company's internal culture towards innovation, which is partially formed with federal legislation. Companies must manage this culture and meet these regulations. According to Frishammar et al. (2019), a company's culture determines their flexibility in the innovation process, their openness to the improvements of other parties, and their willingness to take risks.

2.4.2 – Innovation audit concepts

Having obtained a clear view of the current obstacles to innovation, the researcher needed to learn how to audit these obstacles. It is crucial to use an audit model to measure the obstacles sufficiently. Furthermore, an innovation audit model can produce potential new obstacles which are not mentioned in the literature. The literature uses many synonyms for 'innovation audit', such as 'innovation maturity assessment', 'innovation assessment tool', 'innovation performance indicator', 'innovation assessment', and 'innovation evaluation' (Frishammar et al., 2019). Frishammar et al. (2019) made a list of all the innovation audit concepts that are used in the literature and at consulting firms (see Figure 2.2).

Authors and year	Publication by	Key audit dimensions	Outcome variables	Comments, including limitations	Extent to which openness, servitization, and digitalization is addressed
Björkdahl and Holmén (2016)	Case study, R&D Management	Innovation processes and innovation capabilities	An innovation "Problem", i.e. some specific negative consequence or deficiency a firm should address	• The focus is on finding and formulating innovation-related problems. • The drawback of the emphasis on the "problem" is that little guidance is provided to managers on how to assess their innovation performance.	As the emphasis is on identifying firm-specific "problems" the audit does not address openess, servitization, or digitalization explicitly
Chiesa et al. (1996)	Case study, Journal of Product Innovation Management	Concept generation, product development, process innovation, technology acquisition, human & financial resources, systems and tools, and senior management leadership	Innovation performance and competitiveness	• A thorough and early attempt at defining innovation audits, making it an all encompassing framework. • Focuses on technical innovation auditing, i.e. more recent innovation trends are not included in their innovation audit framework.	No comments on openness, servitization, or digitalization.
Radnor and Noke (2002)	Case study, Creativity and Innovation Management	Structure, leadership, output, teams, and context	New product performance	• Uses an "innovation compass" to distinguish between current and desired innovation performance. • Used qualitative and quantitative data as basis for the development of the model [innovation "compass"].	No comments on openness, servitization, or digitalization.
Cormican and O'Sullivan (2004)	Case study, Technovation	Strategy and leadership, Culture and climate, Planning and selection, Structure and performance, and Communication and collaboration	New product performance	• Identifies a best-practice and score card model based on qualitative case studies. • Do not discuss degree of innovation, nor the nature of innovative ideas.	No comments on openness, servitization, or digitalization.
Rao and Weintraub (2013)	Case study, MIT Sloan Management Review	Resources, Processes, Success, Values, Behavior, and Climate	Innovation performance and competitiveness	• Offers a model of the key elements to build an innovative culture. • Exemplifies a practical 360-degree assessment tool. • Emphasis is primarily on assessing the innovation culture.	Touches upon the themes of openess and servitization, but no comment on digitalization.
Burgelman et al. (2009)	Textbook	Resource availability, Technological environment, Strategic management capacity, Structural and cultural context, and Competitors strategies and industry evolution	Assessment of business unit or corporate innovation strategy	• A general model for auditing innovation is offered. • Is primarily taking an overall strategic perspective, excluding different types of innovation.	No comments on openness, servitization, or digitalization.
Cetindamar et al. (2010)	Textbook	Technological resources and capabilities	"Status" of technologies	• The emphasis is on technology and the associated resources and capabilities. • Do not discuss degrees or types of innovation.	No comments on openness, servitization, or digitalization.
Goffin and Mitchell (2016)	Textbook	Innovation process (from ideas to implementation), Innovation strategy, and People and organization	Innovation (broadly defined)	• Makes a broad assessment of innovation – both the process and the supporting structures. • Includes a limited discussion on the degrees and types of innovation.	Touches upon the themes of openess and servitization, but no comment on digitalization.
Dodgeson, Gann, and Salter (2008)	Textbook	Resources for innovation, Innovative capabilities, and Innovation processes	Innovation (broadly defined)	• Takes a broad view on innovation and presents a model for innovation assessment. • The model does not comment on the degrees of innovation.	No comments on openness, servitization, or digitalization.
Kearney House of Innovation	ATKearney	Innovation strategy, Organization, Culture, Innovation life cycle process, and Enabling factors	Innovation outcomes	• Emphasis is on a broad understanding of innovation, inter-linkages between the parts, but also on high-lighting "growth" champions. • Do not discuss degrees of innovation, nor nature of ideas.	No comments on openness, servitization, or digitalization.
The Innovation Performance Framework	Product Development Institute	Product innovation and technology strategy, Portfolio management, Idea-to-launch process, and Culture and leadership	Innovation performance	• Makes an explicit emphasis on product innovation. • Not entirely clear on the importance and implications from degrees and types of innovation.	No comments on openness, servitization, or digitalization.
The Innovation Audit	InnovationLabs	Innovation strategy, portfolio, processes, culture, and infrastructure	Innovation performance	• Examines 7 technical and 7 cultural factors respectively that are critical to innovation performance and help shape innovation capacity. • Is performed by external experts, so difficult to make a self-assessment.	No comments on openness, servitization, or digitalization, but these may come up in the assessment.
Innovate!	Platform for innovation management	Innovation process (from front-end to launch) and innovation system (with the components of culture, strategy, organization & resources)	Innovation performance	• Examines different key components which a firm may want to audit.	No comments on openness, servitization, or digitalization.

Figure 2.2 – Innovation audit tools (Frishammar et al., 2019)

Frishammar et al. (2019) innovation audit framework

Frishammar et al. (2019) argue that the innovation audit tools from the recent past do not consider that the goal of innovation at companies is changing due to upcoming trends, including openness in innovation (Dahlander & Gann, 2010), increased servitization (Parida, Sjödin, Wincent, & Kohtamäki, 2014) and a more digitalized world (Brynjolfsson & McAfee, 2014), suggesting that this is also the case for Kearney's house of innovation. Frishammar et al. (2019) thus decided to construct a theoretical framework based on concepts from the recent past, as depicted in Figure 2.3.

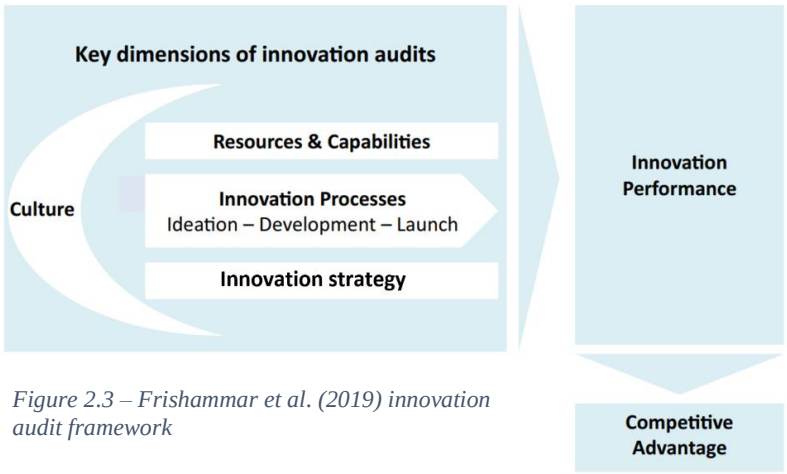

Figure 2.3 – Frishammar et al. (2019) innovation audit framework

Brunswicker and Chesbrough (2018) state that open innovation occurs when companies use purposive inflows and outflows of knowledge from external companies to improve their internal innovation. Moreover, external innovation transpires when companies use open innovation to attempt to grow their markets. Collaboration has a synergistic effect that enables the concerned parties in the innovation process to utilize open innovation.

Servitization can be described as the process of adding services to a product to add value to that product. When Vandermerwe and Rada (1988) introduced this concept, the business world adopted it, and more literature on the topic became available. The current transition is from off-the-shelf products to a more service-driven business world with plenty of servitization (Baines, Lightfoot, Benedettini, & Kay, 2009).

The first breakthrough in digitalization occurred around three or four decades ago when the overall production process was partly automated due to increased IT use in the production processes, which led to more efficient production. About two decades ago, a second transformation transpired with the arrival of the Internet. The next transformation is imminent and involves IT as part of the product (Porter, 1990).

Innovation audit framework components

The following subsections describe the framework of Frishammar et al. (2019), which consists of four components: the innovation process itself, the resources and capabilities, the innovation strategy and the culture. The framework is built so that the innovation process includes the conditions of the other three components; when the resources and capabilities, innovation strategy and culture are balanced most efficiently, this will lead to the most successful innovation process, which will ultimately lead to improved innovation performances.

The obstacles to innovation found in the literature and the components that meet the conditions for an effective innovation process are connected. In this study, the obstacles from Table 2.3 therefore serve as the basis for the description of the different components of the framework to establish whether improvements to the current relationship are possible. The cost and knowledge factors are thus linked to the resources and capabilities from the framework. The market factors are linked to the innovation strategy, while the regulation factors are linked to the culture.

Resources and capabilities

Resources and capabilities can be divided into cost and human resources in companies. The cost resources can be linked to the following obstacles in Table 2.3: internal financing, external financing, and the high price of innovation. Furthermore, the lack of qualified personnel falls under human resources. Capabilities concern companies' ability to generate ideas and acquire technology, among other factors. Companies use these resources and capabilities to execute their desired strategies and meet their goals (Frishammar et al., 2019).

Innovation strategy

Recent literature refers to the component innovation strategy in different ways. For example as business model. However, the term 'innovation strategy' was used during the research to ensure a thorough understanding of the theoretical model and prevent confusion. The innovation strategy dictates how a company uses their resources and capabilities to fulfil the innovation process successfully.

Culture

The innovation culture of a company concerns their norms, values, regulations and beliefs, which can cultivate risk-taking, proactivity, commitment and change within the company (Rao & Weintraub, 2013). Again, resources and capabilities, innovation strategy and culture are the three components of the innovation audit model of Frishammar et al. (2019) which serve as conditions for the innovation process and can be linked to the barriers to innovation in Table 2.3. Table 2.4 provides an overview of the links between the barriers to innovation and the components of the innovation framework of Frishammar et al. (2019).

Table 2.4 – Links between the innovation audit framework and the barriers to innovation

Section of innovation audit framework	**Barriers to innovation**
Resources and capabilities	Cost factors and knowledge factors
Innovation strategy	Market factors
Culture	Regulation factors

Innovation process

The innovation process of a new product, service or production process is supplemented with the conditions of the other three components of the framework. The better these other three components are organized, the better the innovation process will function. The result of a successful innovation process is improved overall innovation performance. This process is divided into three stages: the ideation, development and launch. Ideation concerns generating new ideas and opportunities for existing or new products or services to secure competitive advantages. The development stage involves elaborating the ideas and opportunities and determining whether demand for these exists. The last stage is the launch of the innovation project.

Innovation performance and competitive advantage

These four components ensure innovation performance; the better companies perform on these components, the higher their innovation performance will be, and this innovation performance will lead to competitive advantages.

The theoretical framework of Frishammar et al. (2019) is suitable for the current study for two reasons: First, the framework is based on models and concepts from recent literature and models from well-known consulting firms (e.g., Kearney's house of innovation). Second, the framework considers the upcoming trends in the innovation process (openness, servitization and digitalization).

2.5 – Theoretical framework

Wolcot (1995), as cited in Anfara and Mertz (2011), mentioned that the benefit of using a theoretical framework is that it guides and clarifies the observations, data collection, and data analysis of a study. The main aim of this research is researching which innovation obstacles influence the CMs and OEMs innovation capacity and how the companies manage drawback from these obstacles. The theoretical framework consists of three variables: the obstacles to innovation, innovation capacity and outsourcing from OEMs to CMs.

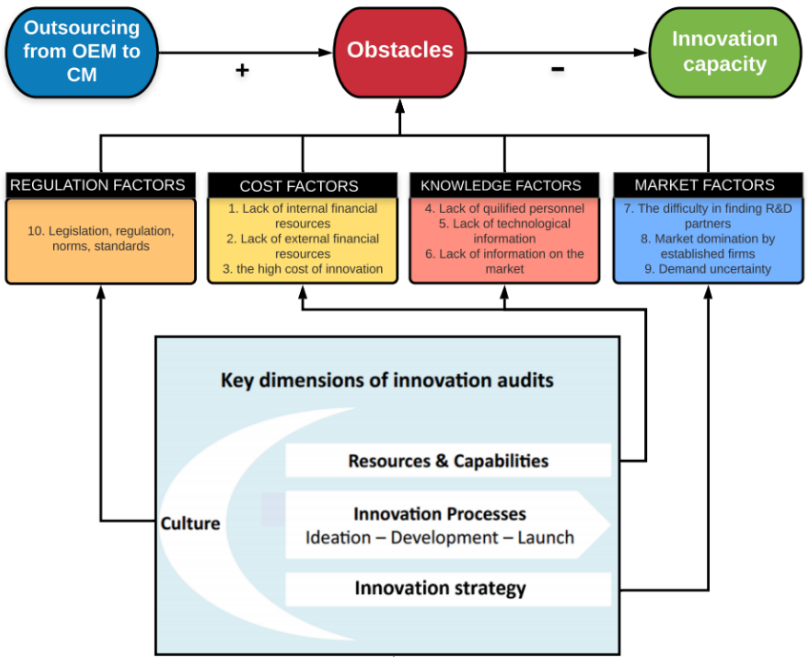

Figure 2.4 – Theoretical framework

Obstacles to innovation and innovation capacity are the independent variables in this study, and outsourcing from OEMs to CMs is the dependent variable.

Outsourcing from OEMs to CMs has a significant effect on the innovation obstacles, which affect innovation capacity negatively.

Figure 2.4 reveals the theoretical framework of this study, which is based on the theoretical concepts mentioned earlier in this chapter. Plambeck and Taylor (2005) state that outsourcing from OEMs to CMs leads to a decrease in innovation capacity at the companies involved. The theoretical framework therefore indicates that outsourcing from OEMs to CMs affects the obstacles to innovation positively, which means that outsourcing from OEMs to CMs strengthens these obstacles.

Specific theoretical concepts are used to elaborate the obstacles to innovation variable to clarify the meaning of obstacles in this context. The bottom of the framework is the innovation audit framework of Frishammar et al. (2019), which is suitable for measuring innovation obstacles in a structured way. This framework is linked to the four main categories of barriers to innovation capacity as stated in multiple studies (Costa-Campi et al., 2014; Galia & Legros, 2004; Galia et al., 2013; Mohnen & Röller, 2005). These main categories are divided into 10 obstacles which influence innovation capacity; the 10 obstacles, as described in the theoretical framework, are based on the ideas from leading studies on innovation obstacles. This study uses an overview of the obstacles from all the studies since they have similarities (D'Este et al., 2008, 2012; Galia & Legros, 2004; Galia et al., 2013; Iammarino et al., 2007; Schneider & Veugelers, 2008; Tourigny & Le, 2004).

This framework facilitates an investigation into which obstacles affect innovation capacity negatively. With this information, companies can focus on and overcome those obstacles which have a negative effect on their innovation capacities. This theoretical framework thus helps to fulfil the purpose of the study.

3 – Methodology

Again, this research intends to determine what will improve the innovation capacities of CMs and OEMs. This chapter describes the methodology that was used to resolve this matter and comprises descriptions of the following three factors: the data collection, the data analysis, and the company that served as a case for the study.

3.1 – Data collection

The methodology used for this study was designed based on the theoretical framework in Figure 2.4. Figure 3.1 illustrates how the theoretical framework is linked to this methodology. The methodology consists of two elements: interviews with employees of the CM and OEMs of the selected case and the thematic analysis, which was used to analyze the data collected from the interviews. All 10 obstacles associated with the innovation audit framework of Frishammar et al. (2019) were thus analyzed. The outcomes of the thematic analysis offered the insights necessary to answer the research question.

