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TOOLS STIMULATING SUPPLIER-DRIVEN INNOVATION

An explorative study about tools stimulating supplier satisfaction

MSc Thesis

Tools Stimulating Supplier-driven Innovation: An explorative study about tools stimulating supplier satisfaction.

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This document contains my Master thesis for the MSc Business Administration, track Innovation and Entrepreneurship for the University of Twente. The subject of the Master thesis is supplier-driven innovation and it is assigned by Capgemini Consulting's Strategy & Innovation. This research focuses on collaboration tools supporting supplier-driven innovation to achieve supplier satisfaction and is an enlargement of Prof. H. Schiele's research on preferred customer status. He proved with his research that supplier satisfaction can lead towards a preferred customer status, which is the ultimate status a supplier can award an organisation with.

Keywords: Collaboration, stimulation tools, supplier satisfaction.

Preface

The last couple of months have been challenging for me. One of these challenges was finishing this Master thesis. These challenges made me more determined to finish, albeit with some delay. Even so I am proud to present my completed Master thesis. While working on this thesis I have gained a lot of new experience and knowledge. Conducting research in a new research area and one in which not many research has been done, is somewhat more challenging, but even more rewarding in the end.

This thesis was conducted under the authority of Capgemini Consulting Strategy & Innovation. A special thanks goes to Daan Giesen MSc. who guided me during this thesis. During my time at Capgemini the Business Innovation team gave me a warm welcome and therefore I would like to thank them all for supporting me.

The assistance out of the University of Twente made this thesis possible. Thanks to my supervisor Prof. Dr. Holger Schiele who gave the input for the research topic. And thanks to my supervisor Dr. ir. Pieter Terlouw for his support during the research design.

In addition, special thanks go to the organisations and respondents in my thesis. Without their interviews, determination and commitment, this thesis could never have be done and working on it would never have been so pleasant.

Knowing that I could always count on and trust my friends and family surely helped the progress on this thesis. Even though the amount of time I put in this thesis was not spent with them, I thank them for their everlasting reassuring support.

Contents

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1. Introduction: The need for collaboration tools to understand the whole picture of innovation.

Organisations have to innovate in order to gain a strong market position.[1] Resources are needed to innovate. These resources are becoming scarce. Primarily scarce are the knowledge and technology needed in a complex market. Therefore large organisations collaborate with suppliers to gain access to those resources. Therefore the need for collaboration emerges in today's economy. Several streams in innovation literature outline these collaborations. First the definition of collaboration is given. This is followed by the gap between the two streams of innovation literature, namely economic-oriented (context) and organisations-oriented (process). Then the scope of this thesis is defined in contingencies and the New Product Development process (henceforth: NPD). This is followed by supplier involvement including alliances. Finally, research objectives, problem definition, sub-questions and outline are given.

1.1 Definition of collaboration: The meaning of collaboration in this thesis.

Collaboration is mentioned in many papers of different scholars and is nowadays called open innovation (see paragraph 1.2.1).[2] This thesis uses the definition of Cagliano *et al*. (2002) who define collaboration as: "*Companies that closely co-operate with customers and suppliers to maximize the benefits of the business they are involved in*." Collaboration is seen as a relationship with customers and suppliers on development, manufacturing, assembling and delivering complex and high technology products (which are similar to the NPD process).[3] Even though it is referred to as a supplier-customer-relation, all the relations in this thesis are business to business. Consumers are not involved in the NPD as such.

1.2 Innovation literature: The need for bringing together the product development literature about innovation context and process.

Innovation literature has two broad areas of inquiry which complement each other.[4] First is the economics-oriented area and offers an understanding of innovation across industries and the evolution of technologies which provide a useful *context*. And second is the

[1] See Drucker (1998), p. 3, Tidd (2001), p. 173, Wheelwright (1992), p. 2 and Fredberg *et al*. (2008), p. 5.
[2] See Trott/Hartmann (2009), p. 714 and Chesbrough (2004), p. 26.
[3] See Cagliano *et al*. (2002), p. 2 and Caniëls/Gelderman (2005), p. 144.
[4] See Brown/Eisenhardt (1995), p. 375.

organisations-oriented one, which focuses on the structure and *process* by which individuals create products. Although the two areas complement one another, both areas need to be brought closer together to create a full picture on innovation and product development.