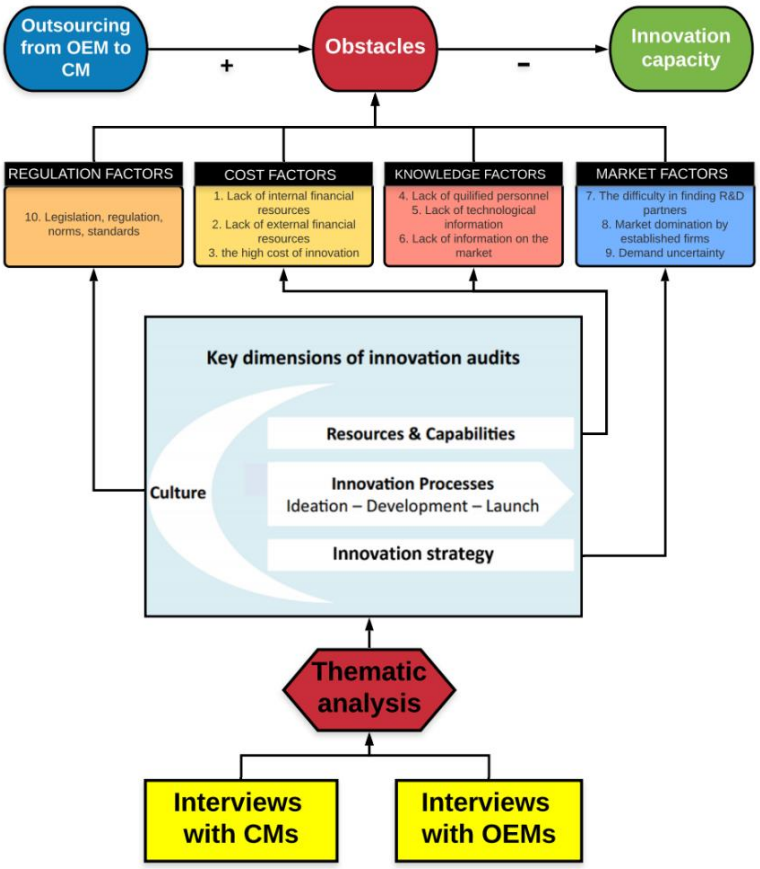

Figure 3.1 – Theoretical framework with methodology

The following research techniques were used to gather data to answer the research question: First, semi-structured interviews were conducted with responsible managers of the CM. Semi-structured interviews were used to assess potential obstacles while retaining the interviewees' focus; however, follow-up questions were included when they added value. Semi-structured interviews were then conducted with three OEMs. It was important for the interviewees from the CM and OEMs to provide insightful answers to the questions and communicate the strategies of their companies. Appendix 1 reveals the entire interview protocol. Second, a thematic analysis which consisted of six steps was used to extract the required data from the interviews to complete the framework of Frishammar et al. (2019) based on the obstacles obtained from the relevant literature.

3.1.1 – Case selection

One carefully selected case serves as the base of the study to facilitate the gathering of qualitative data. Researchers use diverse definitions of a case study. One concise definition describes a case study as an in-depth and structured way to gather information of a small sample within the case by analyzing and interpreting the interactions between humans and the symbolic actions of companies (Creswell, Hanson, Clark Plano, & Morales, 2007; Flyvbjerg, 2006; Seawright & Gerring, 2008; Walsham, 1995). Several studies state that a case study is useful for contributing to the development of new theories and forming connections between current and future categories (Collinson & Rugman, 2010; Eisenhardt & Graebner, 2007; Flyvbjerg, 2006; Leech & Onwuegbuzie, 2008).

The company that was used as a case company for this case study is a CM with more than 500 employees. The main reason for using this company is that it serves OEMs as customers and can represent other CMs with at least 500 employees. A case study was conducted since the goal was to gain deeper insights into the results from the data. Moreover, this study is described so that it can be repeated for other populations.

3.1.2 – Sample selection

Due to the qualitative way this study was conducted, purposive sampling was the method used to select the sample within the case. Specifically, generic purposive sampling was used since the characteristics that were necessary for the respondents were already clear a priori (Bryman & Bell, 2015), which means that the outcomes from the data collection were more accurate and thus useable for answering the research question. The sample companies needed to have three characteristics: First, the companies that participated had to have more than 500 participants. This condition specified that only larger companies would be investigated. Second, the respondents from the selected companies had to be well informed on the innovation strategies of their companies. Third, the respondents also had to be well informed on the relationship between the identified CM and OEM, which ensured that the connection between innovation and the relationship between the CM and OEM could be made.

The sample consists of two groups within the selected case: one CM and three large OEMs with more than 500 employees. The respondents from these companies were selected based on the criteria that they needed to have sufficient knowledge about the innovation strategies of their companies and the relationship between the CM and OEM. The outcome of this selection was four respondents from the OEMs and two respondents from the CM.

Some of the literature criticizes the use of single-case studies with a small sample. For example, Siggelkow (2007) states that it is difficult and less accurate to generalize theory from one carefully selected case. Nevertheless, Boddy (2016) established in his literature review that despite the limitations of samples in single-case studies, these studies can offer reliable arguments for further research directions. This also justifies the sample of six respondents within the case in this study. The data from

the sample supplied all the data required to answer the research question and provide directions for further research.

3.1.3 – Operationalization

Since the sample includes two groups of respondents, those from the CM and those from the OEMs, the study had to be designed so that both were assessed in the same way. Moreover, since the same obstacles were evaluated via the interviews with the respondents from the CM and OEMs, only one interview design was adjusted for the particular respondent, which made the operationalization of the obstacles more consistent.

Operationalization is critical for qualitative research as it allows one to measure the variables in a structured way. The operationalization of this study was achieved via three steps. The first step was based on the 10 obstacles listed in Table 2.3, which were used to operationalize the study as follows: All potential obstacles were measured with the specific questions presented in Table 3.1. Since it is sometimes possible to answer a question with 'yes' or 'no', follow-up questions were added to these questions to measure the obstacle.

After the data had been collected from the interviews, the second step of operationalization was creating thematic maps from the data samples. Each obstacle has its own thematic map, which is assembled in the following way: it has layers from left to right for the obstacle, the data samples (i.e., codes) and the themes. The data samples in the middle are connected to the corresponding obstacle on the left side of the map and themes on the right side of the map. The main goal of these thematic maps was to provide a structured overview of all the data collected to formulate well-considered statements based on this information.

The last step of operationalization was reviewing these results to establish obstacles which can be improved to enhance the innovation capacities of CMs and OEMs. Once these steps were accomplished, answering the research question became possible.

Table 3.1 – Operationalization obstacles

Obstacles	Questions that measure the obstacles
The lack of internal financial resources	Do you have the resources and capabilities you need to coordinate and integrate customers, suppliers and other external actors into the innovation process?
The lack of external financial resources	Do you have the resources and capabilities you need to coordinate and integrate customers, suppliers and other external actors into the innovation process?
The high cost of innovation	How do you manage the high cost of innovation projects with the innovation partners?
The lack of qualified personnel	Do you have sufficient qualified personnel to execute all the phases of the innovation processes? Do your innovation partners have sufficient qualified personnel?

The lack of technological information	Do you have the necessary technological knowledge? Do your partners?
The lack of information on the market	Do you have sufficient knowledge of the market (e.g., market growth, size and demand)?
The difficulty with finding R&D partners	Do you have the desired collaboration with partners and customers?
The market domination of established firms	Have competitors hampered the innovation processes?
Demand uncertainty	Do you have sufficient knowledge of the market (e.g., market growth, size and demand)?
Legislation, regulations, norms and standards	How do you secure a culture of openness? How do you value ideas and insights that originate outside your organization?

3.2 – Data analysis

The collected data was analyzed with the thematic analysis method. Before this data could be analyzed, however, the records had to be transcribed. This transcription was achieved with electronic help from a software program called AmberScript,[3] which can automatically transcribe recorded interviews. After extracting the data from AmberScript, the researcher verified the records himself to increase the trustworthiness of the data. Once the transcripts were finalized, they were sent to the participant for additional verification of the data.

This study uses a thematic analysis, an analysis method which is relatively accessible for researchers who have little experience with qualitative research. This method can transform a large set of data into an understandable summary, from which conclusions can be made, and can reveal differences and similarities in the data (Braun & Clarke, 2006a). An often-used alternative is a content analysis, which indicates the importance of a particular category or theme. However, this study is concerned with more than how many times a certain category or theme emerges (Vaismoradi, Turunen, & Bondas, 2013).

Several studies address the phases of thematic analysis. While these studies often differ, they have the same goal (Braun & Clarke, 2006; Kuckartz, 2014; Miles & Huberman, 1994, as cited in Soumodip, 2007). For this study, the phases that Braun and Clarke (2006) formulated were used to analyze the raw data, since these authors have been cited more than 65 thousand times in the literature. As Google Scholar demonstrates,[4] this method is consistent with most of the other methods for conducting a thematic analysis and suits the current study.

[3] https://www.amberscript.com/nl
[4] https://scholar.google.com/

The thematic analysis, as Braun and Clarke (2006) devised, comprises six successive phases which result in an answer to the research question. These phases are summarized in Table 3.2, which comes from the study of Braun and Clarke (2006).

Table 3.2 – Phases of thematic analysis (Braun & Clarke, 2006a)

Phase	**Description of the process**
1. Familiarizing yourself with your data:	This phase includes transcribing the data (if necessary), reading and rereading the data and noting initial ideas.
2. Generating initial codes:	This process involves coding interesting features of the data in a systematic way across the entire data set and collating relevant data to each code.
3. Searching for themes:	This phase includes organizing codes into potential themes and gathering all data relevant to each potential theme.
4. Reviewing themes:	This process involves confirming whether the themes concerning the coded extracts (Level 1) and the entire data set (Level 2) function and generating a thematic map of the analysis.
5. Defining and naming themes:	This phase includes conducting an ongoing analysis to refine the specifics of each theme and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report:	This phase is the final opportunity for analysis. The process involves selecting vivid, compelling extract examples, the final analysis of the selected extracts, relating the analysis to the research question and literature and producing a scholarly report of the analysis.

After the thematic analysis, the collected and analysed data was used to determine opportunities for CMs and OEMs to enhance their innovation capacities.

3.3 – Trustworthiness of the data

Trustworthiness is an important aspect of academic research. Nevertheless, researchers who conduct qualitative research often struggle to secure trustworthiness factors from academic research. The most commonly used criteria for securing trustworthiness include internal validity, external validity, reliability and objectivity (Bell et al., 2019). Lincoln and Guba, as cited in Bell et al. (2019), state that qualitative researchers must use an alternative for these four criteria, which are often used for quantitative research. These authors thus proposed the following five criteria: credibility, transferability, dependability, confirmability and reflexivity. These criteria are secured within the current study to deliver trustworthy conclusions.

Credibility

Credibility refers to the internal validity of quantitative research, which means that credibility concerns the confidence with which a qualitative researcher can state that the results of a study are trustworthy. The credibility of the research is ensured in two ways. The first is member verification. All the

respondents from the CM and OEMs were verified upfront and selected based on several criteria. The data that the respondents supplied are therefore more trustworthy.

The second way to ensure credibility is with data triangulation, which the researcher achieved by interviewing more than one OEM in the case, obtaining data from more than one OEM and thus increasing the trustworthiness of this data (Leech & Onwuegbuzie, 2008; Quinn Patton, 1999). The interviews were also recorded and transcribed to increase the credibility of the data. Moreover, the respondents verified the transcribed data themselves to ensure the accuracy of their statements.

Transferability

Transferability concerns the extent to which the results of a study apply to other similar situations. One way to ensure that readers understand these results in the incorrect context is including a dense description of the study (Korstjens & Moser, 2018). All research must therefore provide a clear description of the situation for which the study results are suitable and useable. This study not only clarifies the sample but also specifies the conditions which were used to select the participants. Furthermore, the abstract of this thesis describes the results, as well as the sample used.

Dependability

Dependability concerns the extent to which other researchers in similar situations can repeat the study. This factor is essential to the current study since the latter focusses on one case with many employees. Korstjens and Moser (2018) state that an audit trail, which involves recording the research steps used while conducting the study, is the best way to ensure dependability. Chapter 3 thus elaborates the theoretical framework of this study, linking the methodology to this framework before offering a clear description of the research steps, which should enable other researchers to reproduce the research.

Confirmability

Confirmability refers to the neutrality of the findings from the research. One indication of the neutrality of the findings is that the researcher is independent and not a stakeholder from one of the participants in the study. To ensure the confirmability of their findings, researchers must use the audit trail method that Korstjens and Moser (2018) recommend, as an audit trail clarifies how the interview data was collected and analyzed, rendering the outcomes more confirmable.

Reflexivity

The last factor that ensures the trustworthiness of the results of a study is reflexivity. This factor is often underestimated but no less important than the others. Reflexivity concerns any biases of the researcher that may emerge while collecting, analyzing and clarifying the data for the study (Korstjens & Moser, 2018). Chapter 5 addresses this factor in the implications sections and discusses the potential biases that may have arisen during the research.

4 – Results

This chapter presents the results of the data collection and analysis which were conducted for this study. Appendix 3 provides an interview transcript, while Appendix 2 supplies the interview codes. All six phases of Braun and Clarke (2006)'s thematic analysis from Table 3.2 are elaborated in this chapter; however, phases four through six are described with Frishammar et al. (2019)'s framework.

4.1 – Familiarization with the data

The first phase is becoming familiar with the collected data. The data collection was achieved via interviews for this study, and after the interviews had been conducted, they were transcribed. These transcripts were then sent to the interviewees for them to confirm whether the transcripts were complete. Transcribing the interviews was one way for the researcher to become familiar with the data. Nevertheless, he also examined the transcripts after the respondents had verified them.

4.2 – Generating codes

The second phase involves collating relevant data to different codes. The 10 obstacles from the literature which are listed in Table 2.3 served as the codes for which the data samples were selected to generate data samples that target the main aim of this study. Using these obstacles as codes resulted in 84 unique data samples with relevant information on the codes. These data samples are all in Dutch as the interviews were conducted in Dutch. Since this study is in English, a translated summary is therefore offered for each data sample, which facilitates connecting the interview data to potential outcomes.

4.3 – Finding themes

The extracted data remain extensive while distributed over the different codes (i.e., obstacles). Differences in the data samples can be detected; for example, some data samples indicate that a potential obstacle does not hamper the innovation capacities of CMs and OEMs, while other data samples indicate that a potential obstacle does not cause a decrease in innovation capacity in this relationship. The third phase thus includes creating themes that sort the data samples so that it is possible to form conclusions about the data. In this phase, the data samples were subdivided within their code into the following three themes:

- Green = No hampering effect on innovation capacity
- Red = Hampering effect on innovation capacity
- Yellow = Potential improvement that decreases the hampering effect

These three themes are mutually exclusive. Mutual exclusivity means that every word has only one meaning. In this study, it means that each data sample was associated with a single theme (green, red or yellow) (Halberda, 2003).

When a data sample was labelled green, which means that it has no hampering effect on innovation capacity, this suggested that the obstacle to which it is labelled is arranged sufficiently. When a data sample was labelled red, which means that it has a hampering effect on innovation capacity, this implied that the obstacle to which it is connected has caused a decrease in innovation capacity. Finally, the yellow label indicates a potential improvement that decreases the hampering effects of the red-labelled obstacles or how the green-labelled obstacles can be improved even more. The data set was divided so that it was possible to map the data in Phase 4.

4.4 – Results

Phases 4, 5 and 6 focus on the results of the thematic analysis. First, the researcher confirmed whether the selected themes functioned for the data samples and codes. He asked the stakeholders for their opinions on these themes and codes, and their overall response was positive. It was thus concluded that the data analysis method was sufficient for arranging the data systematically.

The following subsections present the thematic maps which were then generated from the different codes (Braun & Clarke, 2006a). These subsections address the components of Frishammar et al. (2019)'s framework.

4.4.1 – Resources and capabilities

The first section of the framework concerns resources and capabilities. This section can be divided into two subsections: financial resources and capabilities, which includes the obstacles concerning internal financial resources, external financial resources and the high cost of innovation, and human resources and capabilities, which includes the obstacles concerning qualified personnel, technological information and information on the market.

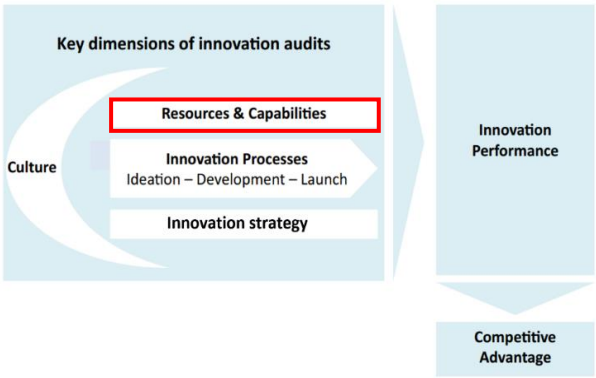

Figure 4.1 – Resources and capabilities by Frishammar et al. (2019)

Internal finance

Internal finance was assessed during the interviews. Figure 4.2, which presents the results from the coding process, is designed in the following way (also true for the other figures in Chapter 4): The left side of the figure demonstrates the variable on which the codes are based. The middle reveals the data samples which were condensed and translated from the original Dutch data samples. Moreover, each data sample indicates which respondent provided the data. The right side of the figure illustrates the themes to which the codes are connected. These links facilitate deeper insights into the data and enable one to form conclusions particular to the variable on which the thematic map is focussed.