1.2.1 Innovation *context*: Collaboration is nothing new but more important as mentioned in open innovation.

Open innovation is seen in current literature as the new innovation model. Trott and Hartmann (2009) state that collaboration (alliances, co-operation, and networks) has been used for centuries. Not only with customers, but also with suppliers or even competitors. Therefore, Trott and Hartmann (2009) argue that open innovation is not a new concept. The open innovation concept seems to overlook all the research on technology transfer and absorptive capacity. This emphasises the need to focus efforts not just on accessing technology, but also on research and development (R&D). The focus on R&D is needed so organisations can benefit from technology developed outside the organisation. Nowadays R&D managers found it difficult to decide when to outsource R&D activities, because outsourcing increases the risk of competitors taking over critical core competencies. To be able to make the right decision, organisations have to optimise their organisational structure. Trott and Hartmann (2009) and Chesbrough (2003) state that the evolution of technology (economics-oriented) needs to be fully integrated within the strategic management process of the business (organisations-oriented) in order to create a technical body of knowledge for future innovation.[5]

1.2.2 Innovation *process*: Key players and their role in new product development (organisational-oriented and economic-oriented combined).

Much literature has been written on product development in the last decades, for example Barczak (1995), Calantone (1999), Danilovic (2006), Harmancioglu (2007). Brown and Eisenhardt (1995) combined economic-oriented and organisational-oriented streams on product development and found the following key players that affect the success of product-development projects: project team, project leader, senior management, suppliers and customers. Suppliers are important because they affect the speed of the development process and provide resources such as information. Brown and Eisenhardt (1995) indicate

[5] See Trott/Hartmann (2009), p. 714 and Chesbrough (2004), p. 26.

that the innovation process is affected by the whole organisation and environment, thus there is a need to structure the whole process. The provision of information during the product development process affects the power of innovation and therefore needs to be optimised. Organisations use tools supporting communication and creativity to optimise the information resource.[6] This thesis focuses on the collaboration tools used by organisations in their innovation process. Information is one of the resources an organisation needs from their suppliers in order to be innovative.[7]

1.3 NPD process: NPD as outline for collaboration with suppliers (organisations-oriented).

Innovation is about developing new products. There are many concepts of developing new products like Griffin (1997) and Cooper and Kleinschmidt (1986). Chiesa *et al*. (1996) describe the core processes of NPD of technological innovation in four processes: "*The overall management of technological innovation includes the organisation and direction of human and capital resources towards effectively: (1) creating new knowledge, (2) generating ideas aimed at new and enhanced products, manufacturing processes and services, (3) developing those ideas into working prototypes and (4) transferring them into manufacturing distribution and use.*"[8]

Step	Process	Activity
1.	Concept generation	Identification of new product concepts.
2.	Product development	Taking the innovation from concept, through development and transfer to manufacturing and use.
3.	Process innovation	The development of innovation in manufacturing processes.
4.	Technology acquisition	The development and management of technology per se.

Table 1 – Core processes (Chiesa *et al*., 1996).

The core processes described by Chiesa *et al*. (1996) state the need for bringing together human and capital resources. According to Schiele (2011) suppliers are both human and capital resources. Therefore, suppliers are essential in an innovative setting.[9] The innovation process can be hindered by ineffective use of inappropriate systems and tools.[10]

[6] See Shneiderman (2007), p. 2.
[7] See Claycomb (2004), p. 18.
[8] See Chiesa *et al*. (1996), p. 108.
[9] See Schiele *et al*. (2011), p. 3.
[10] See Chiesa *et al*. (1996), p. 108.