For the potential obstacle internal finance, some data samples indicate that this obstacle has no hampering effect on innovation capacity. However, other data samples imply that internal finance does have a hampering effect on innovation capacity. The overall results suggest that the internal financing for innovation projects at OEMs has no hampering effect on innovation capacity, which means that OEMs can finance all their required innovation projects. The respondent from OEM2 did state that smaller medical OEMs do sometimes struggle with this; nevertheless, the evidence is insufficient to state that this is the case for all smaller OEMs since only one respondent mentioned this issue. Furthermore, the respondents from the OEMs stated that companies never have sufficient financial resources for innovation since they constantly strive to do more and better.

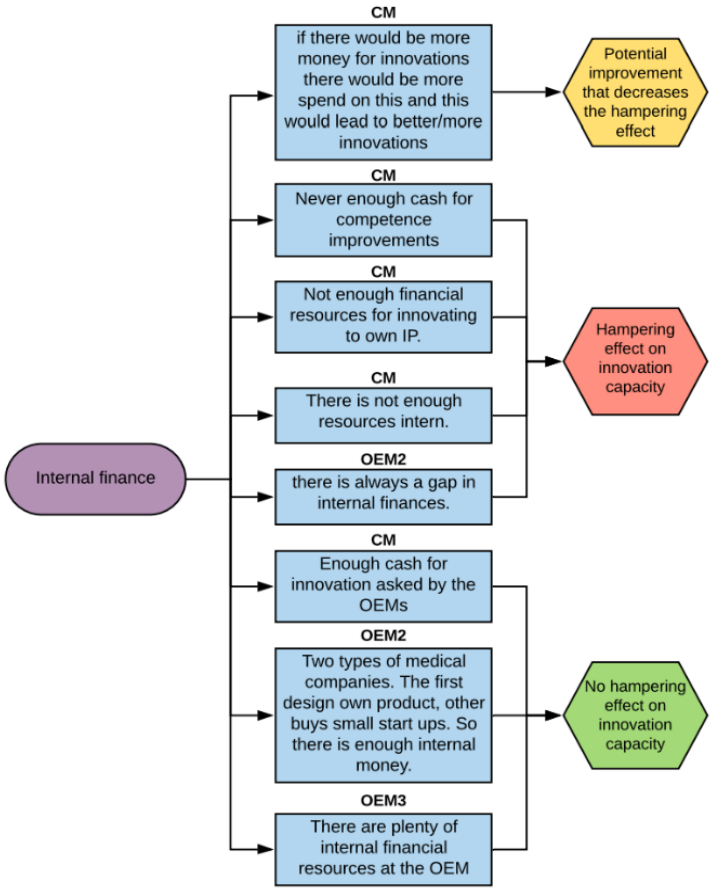

Figure 4.2 – Coding map 'internal finance'

The same cannot be said for CMs. In fact, the data samples from the interviews indicate that insufficient internal financial resources have a hampering effect on innovation capacity at CMs. This result is solid since all respondents formed the same conclusion on internal financial resources.

Potential improvements to internal finance that can be used to increase innovation capacity are difficult to determine since internal finance is based on having resources or not. No easy way to increase internal financial resources exists. However, as one CM suggested, if more financial resources were available, CMs could achieve more and better innovation and potentially even generate their own intellectual property (IP).

In summary, the results for the internal finance variable confirm that internal financial resources have no hampering effect on innovation capacity at OEMs. This is not the case for CMs, where improvements are needed to decrease the effect of insufficient financial resources on innovation capacity.

External finance

The data demonstrates almost no hampering effect on innovation capacity due to external financial resources. The respondents from the CM stated that the financial resources of the CM cannot be compared to those of the OEMs. These respondents thus verified that CMs have sufficient external finance but insufficient internal finance.

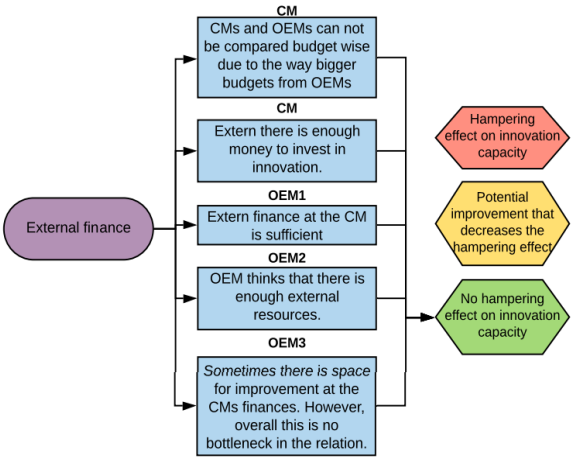

Figure 4.3 – Coding map 'external

The data also demonstrates that the external financial resources of CMs do not affect OEMs. Indeed, all the respondents from the OEMs stated that the external financial resources of CMs have no hampering effect on innovation capacity, which contradicts CMs' overall view of their internal financial resources. This result indicates a gap between the CM's expectations and the OEMs' expectations. In conclusion, CMs and OEMs have sufficient external financial resources to conduct their desired innovation projects. This obstacle might therefore not be the variable with which significant progress can be made towards enhancing innovation capacity.

High cost of innovation

The results indicate that no decrease in innovation capacity occurs due to the high cost of innovation projects. Besides, the data reveals that neither the CM nor the OEMs struggle with the high cost of innovation, which implies that CMs and OEMs have sufficient financial resources to conduct all their innovation projects.

Figure 4.4 – Coding map 'high cost of innovation'

The data also establishes that the relationship between CMs and OEMs is often regulated so that the OEM compensates the CM for innovation projects. However, the OEMs suggested a potential improvement: if the CM was also willing to contribute to the investment, they would be involved in earlier stages of innovation projects.

In summary, the results indicate that the high cost of innovation projects does not cause an overall decrease in innovation capacity. Nevertheless, the data indicates that there is an opportunity to further improve the performance of this specific area via earlier investments from the CM in the innovation processes.

Qualified personnel

The thematic map depicted in Figure 4.5 demonstrates that each theme is supplied with data samples in the case of qualified personnel. Furthermore, the results of the data samples are almost similar, divided between a hampering effect and no hampering effect on innovation capacity. This result indicates that not every participant has experienced a hampering effect on innovation capacity due to qualified personnel in the relationship between CMs and OEMs.

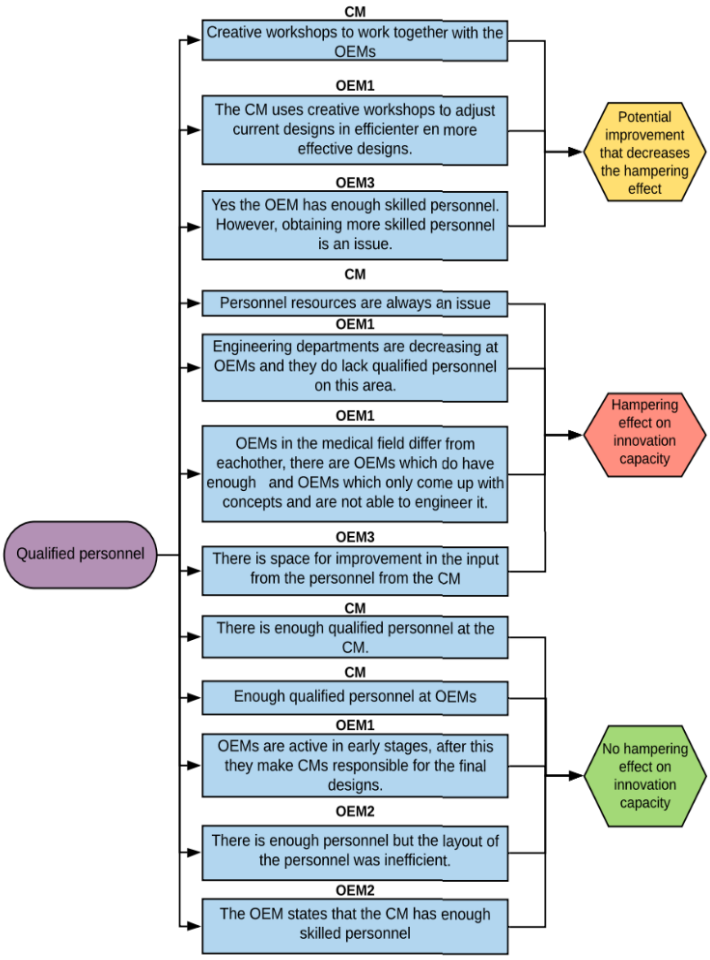

Figure 4.5 – Coding map 'qualified personnel'

The data fluctuates so that neither the CM nor the OEMs have data samples which indicate either a hampering effect or no hampering effect. For instance, OEM1 stated that OEMs are active only in the early stages of innovation processes and thus have insufficient qualified personnel when they want to participate in these processes again. Conversely, OEM2 stated that OEMs do have sufficient personnel; the arrangement of their personnel, however, is inefficient. Moreover, some respondents from the CM stated that no hampering effect had occurred due to qualified personnel, while others insisted that it had.

In conclusion, the results indicate that a decrease in innovation capacity occasionally occurs within these companies due to insufficient qualified personnel. Nevertheless, the consensus seems to be that CMs and OEMs never have sufficient qualified personnel since they constantly strive to achieve more.

Technological information

Almost all the data samples confirm a hampering effect on innovation capacity due to insufficient technological information in the relationship between CMs and OEMs. OEM2 alone stated that both parties have sufficient technological information to conduct their desired innovation projects. Except for this one positive response, the rest of the data on technological information is negative.

The respondents from the CM claimed that technological information is largely unavailable to them, and the market thus considers them to be a generalist rather than a specialist. Moreover, the respondents from the CM and OEMs concluded that OEMs lack technological knowledge of the innovation projects that they outsource to CMs, which suggests a potential improvement that can be used to decrease the hampering effect on innovation capacity.

The collected data provides several potential improvements. For instance, improvements to how OEMs arrange their qualified personnel could lead to an increase in innovation capacity. Other opportunities which could improve this variable include using news flashes to indicate what technological information is available, collaborating to obtain more technological information and gaining IP which can be sold via licence fees. In conclusion, the technological information available at CMs and OEMs can be improved.

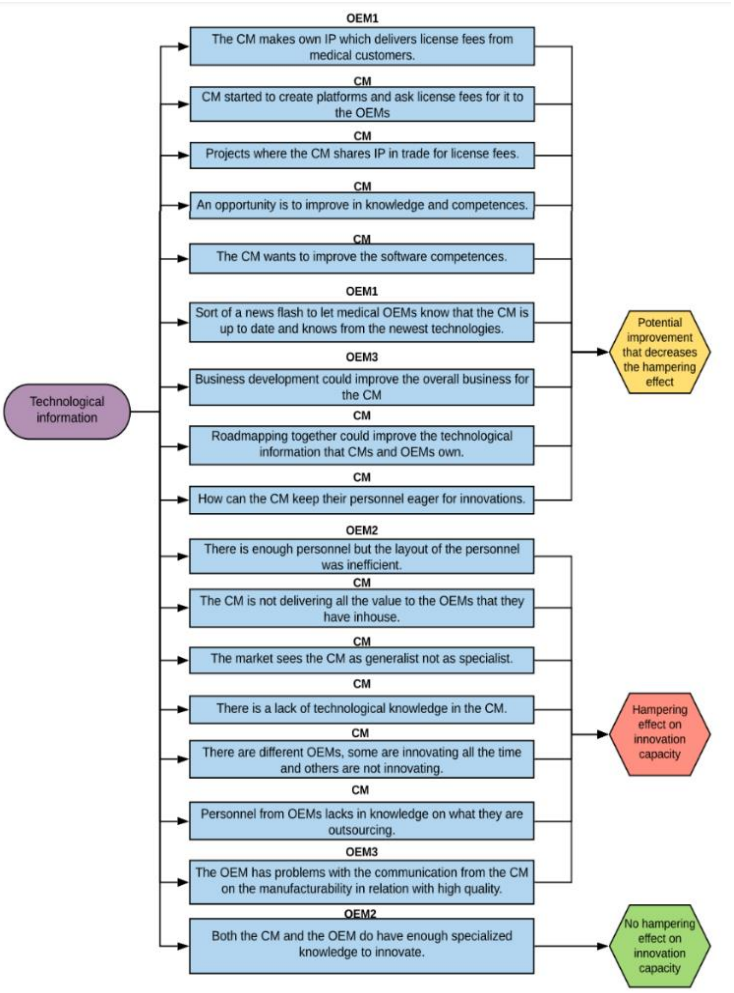

Figure 4.6 – Coding map 'technological infromation'

Information on the market

The results suggest that overall, CMs and OEMs have sufficient market knowledge. OEM3 stated that while their knowledge of their own market is sufficient, their knowledge of their suppliers' markets is not and could therefore be improved. Gaining more of this knowledge is a potential improvement for this specific OEM. However, the rest of the data implies that the CM and the OEMs have sufficient knowledge of the market. It can therefore be concluded that information on the market is not one of the variables that decrease innovation capacity.

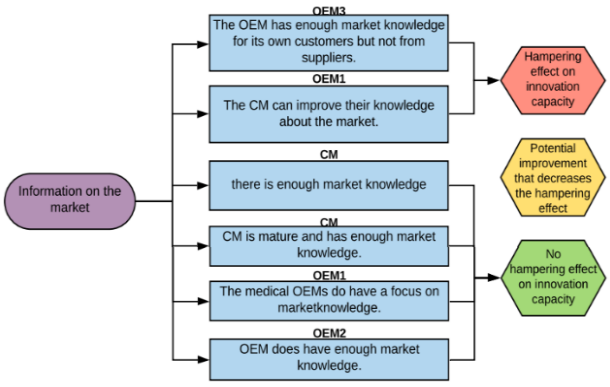

Figure 4.7 – Coding map 'information on the market'

4.4.2 – Innovation strategy

The innovation strategy is another factor which supplies innovation processes with conditions so that they can function efficiently. The innovation strategy concerns how a company creates, delivers and secures value for their customers with innovation (Frishammar et al., 2019). The potential obstacles which describe this section of the framework include the R&D partners, the market domination of established firms, and demand uncertainty. It is important to mention that R&D partners became a considerable part of the interview codes, which indicates that improvements to the innovation strategy might be possible.

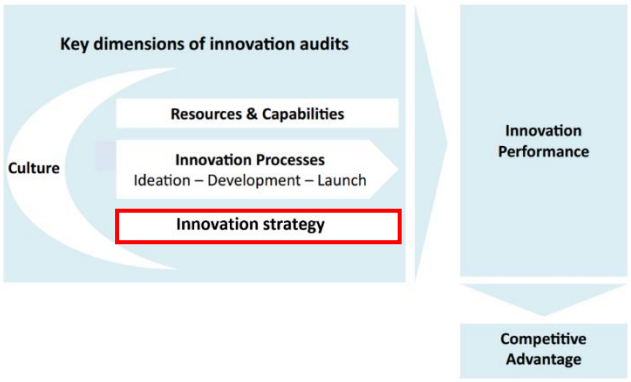

Figure 4.8 – Innovation strategy by Frishammar et al. (2019)

R&D partners

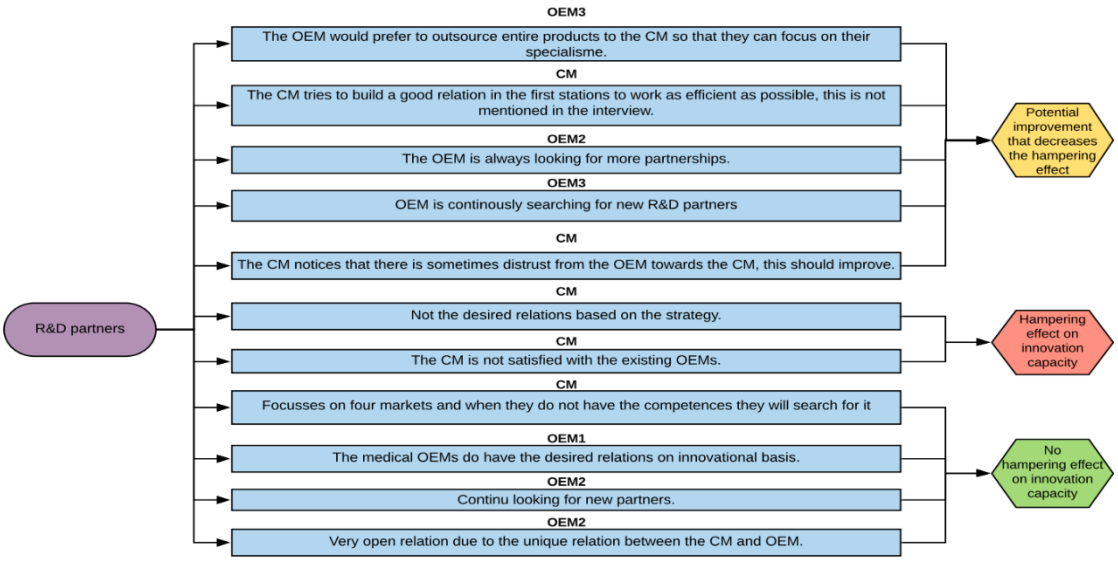

Figure 4.9 – Coding map 'R&D partners'

The data samples reveal that the respondents from the CM are not satisfied with their R&D partners, and the CM is therefore constantly seeking new ones. Conversely, the respondents from the OEMs are satisfied with their R&D partners; however, they also mentioned that they are constantly seeking new partners to never stop improving.

Another significant criterion which recurs often in the data set is building a stable relationship with existing R&D partners, which leads to an increase in innovation capacity. While this factor is not mentioned in the literature, the data set indicates that this relationship is vital to enhancing innovation capacity. Nevertheless, this result was expected when the theoretical framework was designed.

The R&D partners can be divided into new and existing R&D partners. The data demonstrates that existing R&D partners have a hampering effect on innovation capacity at the CM, while R&D partners have no hampering effect on innovation capacity at the OEMs. However, CMs and OEMs are continuously seeking potential new partners. The data also indicates that relationship management is another important factor in enhancing innovation capacity at CMs and OEMs.

Market domination by established firms

The results of the data analysis reveal that CMs and OEMs do not often suffer due to other companies' domination of the market. In fact, since the sample comprises companies with more than 500 employees, almost all the respondents are dominating parts of the markets alone, which means that the market domination of established firms is not an obstacle to the innovation process. Furthermore, initiated innovation projects focus on market demand, which makes competition irrelevant in the relationship between CMs and OEMs.

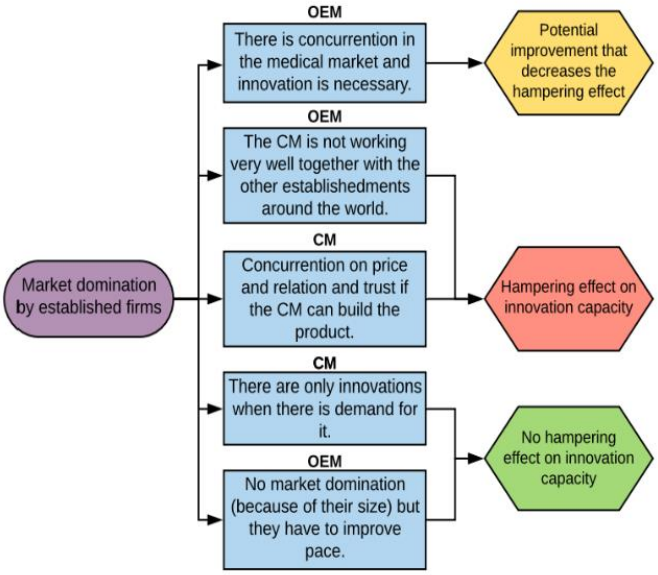

Figure 4.10 – Coding map 'market domination of established firms'

These reasons indicate that the market domination of established firms does not decrease innovation capacity at CMs and OEMs. The only conclusion which can be drawn from this data is that the OEMs experience competition within the establishments of the CM.

Demand uncertainty

In the business relationship between CMs and OEMs, demand for the executed innovation projects is incessant; the OEMs provide the CMs with orders for which the CMs are compensated, and these orders initiate the innovation processes. As a result, no demand uncertainty occurs in this relationship.

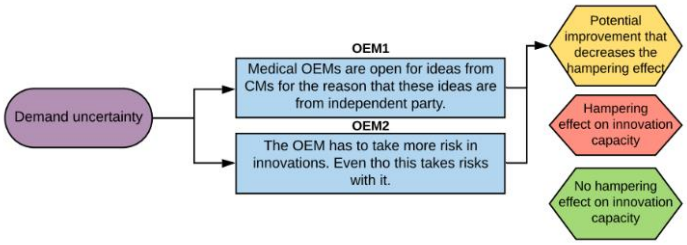

Figure 4.11 – Coding map 'demand uncertainty'

However, OEMs will attempt to sell products which CMs (partly) produced. It can thus be concluded that demand uncertainty does not influence the relationship between CMs and OEMs or enhancing innovation capacity.

4.4.3 – Culture

The third section of the framework concerns a company's culture towards innovation. If a company pays insufficient attention to this factor, it will be impossible to decrease the hampering effect on innovation capacity (van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009). A company's culture is their attitude towards innovation based on their norms, values, beliefs, risk-taking and proactivity (Rao & Weintraub, 2013). This factor is therefore described via the regulation obstacle, which includes legislation, regulation, norms and standards.

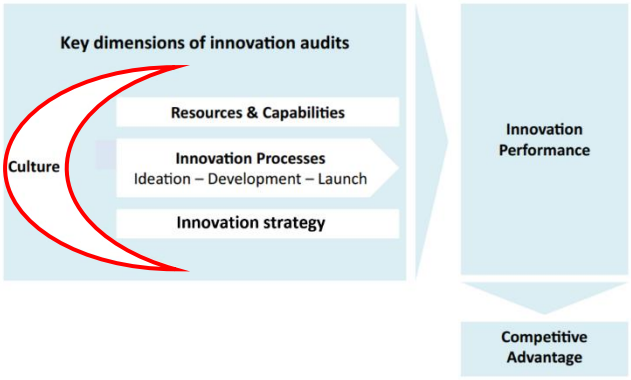

Figure 4.12 – Culture by Frishammar et al. (2019)

Legislation, regulation, norms and standards

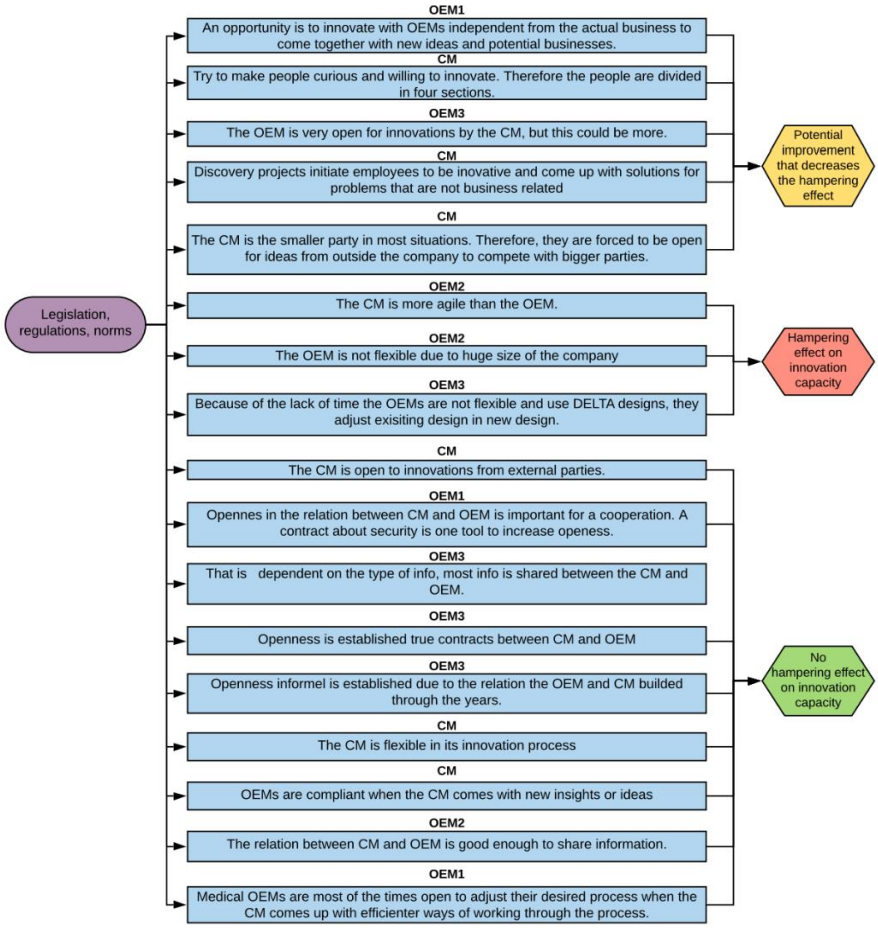

Figure 4.13 – Coding map 'legislation, regulations, norms'

The data samples offer the following insights into the regulation obstacle and how CMs and OEMs manage it: CMs seem to be more flexible in innovation processes than OEMs. This result strengthens the outcome of Kremic et al. (2006)'s study, which suggests that one disadvantage of outsourcing is

losing flexibility. Moreover, all the respondents mentioned that the CM is flexible in the overall innovation process, while the OEMs are not, which means that OEMs' flexibility in innovation processes can be improved.

Furthermore, the data confirms that CMs are open to the improvements and innovations of OEMs in their production processes. The respondents from the CM even stated that CMs must adapt ideas from OEMs to remain current with the innovations due to the larger size of OEMs. The data also indicates that OEMs are open to the improvements and innovations of CMs; nevertheless, this aspect can be improved, which should increase the innovation capacity that results from the culture of the companies. One measure that CMs and OEMs have used to increase their openness is a nondisclosure agreement that both parties sign to prevent data leakage or the usage of each other's data for purposes other than the business relationship. Openness can also be gained via building a long-lasting relationship based on mutual trust.

In conclusion, CMs and OEMs do have a culture which focusses on enhancing innovation capacity; however, OEMs can improve their flexibility in their innovation processes, and both parties must maintain a relationship based on mutual trust, as well as a nondisclosure agreement. Overall, CMs and OEMs can use these improvements to increase their innovation capacities.

4.4.4 – Innovation process

The ultimate purpose of implementing Frishammar et al. (2019)'s framework is to obtain competitive advantages via innovation performance, and increasing innovation performance is achieved with an effective and efficient innovation process. The resources and capabilities, innovation strategy, and culture of a company function in the framework as conditions for a successful innovation process.

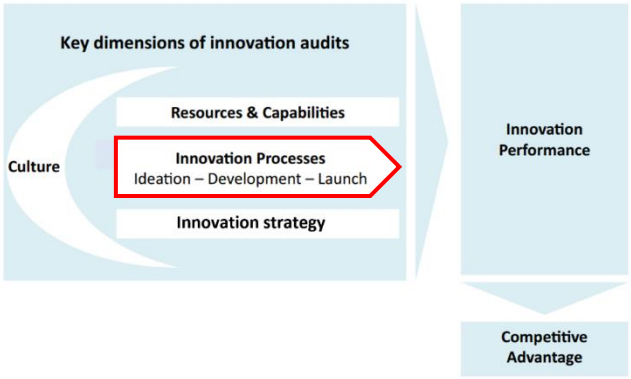

Figure 4.14 – Innovation processes by Frishammar et al. (2019)

Since this study aims to establish which obstacles cause a decrease in innovation capacity and how CMs and OEMs can increase their innovation capacities, these conditions were supplemented with obstacles to innovation capacity which were extracted from the relevant literature. Table 4.1 provides an overview of the results from the previous sections, listing the potential obstacles that cause a decrease in innovation capacity at CMs and OEMs. With this information, CMs and OEMs have insights into what obstacles they must focus on to increase innovation capacity.

The results from the resources and capabilities section of Frishammar et al. (2019)'s framework indicate that based on the financial resources and capabilities, only internal finances cause any hampering effect on innovation capacity at the CM. However, the OEMs do not suffer from the same

lack of internal finances as the CM. Furthermore, the results reveal that CMs and OEMs can increase innovation capacity by enhancing the market factors (i.e., qualified personnel, technological information and information on the market).

For the innovation strategy section, the results are based on the knowledge factors (i.e., R&D partners, the market domination of established firms and demand uncertainty) and demonstrate that improvements can be made to the R&D partners aspect to enhance innovation capacity. The study results also confirm that the potential obstacles which concern the market domination of established firms and demand uncertainty do not influence the innovation capacity from CMs and OEMs.

The culture section is assessed with the potential obstacle which concerns legislation, regulation, norms and standards. The data here indicates a hampering effect on innovation capacity; however, CMs and OEMs can improve on this potential obstacle.

Table 4.1 – Results from thematic analysis

Frishammar et al. (2019)	**Type of barrier**	**Potential obstacle**	**Status**
Resources and capabilities	Cost factors	Internal financial resources	• Hampering effect on innovation capacity (CM) • No hampering effect (OEMs)
		External financial resources	• No hampering effect (CM) • No hampering effect (OEMs)
		The high cost of innovation	• No hampering effect (CM) • No hampering effect (OEMs)
	Market factors	Qualified personnel	• Hampering effect (CM) • Hampering effect (OEMs)
		Technological information	• Hampering effect (CM) • Hampering effect (OEMs)
		Information on the market	• No hampering effect (CM) • Hampering effect (OEMs)
Innovation strategy	Knowledge factors	R&D partners	• Hampering effect (CM) • Hampering effect (OEMs)
		Market domination of established firms	• The data indicates that this obstacle is not relevant in the relationship between CMs and OEMs
		Demand uncertainty	• The data indicates that this obstacle is not relevant in the relationship between CMs and OEMs
Culture	Regulation factors	Legislation, regulations, norms and standards	• Hampering effect (CM) • Hampering effect (OEMs)

5 – Conclusion and discussion

This chapter contains the conclusion, which provides answers to the research question, and the discussion, which addresses the contribution of this study and the significance of its conclusions. It also describes the limitations and the theoretical and practical implications of the study, including a reflection on the methods which were used to conduct the research. Finally, suggestions for further research are formulated at the end.

5.1 – Conclusion and discussion

In their study, Plambeck and Taylor (2005) concluded that outsourcing from OEMs to CMs is increasing significantly. One of the results of this increase in outsourcing is a decrease in innovation capacity at CMs and OEMs (Plambeck & Taylor, 2005). One aim of this study is to confirm or confront this statement. Nevertheless, its main purpose is to provide the literature with insights into which obstacles to innovation cause a decrease in innovation capacity. The following research question was thus formulated:

Which innovation obstacles cause a decrease in innovation capacity in the outsourcing relationship between CMs and OEMs, and how can these companies increase their innovation capacities?

The results of this study corroborate Plambeck and Taylor (2005)'s statement since the analysis confirms that obstacles to innovation cause a decrease in innovation capacity. These results also indicate that improvements to multiple obstacles should lead to an increase in innovation capacity; increasing innovation capacity can therefore be achieved by decreasing the current obstacles to innovation. This study uses a research model which includes obstacles from the literature combined with the innovation audit framework of Frishammar et al. (2019). This theoretical model was tested via a thematic analysis which involves semi-structured interviews. The end result of this study is a list of areas where necessary improvements should increase innovation capacity in the outsourcing relationship between CMs and OEMs.

The results reveal that financial resources and capabilities do not cause a significant decrease in innovation capacity. Indeed, sufficient financial resources and capabilities are available at OEMs. However, the data indicates that sufficient financial resources are not available at CMs, which means that the financial resources at CMs are an obstacle which could lead to an increase in innovation capacity if these financial resources were improved.

Contrasting the financial resources and capabilities are the human resources and capabilities, which are less sufficient in the current situation. The results indicate that for all three obstacles (i.e.,

qualified personnel, technological information and information on the market), improvements should lead to an increase in innovation capacity.

Moreover, the results suggest that the innovation strategy contains two obstacles, the market domination of established firms and demand uncertainty, neither of which influence the innovation capacity under any circumstances. Nevertheless, since this obstacle was investigated via only one business case study with a sample of companies with more than 500 employees, further research is necessary to generalize this conclusion. Based on the results, it can be stated that R&D partners have a hampering effect on innovation capacity. It is therefore important for CMs and OEMs to improve on this obstacle to decrease its influence.