"The technical innovation process should result in improved innovation performance, which in turn leads to increased competitiveness."[11] The four core processes of Table 1 come together in the NPD process of Roozenburg and Eekels (1995). In order to analyse the connections between influencing factors, this research uses the NPD process of Roozenburg and Eekels (1995). [12]

Nr.	Step	Action
1.	Idea finding	Analyse desired product characteristics Select product idea Draft list of requirements
2.	Generate technical concepts	Generate usage concepts Develop basic concepts Evaluate basic concepts Elaborate concepts
3.	Technical and economical evaluation	Carry out consumer test Final choice design Optimise technical principle
4.	Commercialisation	Manufacturing Sales

Table 2 – NPD process steps and actions. [13]

Each step and main actions are described in Table 2. The steps are the general stages of NPD. Each step has a different collaboration goal.[14] In the next paragraph an explanation for the environment influences on the collaboration goal is provided. This will be described by the different factors in the environment (context) that influence innovation management (process). This defines the relation between innovation management, the collaboration with suppliers and the goal of the collaboration.

1.4 Environmental contingencies (economics-oriented) and innovation management (organisations-oriented).

Two environmental contingencies exert a significant influence on the organisation and management of innovation: uncertainty and complexity.[15] Uncertainty is the rate of change of technologies and product-markets. Complexity is defined as the function of technological and organisational interdependencies. This results in four dimensions on the management of innovation and organisational structures as shown in Table 3:

[11] See Chiesa *et al*. (1996), p. 108.
[12] See Roozenburg/Eekels (1995), p. 346.
[13] See Roozenburg/Eekels (1995), p. 346.
[14] See Giesen (2008), p. 48.
[15] See Tidd (2001), p. 175.

Dimension	Contingency	Structure and procedure
Differentiated	low uncertainty, low complexity	• Product and service differentiation are key issues • Marketing competencies are critical • Product or market multi-divisional structure, e.g. fast-moving consumer products
Innovative	high uncertainty, low complexity	• Scientific or technological competencies are critical • Functional structure typical, e.g. pharmaceuticals.
Networked	low uncertainty, high complexity	• Project management competencies are critical • Professional structures typical, e.g. construction
Complex	high uncertainty, high complexity	• A range of competencies, including flexibility and adaption and learning • e.g. application of software to complex systems

Table 3 – Environmental contingencies and innovation management. [16]

Life cycles of products are becoming shorter. At the same time, more advanced and diverse technological knowledge is needed to develop new products. Therefore organisations have to be able to evaluate, develop and commercialise new technologies faster in order to be competitive.[17] The differentiated dimension requests a high speed of development and a high degree of novelty with regard to the competitors. The complex dimension requests a high flexibility in adapting to new technologies.

A key issue in the NPD process for organisations is to develop horizontal structures and multifunctional teams. According to Langerak *et al*. (1997), in addition to the internal cooperation among departments, the collaboration with other companies and institutes is central to success.[18] These external parties bring in knowledge, assets, customers, and funds to speed up and improve the quality of the NPD process. One of the advantages is a heightened sensitivity toward changing market conditions.

1.4.1 Supplier involvement (organisations-oriented) influenced by type of product and environmental contingencies (economics-oriented).

This thesis uses the definition of supplier involvement by Van Echtelt (2008): *"Supplier involvement refers to the resources (capabilities, investments, information, knowledge, ideas) that suppliers provide, the tasks they carry out and the responsibilities they assume regarding the development of a part, process or service for the benefit of a buyer's current or future product development projects."*[19] Suppliers are a source of innovative ideas and

[16] See Tidd (2001), p. 176.
[17] See Langerak *et al*. (1997), p. 282.
[18] See Langerak *et al*. (1997), p. 282.
[19] See Van Echtelt (2008), p. 182.

critical technologies.[20] According to Essig and Amann (2009) it does not matter when the supplier becomes involved, but rather relates to the supplier's concept of ideal involvement.[21]

Table 3 depicts different environmental contingencies (context) that require different structures and procedures (process). Each dimension requires a different form of innovation management and is influenced by the type of product. In the product portfolio matrix of Kraljic (1983) the environmental contingencies are combined with supplier involvement of Figure 1. Caniëls and Gelderman (2009) use the matrix and provide one recommendation for each different type of part a supplier delivers to the buying organisation, based on the profit impact and the supply risk. These recommendations are:

- Form partnerships for strategic products;
- Assure supply for bottleneck products;
- Exploit power for leverage products and ensure efficient processing for non-critical products.[22]

The interdependency of buyers and suppliers is a source of power.[23] Different levels of dependencies between suppliers and buying organisations result in different collaboration goals affecting supplier involvement.