The cultures of the CM and OEMs focus on enhancing their innovation capacities. However, the results establish that improvements can be made. Relationship management between the two parties and flexibility in innovation processes are matters which CMs and OEMs should improve to decrease the hampering on innovation capacity that results from outsourcing from OEMs to CMs.

5.2 – Theoretical implications

The literature indicates a decrease in innovation capacity when CMs and OEMs initiate an outsourcing relationship (Plambeck & Taylor, 2005). Nevertheless, little attention is paid to which obstacles to innovation cause a decrease in innovation capacity and how innovation capacity in the outsourcing relationship between CMs and OEMs can be increased. This study thus demonstrates that the obstacles mentioned in the conclusion cause this decrease in innovation capacity. Furthermore, this study confirms that when companies confront the obstacles which cause such a decrease, this indirectly leads to an increase in innovation capacity. From a theoretical perspective, this study contributes to clarifying Plambeck and Taylor (2005)'s study on which obstacles cause a decrease in innovation capacity.

This study also contributes to the literature on obstacles to innovation (D'Este et al., 2008, 2012; Galia & Legros, 2004; Galia et al., 2013; Iammarino et al., 2007; Schneider & Veugelers, 2008; Tourigny & Le, 2004), thus enhancing the generalizability of the innovation obstacles in the outsourcing relationship between CMs and OEMs. Moreover, the results indicate that another obstacle, relationship management, might influence innovation capacity. However, further research is necessary to verify this finding.

5.3 – Practical implications

These conclusions and the results of this study can serve as guidelines for managers who are responsible for managing the innovation policies of their companies. From a practical perspective, managers struggle to improve their innovation due to a lack of know-how. These strategies are therefore presented in a table with indications as to which areas of the innovation process can be improved, which should allow managers to focus on the areas which need attention and ultimately result in an increase in innovation capacity.

For the CM, the study suggests that improvements to the following obstacles should lead to an increase in innovation capacity: internal financial resources, qualified personnel, technological information, R&D partners and legislation, regulations, norms and standards. When managers from the CM focus on these obstacles, the innovation capacity should increase. For instance, developing a closer relationship with the OEMs should lead to more financial resources for the CM since OEMs have sufficient financial resources compared to CMs.

For the three OEMs, the data indicates that improvements to the following obstacles should lead to an increase in innovation capacity: qualified personnel, technological information, information on the market, R&D partners and legislation, regulations, norms and standards. Focussing on these obstacles should enable managers from these OEMs to increase their innovation capacities. An increase in innovation capacity could be achieved if the OEMs changed their culture to become more flexible (Kremic et al., 2006).

5.4 – Limitations and further research

As to the application of the research method, some limitations must be mentioned. First, the method was tested on only one business case, which means that the results from this business case are difficult to generalize (Siggelkow, 2007). However, studies with one carefully selected business case can offer directions for further research (Boddy, 2016). Repeatable research is thus necessary to generalize the outcomes of this study.

In addition, the COVID-19 pandemic caused some difficulties in the data collection, as the selected medical companies became unavailable for interviews. To overcome this problem, the researcher interviewed a professional with more than three decades of experience in the field of medical CMs and OEMs.

Another matter worth noting is the difference in responsiveness between the different companies: OEMs with businesses which thrive on innovations were more than willing to participate. In contrast, OEMs which are less dependable from innovation were less interested in the study. This matter must be considered since it might have influenced the outcomes.

Another limitation is that the research method was tested on companies with more than 500 employees, which renders the practical implications of this study less relevant for small and medium-sized enterprises (SMEs) since the trustworthiness of the results is lower for companies which are not included in the study. However, the research was conducted so that repeatable studies are possible. Further research is therefore needed to investigate whether the results are also applicable for SMEs.

Since this study suggests that relationship management could also be an obstacle which has a hampering effect on innovation capacity in the outsourcing from OEMs to CMs, further research on this potential obstacle could supplement the literature on obstacles to innovation.

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Appendix 1 – Interview protocol

The interview protocol is a brief overview of how and why the interview is executed. This will result in a clear interview that collects the desired data for the research in order to answer the research question. The purpose of the interview, the interviewees, general data, the interview structure, and the actual interview questions are described.

Purpose of the interview

The purpose of the interviews is to receive data about the CM and OEMs and their current innovation policy and their desired policy within mind the obstacles in innovation that are extracted from the literature. To fulfil this purpose the data will be collected by semi-structured interviews among CMs and OEMs in the case study. Semi-structured interviews will be conducted for the reason that this type of interviewing keeps the interviewee in the right direction to generate essential information for the research question.

Interview respondents

The interviewees are employees of the companies in the case study. There is one CM participating in the case study and the customers from this CM are the OEMs in the case study. The interviews are conducted in the Dutch language in order to obtain complete answers to the interview questions. The interviewees are all Dutch and this takes away the language barrier so that they can give their full opinion.

There are two respondents from the CM. The first one in the international innovation manager. He is responsible for the innovation strategy at the CM over the whole the world except for the American sites. This makes the respondent a good fit for the study because he knows a lot about the innovation strategy from the CM. Furthermore, he knows what the CM would prefer in the future on the innovative area. The second respondent from the CM is also responsible for innovations. This respondent has the required knowledge about the strategy from the CM and the desired relation between the CMs and OEMs.

The respondents from the OEMs are all responsible for (or have the knowledge of) the innovation strategy of their company. For this reason, are the participants all approved to provide the necessary data for the study.

General data:

Date: ……..

Location: ……..

Interviewee: ……..

Interview structure:

The interview consists of four main parts. One general part and four theoretical parts that represent the sections of the theoretical framework, namely:

- General questions
- Resources & capabilities
- Innovation culture
- Innovation strategy

The goal from the general questions is to get familiar with each other and get some basic information about the interviewee and the company he or she works for. It is important to notice that in order to collect all the necessary data it is important to ask follow up questions. Via follow up questions we can achieve extra information from the interviewees.

English version

Resources and capabilities

1. What is your function in the company?
2. Do you have the resources and capabilities you need to coordinate and integrate customers, suppliers, and other external actors into the innovation process?
3. How do you deal with high cost of innovation projects with the innovation partners?
4. How do you routinize for using internal knowledge externally to help your partners?
5. Do you have an understanding of the key actors in your innovation eco-system? What they want, can, and will contribute with?
6. Is there enough schooled personnel to execute all the phases of the innovation processes?
7. Do innovation partners have enough skilled personnel?
8. Do you have the specialized knowledge needed in new technology? Is this also the case for partners?
9. Do you have enough knowledge of the market? For example market growth, size, demand etc.
10. Do you have the knowledge to implement customer-centric business models?
11. Is your innovation process sufficiently flexible and agile? How is this at the partners?

Innovation strategy

12. Do you have the collaborations with partners and customers you need? Yes/no explain.
13. Do you experience hampering due to competitors in the innovation processes?
14. Do you have the skills to co-create innovations with customers and partners at early stages in the innovation process?

15. Are your firm's processes for value creation and value capture deeply integrated with customer activities?
16. How do you develop customer "journeys" that add value?
17. Are you exploring and exploiting opportunities to create new sources of revenues along the whole value chain?

Innovation culture

18. How do you secure a culture of openness?
19. How do you value ideas and insights that originate outside your organization?

Future

20. Are their points that can be improved on innovative level which are not included in the interview?
21. What would you like to change in your company in order to enhance the innovation capacity with the customer? And what would you like to see on the other side of the relation?
22. What grade would you give the relation to the innovative area with the other party?
23. What score would you give yourself on innovative area?

Dutch version

Middelen en mogelijkheden 1, 2, 3

1. Wat is uw functie binnen het bedrijf?
2. Zijn er intern genoeg financiële middelen om de gewilde innovatie projecten daadwerkelijk uit te kunnen voeren? Hoe denken jullie dat dit zit bij de innovatie partners? [1 2 3]
3. Hoe gaan jullie samen met de innovatiepartner(s) om met de hoge kosten van innovatie? [1 2 3]
4. In hoeverre staat het bedrijf ervoor open om interne informatie te delen met externe partijen om hen verder te helpen?
5. Hebben jullie inzicht in wie de belangrijkste spelers in de innovatie processen (extern) zijn? Wat willen, kunnen en zullen ze bijdragen?
6. Is er voldoende genoeg opgeleid personeel om de gevraagde innovatie capaciteit te behalen? [4]
7. Hebben de innovatie partners genoeg opgeleid personeel om deze innovatie capaciteit te behalen? [4]
8. Beschikken jullie over de benodigde gespecialiseerde kennis die nodig is voor de innovatieve projecten?[5] Geldt dit ook voor de innovatiepartners?
9. Hebben jullie genoeg kennis van de markt, denk hierbij aan vraag, marktgrootte, potentiele klanten/concurrenten etc.? [6 9]

10. Beschikken jullie over de vaardigheden om in een vroeg stadium van het innovatieproces samen met klanten en partners innovaties te creëren? [7]
11. Is jullie innovatieproces voldoende flexibel en wendbaar? Hoe zit dit bij de partners

Innovatiestrategie 7, 8, 9

12. hebben jullie de samenwerkingen met partners en klanten waar jullie naar streven? [7] Ja/Nee leg uit.
13. Ervaren jullie hinder van concurrenten tijdens jullie innovatieproces? [8]
14. Hebben jullie de kennis om klantgerichte businessmodellen te implementeren?
15. Zijn de waarde toevoegende processen van uw bedrijf gefocust op klantactiviteiten?
16. Hoe ontwikkelen jullie customer journeys die waarde toevoegen?
17. Zijn jullie bezig met het verkennen en benutten van mogelijkheden om nieuwe inkomstenbronnen te creëren?

Innovatiecultuur 7, 10

18. Hoe zorgen jullie voor een cultuur van openheid naar de klanten/partners? [7]
19. Hoe waarderen jullie ideeën en inzichten die buiten jullie organisatie ontstaan (Denk hierbij aan klanten die met innovaties komen)? [10]

Toekomst

20. Zijn er nog verbeterpunten in de relatie op innovatief gebied die u nog niet bent tegen gekomen in het interview?
21. Wat zouden jullie in de toekomst graag willen zien veranderen binnen jullie eigen organisatie om innovatie samen met de OEMs te verbeteren? En andersom (bij de andere organisatie(s))?
22. Als je de samenwerking tussen … en … op innovatie gebied een cijfer kan geven wat voor cijfer zou dit zijn? Waarom en hoe kan dit verbeteren?
23. Wat voor score zouden jullie jezelf geven op innovatief gebied en waarom?

Appendix 2 – Interview coding scheme

Participant	Section	Summary	Obstacle	Type of code
CM	Nou ja, kijk iedereen die in staat is om een een stuk ontwikkeling te outsourcen in deze manier. Die heeft daar blijkbaar een budget voor, want onze klanten betalen netjes.	Extern there is enough money to invest in innovation.	External financial resources	No hampering effect
CM	Ja, goed, daar kunnen we ons niet echt mee vergelijken, want die hebben gewoon heel andere budgetten…. Dus we zitten altijd in een second tier of first tier situatie qua gelaagdheid, dus uiteindelijk komt ons geld ten alle tijden weg van van de OEMs.	CMs and OEMs cannot be compared budget wise due to the way bigger budgets from OEMs	External financial resources	No hampering effect
CM	er zijn situaties waarbij wij actief meedenken met de klant. Maar er zijn ook situaties waarbij wij gewoon alles op voorhand betaald krijgen.	Sometimes the CM also pays a part, other situations the OEM pays.	High cost of innovation	No hampering effect
CM	onze business is engineering services, dat is betaalde business dus een uurtje wat wij maken wordt betaald door de OEM dus zodanig. Ja, goed het is een commerciële relatie die we hebben met onze klanten, en dat betekent dat in veel gevallen de klant gewoon de innovatie betaald.	The innovation business is payed by the OEM	High cost of innovation	Improvement
CM	Ik denk dat wij dat wij zijn een volwassen organisatie, ik denk dat we uitstekend weten wat er te koop is in de wereld en hoe de wereld werkt dus, dus ik durf te zeggen van wel.	CM is mature and has enough market knowledge.	Information on the market	No hampering effect
CM	Wel, in de marktsegmenten waar we ons op dit moment begeven.	there is enough market knowledge	Information on the market	No hampering effect
CM	Dan durf ik te zeggen. Nee, ik denk dat we veel meer willen dan wat we vandaag doen	There is not enough resources intern.	Internal financial resources	Hampering effect
CM	Het andere punt is: willen we competenties eigen maken? Dus dat betekent een studie budget, maar betekent ook soms dat je pilotprojecten moet draaien. En daar is altijd een beperkt budget voor. Ja dat is iets daar wil je natuurlijk altijd meer van.	Never enough cash for competence improvements	Internal financial resources	Hampering effect

CM	We zijn van het laatste jaar begonnen met met deels ook eigen IP ontwikkelen maar goed, dat is een keer een vijf procent van onze omzet zijn, dus dat zijn maar beperkte mogelijkheden met de budgetten die onze klanten hebben	Not enough financial resources for innovating to own IP.	Internal financial resources	Hampering effect
CM	Kijk, ik denk dat als als ik meer budget zou hebben, zou ik meer kunnen innoveren, dus binnen de de beperktheid van mijn budget en en de manier hoe we ons businessmodel is opgebouwd. Voel ik ook mijn beperkingen, dat wil niet zeggen dat we het slecht doen, maar goed als je zegt van zouden we meer kunnen doen.	if there would be more money for innovations there would be more spend on this and this would lead to better/more innovations	Internal financial resources	Improvement
CM	Ja, ja en nee dus dat dat is, kijk we innoveren continu voor klanten, dus als zodanig innovaties die we voor klanten doen, daar is voldoende geld voor, want goed dat is uiteindelijk onze business dat de klant betaalt ons per uur, dus dat is verder geen punt denk ik	Enough cash for innovation asked by the OEMs	Internal financial resources	No hampering effect
CM	Ja, kijk wij innoveren in opdracht van de klant en het is zo wendbaar als nodig is, dus als de klanten linksaf wil, dan kan die linksaf en als rechtsaf wilde, kan die rechtsaf dus wij, wij zijn daarin wendbaar	The CM is flexible in its innovation process	Legislation, regulations, norms, standards	No hampering effect
CM	Ik een recent voorbeeld is dat ik met een met een klant heb gesproken over de testers strategie. Die heeft een bepaalde. Die klant heeft een bepaalde ehm, een visie op hoe je met testers om moet gaan. Ja, ik denk dat we dat gewoon wel heel serieus oppakken en daarnaar luisteren en waar we waar we kunnen dat we er wat mee doen.	The CM is open to innovations from external parties.	Legislation, regulations, norms, standards	No hampering effect
CM	Ik denk dat partners juist waarderen dat we innovatief zijn en komen met met innovatieve oplossingen, dus die gaan daar best heel vaak in mee er zit altijd een case achter.	OEMs are compliant when the CM comes with new insights or ideas	Legislation, regulations, norms, standards	No hampering effect
CM	Dus dat betekent zorgen dat dat mensen nieuwsgierig zijn, zorgen dat je gewoon stink goede mensen aan boord hebt, we willen vaak een breed palet aan technologieen en processen overzien dus dan dan gaat het innoveren makkelijker en dat empoweren is eigenlijk wel het	Try to make people curious and willing to innovate. Therefore the people are divided in four sections.	Legislation, regulations, norms, standards	Improvement