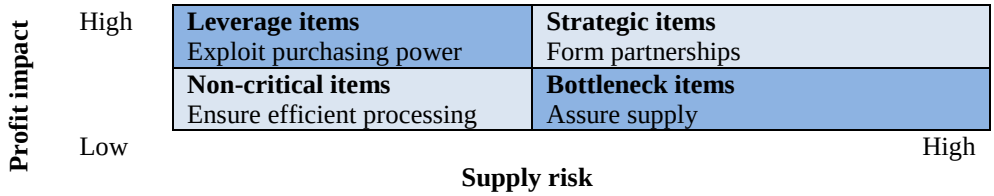

Figure 1 – Purchasing portfolio model (Kraljic, 1983).

Langerak *et al*. (1997) state that the design of an effective NPD process of an organisation depends on the characteristics of the competitive environment (context).[24] Evolutionary models of NPD recommend that organisations have to advance to the highest level of innovation. This includes the highest possible degree of internal and external collaboration.

[20] See Van Echtelt (2008), p. 181.
[21] See Essig (2009), p. 105.
[22] See Caniëls/Gelderman (2005), p. 141.
[23] See Caniëls/Gelderman (2005), p. 144.
[24] See Langerak *et al*. (1997), p. 287.

1.4.2 Alliances: The reason buying organisations collaborate with external parties (organisational-oriented).

Das (1998) defines strategic alliances as voluntary arrangements between organisations.[25] It involves exchange, sharing, or co-development of products, technologies, or services. Alliances are used for a variety of motives and goals and can take different forms. Alliances are formed in order for two organisations to gain from the collaboration by utilising their respective resources, such as expert knowledge and financial assets.[26] Typically, large organisations will develop alliances with several entrepreneurial organisations.[27] Large organisations use these alliances to manage the technological uncertainty they face in their competitive environment. The alliance between the system integrator and the buying organisation is specifically aimed at the commercialisation stage. System integrators are inter-organisational cooperative arrangements whose goal it is to achieve strategic objectives of the partners.[28] A system integrator does not own or takes part in the NPD process. They select optimal elements regarding price and performance, package them together, manage the bundles, and offer them to the customer.[29] The system integrator offers specific expertise regarding the market. The system integrator's expertise is required to commercialise the new product. To market the new product, however, the system integrator needs information on the product from the buying firm. Therefore, the system integrator and the buying organisation have to collaborate.[30] Thus, the relation between system integrator and alliance is seen as a buyer-supplier relationship as well. They are not required to deliver parts but in this case to market the products.

1.5 Research objectives: The benefits of the results.

According to Schiele (2011) "Customer satisfaction has been recognised as a relevant concept of business success. Despite its apparent significance, supplier satisfaction has been widely neglected and remained largely unexplored." [31] The importance becomes clear from the statement of Essig and Amann (2009) *"Industrial customers must be aware of the status of their supplier's satisfaction (…) an unsatisfied supplier may produce poor quality output that lowers the quality of a buyer's products and thus influences the buyer's sales*

[25] See Das/Teng (1998), p. 491.
[26] See Alvarez/Barney (2001), p. 139.
[27] See Alvarez/Barney (2001), p. 139.
[28] See Das/Teng (1998), p. 491.
[29] See Noam (2002), p. 287 - 288.
[30] See Noam (2002), p. 287 - 288.
[31] See Schiele (2011), p. 11.

volumes and profitability." [32] As summed up by Schiele (2011), the findings in the literature confirm the importance of supplier satisfaction.[33] However, there is no research executed on collaboration tools which lead to supplier satisfaction.