	keywoord waarbij we hebben vier rollen binnen de CM engineering afdeling, dat is de professional, dat is de expert, dat is de team people manager en de business man, want dat is mijn business noem ik het maar even.			
CM	We hebben vier keer per jaar een discovery sessie, waar mensen gewoon op de afdeling nieuwe idee kunnen opbrengen en er drie gekozen worden en dan wordt dat project op die manier houdt je ook een stukje openheid en flexibiliteit op innovatie die gebied in leven en dat bepaald door de medewerkers zelf.	Discovery projects initiate employees to be inovative and come up with solutions for problems that are not business related	Legislation, regulations, norms, standards	Improvement
CM	ik heb 120 man, en we battelen met bedrijven die hebben 3000/4000 engineers. Ook daar zijn we overtuigd dat we wat kunnen toevoegen, maar we kunnen alleen maar toevoegen als we ook kennis opdoen van derde partijen. of samenwerken, en dat doen we veelvuldig. Dus dat is één van mijn credo's.	The CM is the smaller party in most situations. Therefore, they are forced to be open for ideas from outside the company to compete with bigger parties.	Legislation, regulations, norms, standards	Improvement
CM	Absoluut dus dus de de de business bij ons draait op twee dingen. Dat is volgens mij vertrouwen of de partij kan leveren, wat die moet leveren en het tweede is prijs en hoe meer een product is uitgekristalliseerd.	Concurrention on price and relation and trust if the CM can build the product.	Market domination by established firms	Hampering effect
CM	Kijk, we focussen ons op bepaalde klanten, een bepaald markt, de innoveren alleen daar waar we het spel willen spelen. Dus waar onze klanten zitten dus ik, Ik doe geen wilde innovatie, bijvoorbeeld in ruimtevaart, als we daar geen geen business hebben.	There are only innovations when there is demand for it.	Market domination by established firms	No hampering effect
CM	Resources is altijd een issue, dus we zijn altijd nog in staat gebleken om te maken wat we willen maken ehm. Maar ik denk dat we zijn continu op zoek naar slimme en en gedreven mensen. Nee, ik vind dat we nog wel een stap mogen maken.	Personnel resources are always an issue	Qualified personnel	Hampering effect
CM	Dat doen met een creative workshop, dus we hebben daar uitstekend tool voor dat we samen met met zeg maar de key engineer van de klanten en onze key engineers al tijdens een sales fase of	Creative workshops to work together with the OEMs	Qualified personnel	Improvement

	tijdens een eerste concept development gezamenlijk komen om ideeën te delen en gezamenlijk met een concept op tafel te komen, wat wat verder dan dat uitgewerkt als product.			
CM	Ja, ik denk, ik ben heel blij met alle jonge studenten die we aan boord hebben. Dus ik denk dat als ik kijk naar het potentieel, we op dit moment genoeg in huis hebben binnen design engineering ben ben ik super en is dat voldoende.	There is enough qualified personnel at the CM.	Qualified personnel	No hampering effect
CM	Kijk bij onze klanten, laat ik zo zeggen: ja.	Enough qualified personnel at OEMs	Qualified personnel	No hampering effect
CM	Ehm ik ik denk dat de de mix van klanten die we vandaag hebben, nog niet volledig in lijn is met met de strategie van de organisatie. Dus wat de strategie is van de organisatie, is om grote klanten te bedienen met met het volledige pakket wat we doen.	Not the desired relations based on the strategy.	R&D partners	Hampering effect
CM	Ehm omdat ik nog niet tevreden ben met de klanten die ik vandaag heb, dus ik vind dat ik nog kan verschuiven in de waardeketen	The CM is not satisfied with the existing OEMs.	R&D partners	Hampering effect
CM	Ik denk dat een belangrijke pijler in in het komen tot een innovatie, een succesvolle innovatie en en is het team wat dat doet, we besteden altijd echt energie en tijd? Ja, vanuit een interne, of een intrinsieke interesse daarin, maar in de klant. Dus wij proberen voor in het proces gewoon een een stevige persoonlijke relatie te bouwen met de klant waarin die een stuk vertrouwen krijgt in in onze in onze mensen, dat we dat we een open en transparante communicatie hebben.	The CM tries to build a good relation in the first stations to work as efficient as possible.	R&D partners	Improvement
CM	dan zou ik graag willen dat ze ons dat we beginnen in de relatie vanuit de positie van vertrouwen in plaats van wantrouwen. Dus als je een quote maakt, wordt die ik noem maar even gefileerd, ehm Ja het zou ons helpen als mensen aan de voorkant en ik snap dat proces nodig is hoor maar en dat dat mensen aan de voorkant gewoon zeggen: oké, hiervoor ga je het doen	The CM notices that there is sometimes distrust from the OEM towards the CM, this should improve.	R&D partners	Improvement

	en ik geloof je dat je mij niet de poot uitdraait.			
CM	Nou laat ik het zo zeggen ik ben heel gericht bezig om met een strategie. Dus met focussen ons op een viertal markten, en daar zijn we ook meegaand. En als we bepaalde competenties niet hebben of technologie, dan proberen we die binnen te halen.	Focusses on four markets and when they do not have the competences they will search for it	R&D partners	No hampering effect
CM	Ik denk dat je alleen maar succesvol kunt outsourcen wanneer jezelf boven de materie staat, en dat betekent dat dat de klanten altijd iemand in de verschillende disciplines iemand zou moeten hebben die die op op het hoogste niveau kan acteren. En dat is niet altijd het geval.	Personnel from OEMs lacks in knowledge on what they are outsourcing.	Technological information	Hampering effect
CM	*:* Nee, ik, als ik naar de engineering kijken naar design engineering zijn een viertal technologiegebieden waarin wij willen boven het gemiddelde uit willen stijgen of eigenlijk de beste willen zijn. En en ik durf te zeggen dat we daar nog wel een stap mogen maken als organisatie.	There is a lack of technological knowledge in the CM.	Technological information	Hampering effect
CM	We hebben verschillende projecten waarbij wij een stuk IP van ons inbrengen en en dan maken we afspraken over license fees of over korting of additionele business, dat is dat zijn. Dat zijn gewoon gesprekken die gaande zijn.	Projects where the CM shares IP in trade for license fees.	Technological information	Improvement
CM	Dus wij worden nog niet door door de markt gezien als de de de specialist op bepaalde vlakken. Wij zijn nog steeds een generalist. ... Willen wij dat worden? Nee, maar maar wel in staat om de core van de klant waar zijn intelligentie en IP in zit, omdat voldoende te snappen zodat wij gewaardeerd gesprekspartner zijn daar.	The market sees the CM as generalist not as specialist.	Technological information	Hampering effect
CM	Maar er zijn ook klanten waar we waar we of alleen een stukje engineering of alleen een stukje manufacturing voor doen. En daar leveren we nog niet alle waarde die we hebben. En dus daar kunnen we nog maken.	The CM is not delivering all the value to the OEMs that they have inhouse.	Technological information	Hampering effect

CM	Ehm ja, dat zit in. Ik denk een stuk kennis en competentie. Die die we moeten ontwikkelen in bepaalde technologische gebieden ik denk dat voor een bepaalde repeterende zaken dat er dan praat ik over efficiëntie, hè dus dus zaken die we die we vaker doen die moeten we zo geolied maken, dat ze dat ze super soepel gaan.	An Improvement is to improve in knowledge and competences.	Technological information	Improvement
CM	En ook ja ook op de software kant zal k maar zeggen dat we dat we onszelf willen verbeteren als als we daaraan aan die thema's kunnen werken dan denk ik dat we echt nog echt nog een stap kunnen maken om waarde toe te voegen.	The CM wants to improve the software competences.	Technological information	Improvement
CM	Als je dat de innovatie wil noemen, ehm dus dat. Dat is feitelijk waar we op eigen investering komen, met met oplossingen in de vorm van platform voor klanten. En de bedoeling is dat dat klanten dat we deze oplossingen toepassen, dit in plaats van toepassing in de oplossingen voor klanten, en in dat geval vragen we een license fee voor een het product.	CM started to create platforms and ask license fees for it to the OEMs	Technological information	Improvement
CM	Maar goed we hebben ook bedrijven die ja die engineeren producten, maar die zitten niet te kijken van hoe kan het anders hoe kan ik de laatste technologie toepassen, dus die, en dat heeft heel veel te maken met de mensen die je aan boord hebt en de cultuur die heerst in een bedrijf.	There are different OEMs, some are innovating all the time and others are not innovating.	Technological information	Hampering effect
CM	Nou goed, de ambitie is altijd, maar dat is best een moeizaam iets dat is roadmapping dus dat de klant duidelijk is waar hij naartoe wil, in het in het deel innovatie en dat wij daar goed bij aan kunnen sluiten. Maar goed als je vraagt om roadmaps. Dat is, dat is best een heikel punt. Dat is iedereen heeft ze, maar zo snel je er dan dieper in duikt, dan heeft er toch zijn beperktheden. laat ik het zo zeggen.	Roadmapping together could improve the technological information that CMs and OEMs own.	Technological information	Improvement
CM	De moeilijkheid is: je moet in een glazen bol kijken, en dat is de complexiteit, dus dat is onzekerheid managen en daar een visie op hebben. Dat is, ja niet altijd even	Roadmapping together could improve the technological information that	Technological information	Improvement

	makkelijk, dus innovatie klinkt heel mooi, maar eigenlijk is het een flink deel, heb je als persoon een visie van waar wil je naartoe in een bepaald marktsegment, waar geloof je in en daar kun je mensen op deelgebieden laten innoveren dat is hoe ik ernaar kijk.	CMs and OEMs own.		
CM	kijk mensen die we gemiddeld hebben op de vloer zijn allemaal grotendeels academici zijn slim genoeg alleen blijven ze nieuwschierig, blijven ze eager om nieuwe oplossingen te zoeken? Of kom je in een automatische piloot? Nou en hoe kan je daar een omgeving voor creëren dat je continu alert blijft van oké? Ik sta weer stil maar buiten gaat weer gaat alles verder, dus hoe sluit ik daar weer bij aan en dat is een gedragscode. Dus dat is voor mij key, Hoe krijg ik, hoe krijg ik een cultuur hier op de loer die die continu eagar is om nieuwe zaken eigen te maken.	How can the CM keep their personnel eager for innovations.	Technological information	Improvement
OEM 1	Ja, vinden ze over het algemeen ongelooflijk interessant. Kijk, dat zijn de ook ideeën die die van buiten betekent, ook van buiten de medische markt. Dus als wij een product zien en we kijken naar een product, hoe moet ik dat zeggen euhm een concept of of een product toepassing zien wat de ontwikkeld moet gaan worden.	Medical OEMs are open for ideas from CMs for the reason that these ideas are from independent party.	Demand uncertainty	Improvement
OEM 1	Ja, dat zou je het gaat er vrij goed, denk ik, hè. Dus we hebben de de projecten binnen engineering. Dat is heel erg leuk die discovery projecten.	Extern finance at the CM is sufficient	External financial resources	No hampering effect
OEM 1	de klant van ons wil dan de ip behouden. Dus de intellectual property en die wil ik dat het zijn product , en dat betekent dat de klanten dan ook betaald voor de ontwikkelingen die wij doen. Zeg maar als je een project gerichte ontwikkeling hebt op een projectgericht innovatie wel.	When the CM designes something for the OEM then is the OEM paying.	High cost of innovation	No hampering effect

OEM 1	Ja, iets minder, maar ook wel, kijk wij kennen onze concurrenten natuurlijk ook wel, en we weten ongeveer wat er speelt met in de in de medische markt en de belangrijkste trends. Dat gaat soms om nichemarkt of hele specifieke details, daar weten we ook niet alles van.	The CM can improve their knowledge about the market.	Information on the market	Hampering effect
OEM 1	Ja, zeker zeker eigenlijk alle klanten wel zowel de kleine als de grote, dat is echt hun. Dat is echt hun focus. Oké.	The medical OEMs do have a focus on marketknowledge.	Information on the market	No hampering effect
OEM 1	Ja, dat houden ze dan toch dat zijn twee mogelijkheden. Denk ik. Als je naar onze klanten kijkt, eigenlijk dus zeg maar de OEMers: enerzijds zijn de klanten die die veel zeg maar conceptueel in huis nog ontwikkelen, maar het uit engineeren uitbesteden. En er zijn ook de nodige die ehm die eigenlijk scouten, zeker de grotere bedrijven, dus die scouten naar kleinere bedrijven, en die worden gewoon opgekocht zodra er een werkend prototype is, of zodra een idee ehm wat meer vorm gaat krijgen, of zodra zo'n startup failliet gaat.	Two types of medical companies. The first design own product, other buys small start ups. So there is enough internal money.	Internal financial resources	No hampering effect
OEM 1	Ja, ja, dan moet je de klanten een beetje kennen, is natuurlijk belangrijk. En dan komt het een beetje op de relatie aan wat ik dan doe is bijvoorbeeld één of twee ideeën poneren en dan kan het zijn dat ze daarop daarop aanhaken. En dan kun je verder praten, als het goede ideeën zijn, dan moet je natuurlijk wel een beetje er induiken en als het goede ideeën zijn en ze haker er niet op aan ja dan dan dan heeft het ook geen zin. Dan dan dan staan ze dus niet voor open en dan willen ze gewoon hun concept gerealiseerd hebben. en dat kan ook.	Medical OEMs are most of the times open to adjust their desired process when the CM comes up with efficienter ways of working through the process.	Legislation, regulations, norms, standards	No hampering effect
OEM 1	Ja ja, wat wel zou kunnen zijn, is dat je wat we eigenlijk nog niet doen is dat we zeg maar innovatieprojecten met klanten doen? Even even los van het product vraag snap je dus dus bijvoorbeeld wat je wat je binnen de CM hebt die nou die innovatieprojecten binnen	An Improvement is to innovate with OEMs independent from the actual business to come together with new ideas and	Legislation, regulations, norms, standards	Improvement

	engineering hè, die discovery projecten	potential businesses.		
OEM 1	Ja, dat is eigenlijk helemaal vanaf het begin dat als je de relatie opbouwt, is dat al belangrijk als er een klant is die zegt, als er een klant is van die niet open is, dan kunnen we daar geen relatie mee bouwen. : Eén van de dingen die we doen is bijvoorbeeld een wederzijdse geheimhoudingsverklaring, dus dat je naar beide kanten toe open kunt zijn.	Opennes in the relation between CM and OEM is important for a cooperation. A contract about security is one tool to increase openess.	Legislation, regulations, norms, standards	No hampering effect
OEM 1	Ja, dat gebeurt altijd wel, zeg maar hè dus in een ontwikkel traject moet je altijd strijden. Je moet altijd eigenlijk altijd strijden voor een voor een win. Ja, dus je bent nooit enige oké.	There is no market domination in the medical market, however there is concurrention and innovation is necessary.	Market domination by established firms	Hampering effect
OEM 1	het is altijd wat je weet is altijd een deel verzamelingen. Je kunt niet alles weten, nee, dus dus ik denk wel dat zeker bijvoorbeeld met de creatieve workshops die wij doen dat daar. Daar komt alles wel aan bod. Ehm ja, het is altijd de vraag of je of je als je andere mensen erbij zou halen of je dan toch weer tot nieuwe inzichten komt.	The CM uses creative workshops to adjust current designs in efficienter en more effective designs.	Qualified personnel	Improvement
OEM 1	Ja, dat hebben ze het over het algemeen wel. Je ziet wel de trend dat dat wat minder wordt, hè dus dat dat de engineering afdelingen kleiner worden. Dus trekken zich een beetje terug op op de op het conceptuele ontwerp, of zelfs dat nieteens hé.	Engineering departments are decreasing at OEMs and they do lack qualified personnel on this area.	Qualified personnel	Hampering effect
OEM 1	Ja, sommige klanten hebben inderdaad wel voldoende, zeg maar een senior elektronische medewerkers, bijvoorbeeld, om zo'n concept goed neer te zetten. Maar je ziet ook wel OEMs die dat niet hebben, dus dan wordt er wel een concept.	OEMs in the medical field differ from eachother, there are OEMs which do have enough and OEMs which only come up with concepts and are not able to engineer it.	Qualified personnel	insufficient
OEM 1	ja meestal wel, ja, eigenlijk wel, want je ziet typisch bij OEMers dat zij dat ze zich richten op de toepassing en op de eerste	OEMs are active in early stages, after this they make CMs	Qualified personnel	No hampering effect

	concepten. Dus dat is typisch een werkgebied waar zij inzetten, en ook daarin, want daarin zeg maar kun je natuurlijk ook innovaties inbrengen.	responsible for the final designs.		
OEM 1	ja, dat denk ik wel. Vaak heb je bij zeker grotere OEMs wel een een paar mensen in ieder geval zitten die behoorlijk ervaren zijn? Die dan wel weten van goh, heb ik alle eh alle noodzakelijke capabilities afgedekt,	The medical OEMs do have the desired relations on innovational basis.	R&D partners	No hampering effect
OEM 1	De CM heeft een paar eigen innovatieprojecten en de resultaten daarvan, die moeten ofwel tot zeg, maar dat is een soort offerte ondersteuning dus die die leiden tot grotere kans op business of of die worden gebruikt als soort building blocks met licenties.	The CM makes own IP which delivers license fees from medical customers.	Technological information	Improvement
OEM 1	Ja, ik denk dat je dat er misschien een soort van een nieuwsbrief of iets dergelijks of een soort van ehm nieuws flash ofzo. Weetje wel wat je naar medische, inderdaad specifiek medische innovaties.	Sort of a news flash to let medical OEMs know that the CM is up to date and knows from the newest technologies.	Technological information	Improvement
OEM 2	Maar ik denk dat het twee gezonde financieel gezonde bedrijven zijn. Ja, wij komen vaak genoeg binnen bij de CM. Wij zitten om de hoek, dus de CM kan voor ons niet veel verbergen.	OEM thinks that there is enough external resources.	External financial resources	No hampering effect
OEM 2	Nou wij, het is typisch als wij een case bij OEM2 op het hoofdkantoor kantoor goedgekeurd krijgen. Dan funden wij alles, dus wij vragen niet de CM om mee te financieren.	The OEM finances most of the innovation projects.	High cost of innovation	No hampering effect
OEM 2	Ja, ik denk dat wij heel veel marktkennis hebben. Al onze concurrenten, die zeggen van jullie technologie, niks bijzonders. Jullie zijn brand nummer 1 omdat jullie zo'n, geweldige commerciële afdeling hebben, jullie hebben zo'n marketingpower,	OEM does have enough market knowledge.	Information on the market	No hampering effect
OEM 2	Ja, daar is natuurlijk wel een gap op bij OEM2, maar er zijn meer ideeen altijd in Funnle dan dat we echt kunnen funden.	there is always a gap in internal finances.	Internal financial resources	Hampering effect
OEM 2	Nee, denk ik niet, want daar zijn we te groot voor.	The OEM is not flexible due to huge size of the company	Legislation, regulations, norms, standards	Hampering effect

OEM 2	Ja, ik vind het veel agility bij de CM Almelo. De CM in Almelo is meer Agile dan OEM2 op dit moment, dus dat is op dit moment geen bottleneck. De bottleneck zit bij OEM2.	The CM is more agile than the OEM.	Legislation, regulations, norms, standards	Hampering effect
OEM 2	Ja, ik denk dat die die business relatie die is, is zo degelijk dat dat ja vaak gedaan wordt. Het is, het is zelfs zo dat mensen van de CM na het hoofdkantoor van OEM2 gaan om in Kaizens mee te participeren	The relation between CM and OEM is good enough to share information.	Legislation, regulations, norms, standards	No hampering effect
OEM 2	Nee, ik heb het idee van niet, ik denk wel dat we sneller moeten worden	No market domination (because of their size) but they have to improve pace.	Market domination by established firms	No hampering effect
OEM 2	Ja, ik denk het wel, het enige waar ik op hamer is en je ziet dat men langzamerhand daar meer aandacht aan besteed. er is ook een reorganisatie plaatsgevonden binnen OEM2. Wat we vroeger hadden was een engineering team en die waren eigenlijk bezig met product innovatie en sustaining hè	There is enough personnel but the layout of the personnel was inefficient.	Qualified personnel	No hampering effect
OEM 2	Ja, ik denk dat de CM een hele hele mooie, sterke mix heeft van van de disciplines die goed aansluiten bij een OEM2.	The OEM states that the CM has enough skilled personnel	Qualified personnel	No hampering effect
OEM 2	Nou, ik denk dat wel dat OEM2 op zoek is naar meer meer partners. Ja, inderdaad, daar ben ik van overtuigd. en dan is er dan meer partners die specifieke technologie in huis hebben. Die een specifieke domein kennis hebben.	The OEM is always looking for more partnerships.	R&D partners	Improvement
OEM 2	Ik denk dat je bij OEM2 dan wat meer voeten aan de grond krijgt als je gezamenlijk investeerd. Dat het niet, het is nu altijd uurtje factuurtje, dus zo gauw je zegt kun je daar eens naar kijk dan is het meteen 100 euro per uur. En ik, ik denk dat dat een barrière is dat dan sneller bij OEM2 gedacht wordt dan zoeken we dat zelf wel uit omdat. Want in het begin is er dan nog geen case en als er geen case is dan dan dan komen er geen fondsen vrij.	every hour costs money, when the CM wants to be part of a project in early stages they have to invest also by themselves.	High cost of innovation	Improvement
OEM 2	Ja, er wordt heel sterk gekeken naar recurring revenue model. Dus op dit moment is dat bij OEM2 nog laag is	Continu looking for new partners.	R&D partners	No hampering effect

	misschien maar ik denk iets van tien procent en wil dat met de tijd naar 30 procent brengen of nog hoger.			
OEM 2	Ja, dat komt gewoon door een relatie, de langdurige relatie die we hebben, dus die openheid is heel hoog denk ik. Maar dat is denk ik uniek, dus ik denk dat de CM dat niet met andere klanten zo sterk heeft.	Very open relation due to the unique relation between the CM and OEM.	R&D partners	No hampering effect
OEM 2	Ja, ik denk het wel, het enige waar ik op hamer is en je ziet dat men langzamerhand daar meer aandacht aan besteed. er is ook een reorganisatie plaatsgevonden binnen OEM2. Wat we vroeger hadden was een engineering team en die waren eigenlijk bezig met product innovatie en sustaining hè	There is enough personnel but the layout of the personnel was inefficient.	Technological information	Hampering effect
OEM 2	Ja, dat denk ik wel. We hebben zo'n 200, we hebben een engineering Team van 200 man bij OEM2 dus genoeg kennis.	Both the CM and the OEM do have enough specialized knowledge to innovate.	Technological information	No hampering effect
OEM 3	Nou, ik denk dat het bedrijf meer meer naar buiten moet gaan. Het is goed, dat ze al nou die aparte groep hebben, ja en en, en dat moet verder doorgezet worden, en meer netwerken en met de buitenwereld. Ik geloof niet dat alle ideeën intern ontwikkeld kunnen worden. Ik denk dat er veel meer ideeën buiten het bedrijf zitten als binnen het bedrijf.	The OEM has to take more risk in innovations. Even tho this takes risks with it.	Demand uncertainty	Improvement
OEM 3	Nee, natuurlijk, op sommige punten denk je altijd van hé, dat moet wel, maar ik denk wel dat het past met het model op het moment dat zij hanteren en het type leverancier dat zij zijn.	Sometimes there is space for improvement at the CMs finances. However, overall this is no bottleneck in the relation.	External financial resources	No hampering effect
OEM 3	Dus hun core business zijn EMS activiteiten eigenlijk electronics manufacturing services? Ik denk dat daar een stukje innovatie dan zit in de upgrade van de SMD lijnen en dergelijke, dat wordt grotendeels door De CM zelf gedragen. Als het meer voor OEM3 specifiek is, dan zien je ook meer dat OEM3 in basis betaald.	Innovations on the production processes are for the CM and more OEM related is payed by the OEM.	High cost of innovation	No hampering effect

OEM 3	*:* Ja, Onze markt wel, de markt waarin De CM opereert, dus zeg maar even mijn leveranciers landschap in dezelfde competentie. Ik denk dat wij daar onvoldoende kennis van hebben.	The OEM has enough market knowledge for its own customers but not from suppliers.	Information on the market	Hampering effect
OEM 3	of er voldoende middelen binnen OEM3 om innovatie uit te voeren. Ja, dat is, dat is onze kracht. Daar zijn voldoende middelen, dat kun je ook online wel vinden. Hoeveel wij van ons totale omzet aan R&D besteden.	There are plenty of internal financial resources at the OEM	Internal financial resources	No hampering effect
OEM 3	De typische manier ondanks dat we een grootbedrijf zijn, hebben wij een enorm veel tekorten aan resources, omdat er heel veel projecten lopen. Ehm, dat houdt in dat wij heel veel DELTA designs doen, dus we pakken een bestaand design en we voegen daar de nieuwe functionaliteit aan toe ehm wat vaak ook met zich meebrengt dat je dan het het innovatieve van nu eh vergeet.	Because of the lack of time the OEMs are not flexible and use DELTA designs, they adjust exisiting design in new design.	Legislation, regulations, norms, standards	Hampering effect
OEM 3	*:* En dat ligt natuurlijk aan wat wat type die documenten geclassificeerd zijn als ze top secret zijn dan worden ze uiteraard niet gedeeld, als het confidential is wel, of hierin heb je bepaalde gradaties.	That is dependent on the type of info, most info is shared between the CM and OEM.	Legislation, regulations, norms, standards	No hampering effect
OEM 3	Daar staan we heel hard voor open. Dat is iets dat we wel proberen te pushen dat onze leveranciers met die informatie komen. Omdat uiteindelijk zijn jullie de experts in jullie vakgebied en wij hebben er allemaal baat bij om die kennis en kunde in onze design proberen te embedden.	The OEM is very open for innovations by the CM, but this could be more.	Legislation, regulations, norms, standards	Improvement
OEM 3	Ja, ik denk enerzijds dingen we dat af via een supplier profile. Waarin ook heel duidelijk punten benoemd worden waarin men ook transparantie wil van vanuit de leverancier richting OEM3 en andersom. Dit wordt vastgelegd in allemaal documenten	Openness is established through contracts between CM and OEM	Legislation, regulations, norms, standards	No hampering effect
OEM 3	Anderzijds informeel, hè. We werken nauw samen met elkaar op account niveau. Dus vanuit SAT level, supplier account team. Aan de andere kant, het customer focus team van De CM. ik denk wel dat	Openness informel is established due to the relation the OEM and CM	Legislation, regulations, norms, standards	No hampering effect

	we een bepaalde vertrouwensrelatie proberen op te bouwen met onze counterparts en dat we op basis van die dingen gedekt zijn en daardoor heel transparant naar elkaar kunnen zijn en een hele hoop kunnen delen met elkaar.	builded through the years.		
OEM 3	Wij hebben met De CM als voorbeeld. Die kun je dan intern dan ook nog eens vinden binnen de organisatie. We hadden heel erg behoefte aan een local supply keten, in azië. En wij hadden de relatie met Almelo, voor almelo is dat natuurlijk wegvloeien van omzet naar naar een Aziatische, ook al is het ook van De CM, naar een Aziatische speler, en dat heeft eigenlijk jaren gekost om daar om die stap met elkaar te gaan maken.	The CM is not working very well together with the other establishedments around the world.	Market domination by established firms	Improvement
OEM 3	of er voldoende opgeleid personeel kan ik nooit eerlijk beantwoorden. Maar kan de CM meer toegevoegde waarde leveren door vanuit hun kennis, zeg maar product wijzigingen door te voeren die hè, die die het product verbeteren, de kwaliteit verbeteren, het manufacturing proces verbeteren, jazeker. Dus daar zien we wel een mogelijkheid tot groeien.	There is space for improvement in the input from the personnel from the CM	Qualified personnel	Hampering effect
OEM 3	Ja, maar ik denk dat het probleem is dat door constante groei, dat het soms moeilijk is om genoeg mensen te vinden die voldoende opgeleid zijn. Dus doordat je nu soms tegen resource issues aanloopt, daardoor zou dat wel enige vertraging kunnen opleveren	Yes the OEM has enough skilled personnel. However, obtaining more skilled personnel is an issue.	Qualified personnel	Improvement
OEM 3	We zijn altijd op zoek naar, ik kan ze niet allemaal noemen maar we zijn altijd op zoek naar, nieuwe competenties voor de toekomst.	OEM is continously searching for new R&D partners	R&D partners	Improvement
OEM 3	Ja, maar ik zou veel meer de deel verantwoordelijkheid die De CM heeft, ik zou in het vervolg producten gewoon volledig daar neer willen leggen. En in die zin zou het goed zijn als. samen met ons dat je zeg, maar een autoriteit wordt op dit vakgebied. Dat is nooit van de grond gekomen. Maar dat zou op zich op sommige vlakken is dat best is dat heel interessant. Voor ons is	The OEM would prefer to outsource entire products to the CM so that they can focus on their specialisme.	R&D partners	Improvement

	dit noodzaak voor de machine, maar dat is niet het het innovatieve vak domein waar wij ons op bevinden. De CM zich meer profileert over zn eigen we deelgebieden.			
OEM 3	Dat is de technische product data acceptance by supplier document, van kun je dit maken? en het antwoord is eigenlijk altijd: ja, wat men wel de business hebben en wil de omzet daarvoor hebben. Eigenlijk de echte vraag die wij stellen, kun je dit efficiënt en goed maken, met de hoogste kwaliteit en daar zie je dan toch vaak niet dat daar meer antwoord op gegeven wordt.	The OEM has problems with the communication from the CM on the manufacturability in relation with high quality.	Technological information	Hampering effect
OEM 3	anderzijds een stukje business development dat op dit moment te zwak is van De CM richting OEM3. Er zit veel meer in dan dat ze er op dit moment eruit halen.	Business development could improve the overall business for the CM	Technological information	Improvement

Appendix 3 – Example interview transcript

First interview CM (respondent 1)

Speaker 1: We gaan beginnen, zijn er binnen De CM genoeg financiële middelen om de gewilde innovatieprojecten daadwerkelijk uit te kunnen voeren.

Speaker 2: Ja, ja en nee dus dat dat is, kijk we innoveren continu voor klanten, dus als zodanig innovaties die we voor klanten doen, daar is voldoende geld voor, want goed dat is uiteindelijk onze business dat de klant betaalt ons per uur, dus dat is verder geen punt denk ik. Het andere punt is: willen we competenties eigen maken? Dus dat betekent een studie budget, maar betekent ook soms dat je pilotprojecten moet draaien. En daar is altijd een beperkt budget voor.

Speaker 1: Oké, dus dat zou dat zou meer kunnen zeg maar?

Speaker 2: Ja dat is iets daar wil je natuurlijk altijd meer van.

Speaker 1: En hoe zit dat met de klanten en partners? Hoe denken jullie daarover? Dat dat zit bij de partners waar jullie mee samenwerken op innovatieve gebied? Denk daarbij aan de OEMs.

Speaker 2: Ja, goed, daar kunnen we ons niet echt mee vergelijken, want die hebben gewoon heel andere budgetten.

Speaker 1: In de zin van hoger bedoelt u.

Speaker 2: Ja, altijd dus, laat ik zo zeggen: partners innoveren heel vaak, laat ik zeggen: innoveren key competentie op key zaken en en daarvoor hebben ze gewoon meer geld beschikbaar. Een deel van het innovatie, geld wat zij vrijmaken komt weer bij De CM. Dus we zitten altijd in een second tier of first tier situatie qua gelaagdheid, dus uiteindelijk komt ons geld ten alle tijden weg van van de OEMs.

Speaker 1: Oké, duidelijk, Hoe gaan jullie om samen met innovatie partners als de kosten van een innovatieproject echt hoog zijn? Zeg maar.

Speaker 2: Nou, samen en je moet wel even kijk, kijk, onze business is engineering services, dat is betaalde business dus een uurtje wat wij maken wordt betaald door de OEM dus zodanig. Ja, goed het is een commerciële relatie die we hebben met onze klanten, en dat betekent dat in veel gevallen de klant gewoon de innovatie betaald. We zijn het laatste jaar begonnen met met deels ook eigen IP ontwikkelen maar goed, dat is een keer een vijf procent van onze omzet zijn, dus dat zijn maar beperkte mogelijkheden met de budgetten die onze klanten hebben factor, daar wil ik even bij toevoeging. Dat het niet wil zeggen dat we innoveren, innoveren ook tijdens klanten projecten dus. Ik denk dat wij doordat we een diversiteit aan klanten hebben, supersnel innoveren. Ondanks dat we een beperkt budget hebben, leren we ontzettend veel.

Speaker 1: Van de klanten zeg maar.

Speaker 2: Ja, met de klant.

Speaker 1: In hoeverre staat het bedrijf dus De CM, open om intern informatie te delen met externe partijen, om, zeg maar, een innovatieve prestaties te bevorderen.

Speaker 2: Ja, laat ik zo zeggen: je hebt IP van de klant wat is afgeschermd, dus dat, dat mogen we niet openstellen, dus en en dat is denk ik ook de moeilijkheid waar wij ons in bevinden. Dus het meest van IP is afgedekt met een mba en daardoor beschermd en daardoor kunnen we niet ja, niet open zijn.

Andere kant: als je open source hebt, ja, goed dan dan is dat gewoon binnen de regulatie. Die geldt voor open source technologie, moeten wij publiceren en dat gebeurt dan ook.

Speaker 1: Oké, oké, duidelijk is er binnen De CM, voldoende opgeleid personeel om aan de gevraagde innovatie capaciteit te voldoen, zeg maar vanuit de klant.