Brown and Eisenhardt (1995) combined empirical literature of both economic-oriented and organisational-oriented streams and indicated that preferably suppliers should be integrated in the product development process by using supplier-driven innovation. Supplier satisfaction can lead to a preferred customer status which is the ultimate status a purchasing organisation can receive in a buyer-supplier relation. Preferred customer status is reached when the supplier offers the buyer preferential resource allocation.[34] This thesis is an elaboration of the research of Schiele (2011) by focussing on the collaboration tools directing towards supplier satisfaction. It also has managerial implications for the application of collaboration tools which support supplier satisfaction.

1.6 Problem definition: The need for collaboration tools in a buyer-supplier relation on innovation.

Summing up, internal R&D is no longer the valuable strategic asset it used to be because of the fundamental shift in the way companies create new products, as indicated before.[35] The changes in the *context* of organisations generate a need for collaboration with external parties like suppliers. A good relationship with suppliers is necessary because of the fast moving innovation done by small and midsize entrepreneurial companies.[36] Because of collaboration with suppliers, the innovation *process* of organisations needs to change as well. Collaboration creates opportunities for gaining wider access to knowledge. Structuring the process of working together can be done by using collaboration tools. The problem, however, is the lack of knowledge on collaboration tools and the innovation power that can be gained from these tools.[37] Collaboration tools need to support supplier satisfaction, because an unsatisfied supplier may produce low quality output which lowers the quality of the organisation's products and thus influences the organisation's sales

[32] See Essig/Amann (2009), p. 104.
[33] See Schiele (2011), p. 12.
[34] See Schiele *et al*. (2011), p. 7.
[35] See Chesbrough (2004), p. 23.
[36] See Huston/Sakkab (2006), p. 2.
[37] See Schiele (2010), p. 144.

volumes and profitability.[38] A collaborative setting alone does not suffice to increase innovation with suppliers. The satisfaction of suppliers is required as well. Therefore the research question of this thesis is:

'Which tools are used by organisations for collaboration with suppliers in new product development processes, why are these tools used and do these stimulate supplier satisfaction?'

To answer this research question the economic-oriented and organisations-oriented literature is used. External collaboration is mostly described in economic-oriented literature and collaboration tools are mainly described in organisations-oriented literature. This research combines both and therefore adds new insights to the body of knowledge.

1.6.1 Sub-questions: Questions about the variables to answer the research question.

This research focuses on the collaboration tools used in the NPD process. The NPD process of an organisation is about developing new products or product improvement. The development process as a whole contains different phases in which different departments are involved. Suppliers are part of the whole process. For this thesis the goal of collaboration used by organisations is derived from the literature. As depicted in Figure 2, this thesis examines whether the collaboration goal influences the collaboration tools used by the buying organisation. Different internal departments are involved in the NPD process. The departments involved collaborate on NPD. Each department has their own input and interests. Furthermore, the thesis examines whether the involved department influence the collaboration tools used. When the collaboration tools used in the NPD process have been presented, the supplier satisfaction will be examined. First, the supplier satisfaction will be described by examining the literature. This literature research gives an overview of the aspects that lead towards supplier satisfaction. Then an analysis of the influence of collaboration tools on supplier satisfaction is made. Subsequently, this thesis investigates whether buying organisations use supplier satisfaction as a goal to select collaboration tools. This is also examined the other way around: whether supplier satisfaction has an influence on collaboration tools which are used by buying organisations. In this thesis a buying organisation is the organisation that buys parts from

[38] See Essig/Amann (2009), p. 104.

other organisations, the suppliers. Out of the research design depicted in Figure 2 the following sub-questions are formulated:

1.	At what stage of the NPD process is the supplier involved?
2.	What is the buying organisations collaboration goal with regard to the supplier in the NPD process?
3.	Which departments of the buying organisation are involved in the collaboration with suppliers?
4.	Which collaboration tools are used by the buying organisations in the NPD process?
5.	Is there a relationship between the collaboration goal and collaboration tools?
6.	Is there a relationship between the department involved in the NPD process and the collaboration tools?
7.	Which collaboration tools affect supplier satisfaction?
8.	Is supplier satisfaction an objective for selecting collaboration tools?

This thesis follows the research design as is depicted in Figure 2:

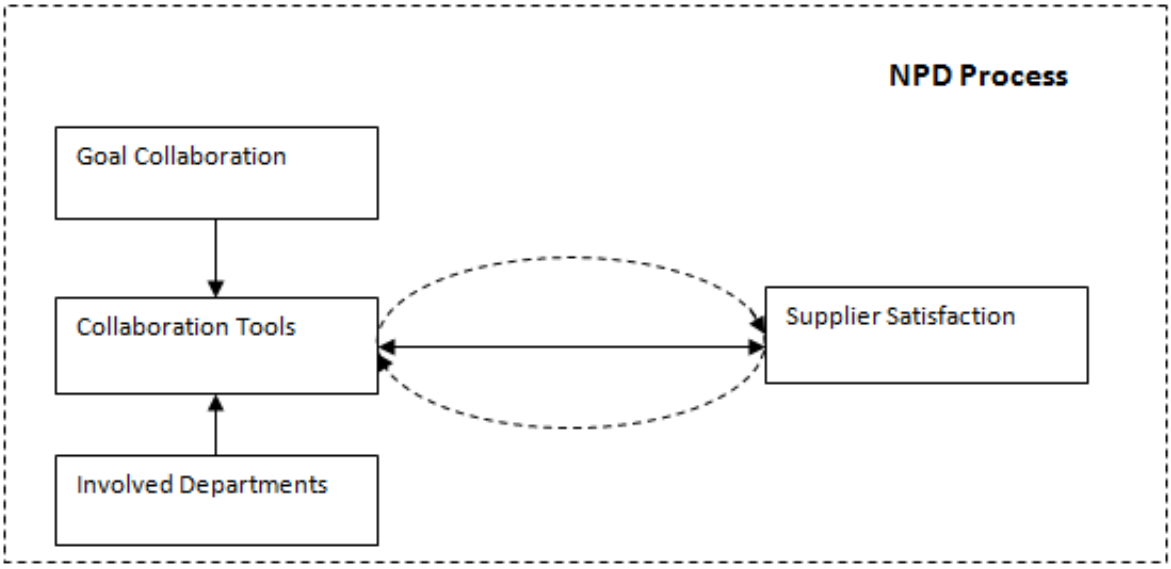

Figure 2 – Research Design.

1.6.2 Research outline: What to expect from each chapter.

So far the gap between organisations-oriented (process) and economic-oriented (context) literature is identified. Also the scope for this thesis is given which defined the area of research. Next, the goal of the research project is formulated. This research goal is converted into a research question. To answer the research question sub-questions are formulated. The answers to these questions provide knowledge that contributes to fill the gap between organisations-oriented and economic-oriented literature. Organisations are known with the term “open innovation”, but struggle with the collaboration aspect within the NPD process. This thesis builds upon four main variables within the NPD process. In the next chapter these variables - collaboration goal, involved departments, collaboration tools, and supplier satisfaction - are explained from a literature perspective. In this chapter

also a toolkit is given. This toolkit is also used as a managerial implication. Chapter three is on the methodology for conducting an explorative case study research and measuring variables. In chapter four the results of the case studies are presented. Chapter five outlines the comparison of the theoretical framework and the case studies. Chapter six provides the conclusions of this thesis and the managerial implications. The final chapter outlines the limitations of this thesis and suggests elements for further research.