Speaker 2: Ja, ik denk, ik ben heel blij met alle jonge studenten die we aan boord hebben. Dus ik denk dat als ik kijk naar het potentieel, we op dit moment genoeg in huis hebben binnen design engineering ben ben ik super en is dat voldoende. Kunst is om altijd mee te bewegen met de klant, dus je kunt nooit stil zitten, dus dat betekent dat we als de nieuwe technologie komen we ons die ook eigen moeten maken. Nou daar focussen we ook op. Dus we hebben discipline en competenties matrix waar we kijken, wat zijn de de nieuwe technologieen, de nieuwe competenties die we ons eigen moeten maken voor de komende jaren? of voor het huidige jaar.

Speaker 1: Oké, en bij de innovatie partners dus de klanten en OEMs. Denkt u dat die voldoende personeel, opgeleid personeel hebben om de innovatie te bevorderen.

Speaker 2: Kijk bij onze klanten, laat ik zo zeggen: ja.

Speaker 1: Die hebben genoeg.

Speaker 2: De vraag is niet zozeer of personeel er genoeg is de vraag is of er een cultuur is om te innoveren, maar goed, en nu, nu stel ik een andere vraag, maar ik denk dat is voor mij.

Speaker 1: Die vraag, die komt straks inderdaad nog.

Speaker 2: Oké.

Speaker 1: Een vooruitziende blik: hebben jullie de samenwerking met partners? Zijn klanten waar jullie naar willen streven of zijn er markten of klanten waar jullie graag samenwerking mee willen, maar die zijn op dit moment niet.

Speaker 2: Nou laat ik het zo zeggen ik ben heel gericht bezig om met een strategie. Dus met focussen ons op een viertal markten, en daar zijn we ook meegaand. En als we bepaalde competenties niet hebben of technologie, dan proberen we die binnen te halen.

Speaker 1: Oké, beschikt De CM over de vaardigheden om in een vroeg stadium van innovatie proces samen met klanten en partners innovaties te creëren.

Speaker 2: Ja.

Speaker 1: Vanaf het begin.

Speaker 2: Dat doen met een creative workshop, dus we hebben daar uitstekend tool voor dat we samen met met zeg maar de key engineer van de klanten en onze key engineers al tijdens een sales fase of tijdens een eerste concept development gezamenlijk komen om ideeën te delen en gezamenlijk met een concept op tafel te komen, wat wat verder dan dat uitgewerkt als product.

Speaker 1: Oké, denkt u dat jullie dus de CM, innovatie, proces voldoende flexibel en wendbaar is.

Speaker 2: Ja, ik denk dat, laat ik zo zeggen, ik probeer de hele afdeling te enten op agile en scrum, maar ook het het stukje innovatie proces. Dus. We hebben vier keer per jaar een discovery sessie, waar mensen gewoon op de afdeling nieuwe idee kunnen opbrengen en er drie gekozen worden en dan wordt dat project op die manier houdt je ook een stukje openheid en flexibiliteit op innovatie die gebied in leven en dat bepaald door de medewerkers zelf.

Speaker 1: En hoe voelt u dat met partners? Zijn die ook flexibel genoeg om als als jullie zeg maar met verandering komen dat ze daarin mee willen gaan? Of kan dat beter.

Speaker 2: Ik denk dat partners juist waarderen dat we innovatief zijn en komen met met innovatieve oplossingen, dus die gaan daar best heel vaak in mee er zit altijd een case achter. Dus uiteindelijk moet het dan attractief zijn, zowel voor voor De CM als voor de Partner want uiteindelijk moeten we geld verdienen.

Speaker 1: Ja, duidelijk. Heeft De CM genoeg kennis van de markt, denk hierbij aan vraag, marktpotentieel, klanten, concurrentie.

Speaker 2: Wel, in de marktsegmenten waar we ons op dit moment begeven.

Speaker 1: Oké, oké, ervaren jullie hinder van concurrentie tijdens tijdens de innovatie proces of zijn het echt gericht innovatieprocessen, die je ingaat waarvan je van tevoren al weet dat er een markt vooris.

Speaker 2: Kijk, we focussen ons op bepaalde klanten, een bepaald markt, de innoveren alleen daar waar we het spel willen spelen. Dus waar onze klanten zitten dus ik, Ik doe geen wilde innovatie, bijvoorbeeld in ruimtevaart, als we daar geen geen business hebben. Natuurlijk innoveren we het best in de vier segmenten die we bedienen.

Speaker 1: Volgende vraag: zijn de waarde toevoegen aan de processen van uw bedrijf gefocust op klant activiteiten.

Speaker 2: Moet je me even helpen wat je precies bedoelt.

Speaker 1: Nou, dat is, zeg maar de innovatie zijn gericht op op de klanten, zeg maar je jullie voeren. Ik hoor net terugkomen dat jullie innovaties uit voeren als de vraag naar is vanuit de klant. Nou ja, mijn vraag is dan zeg maar een beetje dubbel, of jullie alleen innovaties voerenop op gebied van klant? Vraag dus klantgerichte businessmodel, of kijken jullie ook voor jullie ook innovaties die je zegmaar gewoon blank in de markt kan zetten zonder dat er nog klanten voor zijn?

Speaker 2: Deels laat ik het zo zeggen zijn we bezig met met platformen. Als je dat de innovatie wil noemen, ehm dus dat. Dat is feitelijk waar we op eigen investering komen, met met oplossingen in de vorm van platform voor klanten. En de bedoeling is dat dat klanten dat we deze oplossingen toepassen, dit in plaats van toepassing in de oplossingen voor klanten, en in dat geval vragen we een license fee voor een het product. Wat de klant verkoopt, dus per product, komt er dan up lift op, maar dat kan variëren van een dollar tot tot tientallen dollars, afhankelijk van de hoeveelheid producten die de klant verkoopt.

Speaker 1: Gebeurt dat ook in Almelo.

Speaker 2: Ja, dat gebeurd ook in Almelo.

Speaker 1: Haha ja, zijn jullie bezig met het verkennen en het benutten van mogelijkheden voor nieuwe inkomstenbronnen?

Speaker 2: Ja, nou goed, dat is een beetje bijkomende hobby van mij. Laat ik het zo zeggen ik, ik weet niet of het bijkomstige inkomstenbronnen zijn, het zijn meer van modulleren van businessmodellen. Dus hoe kunnen we verder gaan door pre financing van van startups? Dus dat we zeggen van goed, wij nemen wij participeren in een bepaald deel van het project, dus we nemen risico. Participatie, dus daar zijn we mee bezig, we zijn ook bezig met laat ik zo zeggen, met name in de medische wereld kunnen dus product als een invasive hartpomp. Dat betekent dat we moeten innoveren, zowel in in technologie, maar ook met name in de fabriek in NPI en in procestechnologie, daar zijn we volop mee bezig.

Speaker 1: Oké, nou ja, daar komt een vraag die u al aan zag komen. Hoe zorgt De CM voor een cultuur van openheid naar klanten en partners toe op innovatief vlak, zeg maar.

Speaker 2: Nou, voor mij is heel belangrijk: ik noem het het empoweren van de van de medewerkers en het empoweren van teams, dus dat betekent creativiteit bevorderen. Dus dat betekent zorgen dat dat mensen nieuwsgierig zijn, zorgen dat je gewoon stink goede mensen aan boord hebt, we willen vaak een breed palet aan technologieen en processen overzien dus dan dan gaat het innoveren makkelijker en dat empoweren is eigenlijk wel het keywoord waarbij we hebben vier rollen binnen de CM engineering, dat is de professional, dat is de expert, dat is de team people manager en de business man, want dat is mijn business noem ik het maar even. Nou ja en iedereen die afgestudeerd is die kent zijn methodes. Je bent zit nu zelf als master af te studeren. Methodische aanpak, daar ga ik vanuit, dat heeft iedereen, dus dat hoef ik de mensen niet te leren. En het liefst heb ik ook dat ze dat vanuit zichzelf toepassen. Nou dan dan betekent dat ze zich continu. Dat is eigenlijk de uitdaging. Ik heb voor de mensen gaan ontwikkelen in in technologie, competenties, dus dat je nieuwsgierig bent. Wat is er op de markt? En hoe pak je dat op? Ik bied de condities. De mensen moeten het zelf doen, dus ik ga niet mensen zeggen van gij zult dit doen. Nee, dat is iets wat wat je moet ambiëren, waar je lol aan moet hebben en dan is belangrijk dat je zowel teams, intern als extern, dus team performance is gewoon belangrijk, want je kunt niet in een hoekje bij De CM, gaan zitten en en denken van goed. Daar kom ik met een briljante oplossing. Sommigen kunnen dat hè, dus laat ik dat niet uitsluiten, die die mannen hebben we best aan boord, maar oke samenwerken is key omdat je als team met een oplossing wilt komen en uiteindelijk moet verkopen. Dus dat betekent overtuigend zijn naar naar de klant en dat is misschien bij ons is dat misschien business wise verkopen. Maar goed als je interne in de organisaties zit moet je ook je innovaties verkopen. Uiteindelijk maakt het allemaal niet zoveel uit of je het verkoopt aan de klant. Of als je bij een OEM3 werkt en ik moet een nieuw idee lanceren dan moet ik het ook verkopen aan de mensen intern dat dat die cultuur probeer ik te creëren. Dus ik ben niet iemand. We hebben best processen en procedures, maar dat is dat is dat als je zegt, ik ben professional, dus ik moet methodisch werken, dus een bepaalde basis heb je nodig. Het is juist de kracht dat de professional vanuit zn eigen manier van werken tot de beste oplossing komt of dat een team met zn eigen manier van werken tot de beste oplossing komt.

Speaker 1: Dus als ik begrijp dat laatste uw mensen zeg maar gewoon vrij in hun werk als maar gewoon met goede ideeën komen en goed werk leveren, zeg maar.

Speaker 2: Als ze professioneel werk leveren, dat is hetzelfde ik vergelijk dat met een vakman levert per definitie goed werk omdat die niet anders kan. Dat zit in zijn genen. Dat is ook wat ik zoek op mijn afdeling het moet niet in de procedures zitten het moet in de genen van de mensen zitten nou, dat is, dat is mijn ambitie, waar ik op dit moment probeer slagen te maken. Dus niet dat we want procedures is vastleggen van het verleden noem ik altijd en hoe beter je dat doet, hoe vaste je verleden verankerd zit in de organisatie.

Speaker 1: Oké, duidelijk: hoe waardeer De CM ideeën, inzichten van buiten de organisatie? Denk hierbij aan klanten die innovaties komen.

Speaker 2: Goed voor mij is een ander, dat heb ik niet genoemd, maar dat is feitelijk netwerken. Het ecosysteem noem ik dat dus ik sta per definitie open voor voor innovatie van buiten, want ik heb 120 man, en we battelen met bedrijven die hebben 3000/4000 engineers. Ook daar zijn we overtuigd dat we wat kunnen toevoegen, maar we kunnen alleen maar toevoegen als we ook kennis opdoen van derde partijen. of samenwerken, en dat doen we veelvuldig. Dus dat is één van mijn credo's.

Speaker 1: Dus dat is weldegelijk een onderdeel.

Speaker 2: Ja, dat is een essentieel onderdeel.

Speaker 1: Oké, dan gaan we nu over de toekomst hebben. Zijn er nog verbeterpunten die u nog niet

heeft voorbij horen komen in de relatie op innovatieve gebied, tussen de CM en hun klanten, dus, hoe zou De CM samen met hun klanten kunnen verbeteren op innovatief gebied? Hoe zou De CM er nog meer uit kunnen halen.

Speaker 2: Nou goed, de ambitie is altijd, maar dat is best een moeizaam iets dat is roadmapping dus dat de klant duidelijk is waar hij naartoe wil, in het in het deel innovatie en dat wij daar goed bij aan kunnen sluiten. Maar goed als je vraagt om roadmaps. Dat is, dat is best een heikel punt. Dat is iedereen heeft ze, maar zo snel je er dan dieper in duikt, dan heeft er toch zijn beperktheden. laat ik het zo zeggen.

Speaker 1: Kost natuurlijk ook veel tijd.

Speaker 2: De moeilijkheid is: je moet in een glazen bol kijken, en dat is de complexiteit, dus dat is onzekerheid managen en daar een visie op hebben. Dat is, ja niet altijd even makkelijk, dus innovatie klinkt heel mooi, maar eigenlijk is het een flink deel, heb je als persoon een visie van waar wil je naartoe in een bepaald marktsegment, waar geloof je in en daar kun je mensen op deelgebieden laten innoveren dat is hoe ik ernaar kijk.

Speaker 1: Oké, wat zou De CM in de toekomst graag zelf willen veranderen binnen de eigen organisatie om innovatie te verbeteren of of kiest ervoor om gewoon zo door te gaan omdat ze vinden dat het al goed loopt, zeg maar.

Speaker 2: Voor mij is laat ik het zo zeggen ik geloof in een lerende organisatie, dus voor mij is. Daar ben ik op dit moment ook volop mee bezig. Hoe krijgen we dat leren op op verschillende niveaus, kijk waar we heel goed in zijn is leren op de processen, procedures dus. Ik noem maar wat rationeler dat kan iedereen pakken, en dat is makkelijk en ik geloof heilig in als je zegt het samenwerken, hoe creatief samenwerking maar hoe kun je dan ook daarop weer leren dus dan reflecteren van hoe we vandaag samenwerken. Dus wat betekent dat voor mij als engineer, wat betekent dat voor mijn gedrag dus pas mijn gedrag bij continu innoveren, nieuwsgierig zijn producten creëren. En daar zou ik slag willen maken, want kijk mensen die we gemiddeld hebben op de vloer zijn allemaal grotendeels academici zijn slim genoeg alleen blijven ze nieuwschierig, blijven ze eager om nieuwe oplossingen te zoeken? Of kom je in een automatische piloot? Nou en hoe kan je daar een omgeving voor creëren dat je continu alert blijft van oké? Ik sta weer stil maar buiten gaat weer gaat alles verder, dus hoe sluit ik daar weer bij aan en dat is een gedragscode. Dus dat is voor mij key, Hoe krijg ik, hoe krijg ik een cultuur hier op de loer die die continu eagar is om nieuwe zaken eigen te maken.

Speaker 1: Oké, en en andersom dus zou u iets willen zien veranderen bij bij de andere organisaties bij de OEMs.

Speaker 2: Even dat ze mij een mooie projecten geven, maar dat deels dan moeten we onszelf sterk qua innovatie, ja goed, ik denk, sommige bedrijven kunnen meer innoveren, dan ze vandaag doen. Maar goed, dat is net wat ik doe. Dat is continu aandacht besteden aan de juiste ingrediënten. Kijk een sterk voorbeeld van innovatie is OEM3, maar goed, daar zit het in de genen. Maar goed we hebben ook bedrijven die ja die engineeren producten, maar die zitten niet te kijken van hoe kan het anders hoe kan ik de laatste technologie toepassen, dus die, en dat heeft heel veel te maken met de mensen die je aan boord hebt en de cultuur die heerst in een bedrijf.

Speaker 1: Duidelijk ehm als je de samenwerking in het algemeen tussen De CM en de klanten een scoren moet geven op innovatieve gebied van één tot tien, wat voor score zou dat zijn en waarom.

Speaker 2: Een tien is wel heel veel maar een negen, dat durf ik wel te geven. Ik denk dat wij heel veel klanten, met name waar baseer ik dat op, de creative workshops die we hebben. We komen twee dagen samen met de klant, de klant is enthousiast over de voorstellen die wij maken, dus voor mij een belangrijke pijler dat jij ook boter bij de vis doet maar ook meteen de feedback krijgt in de vorm van een nieuw project, want dat is de beste manier van peilen en dat gebeurt dus heel vaak als wij een creative workshop doen met de klant, krijgen we ook de business.

Speaker 1: Oké, en wat voor score zouden jullie jezelf geven? Op innovatief gebied.

Speaker 2: Een acht.

Speaker 1: Een acht en waarom, waarom lager dan de samenwerking.

Speaker 2: Nou goed, maar dat heeft meer met mijn ambitie te maken. Kijk, ik denk dat als als ik meer budget zou hebben, zou ik meer kunnen innoveren, dus binnen de de beperktheid van mijn budget en en de manier hoe we ons businessmodel is opgebouwd. Voel ik ook mijn beperkingen, dat wil niet zeggen dat we het slecht doen, maar goed als je zegt van zouden we meer kunnen doen. Ja, bij een gemiddelde OEMer zou ik meer geld aan innovatie spenden dan ik hier doe.

Speaker 1: Oké, dat waren daar waren de vraag, ging. Wil ik eigenlijk is, wil ik u heel erg bedanken?