2. Theoretical framework: The basis for exploring collaboration tools leading towards supplier satisfaction.

This chapter is the literature framework for this thesis. The definition of collaboration of Cagliano *et al*. (2002) is given in the introduction of this thesis. The definition of Cagliano *et al*. (2002) is suitable for this research because collaboration referred to as partnership has been pointed out as the most suitable form of relationship with those companies that supply strategic parts.[39] The main advantages obtained from collaboration are related to costs savings, increased responsiveness to the changing external environment, quality and novelty of products and higher flexibility.[40] Also, the NPD process is described in the introduction. First, the collaboration goals will be described, followed by the involved departments. Then the definition of tools is given. This is combined with the definition of collaboration to the definition of collaboration tools. Next, the toolkit is introduced. Then the supplier satisfaction and their variables are given. This results in the theoretical configuration in the final paragraph.

2.1 Collaboration goal: Reasons for collaborating with suppliers in the NPD stages.

Depending on the actions, there are different collaboration goals and departments involved. The differences in collaboration goals and involved departments within the NPD process could influence collaboration tools. The most significant improvements can be achieved in the NPD stage before the go/no-go decision of the manager.[41] From a research perspective there is a need to direct research on NPD towards an organisational- and a supplier-focused perspective.[42] As stated by Schiele (2010), the purchasing organisation's need to design a sustainable internal organisational structure that supports cross-functional and internal-organisational development process.[43] A good relationship with suppliers is necessary because of the fast moving innovation done by small and midsize entrepreneurial companies.[44] Collaboration is the key to improve the NPD process, but before that can be included the aspects of collaboration need to be explained.

[39] See Cagliano *et al*. (2002), p. 3 and Caniëls/Gelderman (2005), p. 144.
[40] See Caniëls/Gelderman (2005), p. 144.
[41] See Khurana/Rosenthal (1997), p. 106.
[42] See Schiele (2006), p. 2.
[43] See Schiele (2010), p. 139.
[44] See Huston/Sakkab (2006), p. 2.

2.1.1 Increased responsiveness and higher flexibility: Co-creation on idea finding in the early stages of the NPD process.

Innovation for buying organisations is necessary in order for them to gain a strong market position.[45] Organisations invest in research and development (R&D) so that they can become innovative.[46] However, investments in R&D alone do not make an organisation innovative and successful. Innovation depends on internal and external factors within the innovation process, such as integration of new knowledge.[47] In modern innovation literature it is stated that a network innovation approach, co-creation with suppliers is the most suitable for today's emerging markets.[48] Resources are becoming scarce, especially knowledge and technology that are needed in a complex market. Suppliers (mainly small entrepreneurial organisations) have the knowledge, the technology and the ability to flexibly adapt to the emerging markets.[49] Therefore, large organisations need to cooperate with suppliers to gain information concerning the fast moving environment and to create strategic advantages. To increase the responsiveness of the supplier it is necessary to involve the supplier in an early stage of NPD.[50] The first stage of the NPD process is 'idea finding' (Table 2).[51] In innovative settings suppliers are essential for human and capital resources.[52] Early supplier involvement in the 'idea finding' stage increases the responsiveness of the supplier in the NPD process.[53] Small and midsize entrepreneurial companies are more flexible in adapting to fast moving innovation.[54]

2.1.2 Cost savings: Creating a dialogue to gain the support of the supplier to think about effective and cheaper solutions.

Schiele (2010) states that involving the supplier can increase the generation of ideas, improve technical concepts of a product by limiting its complexity and decrease the danger of over-engineering.[55] These steps all reduce costs and match the first three stages of the

[45] See Drucker (1998), p. 3, Tidd (2001), p. 173, Wheelwright (1992), p. 2 and Fredberg *et al*. (2008), p. 5.
[46] See Thamhain (2003), p. 279 and Cassinman *et al*. (2009), p. 216.
[47] See Huchzemeier/Loch (2001), p. 85, Pich *et al*. (2002), p.1009, O'Connor *et al*. (2008), p. 5, Thamhain (2003), p. 303 and Cassinman *et al*. (2009), p. 217.
[48] See Trott/Hartmann (2009), p. 269, Tidd (2001), p. 179 and Faems *et al*. (2005), p. 238.
[49] See Alvarez/Barney (2001), p.139.
[50] See Schiele (2006), p. 2.
[51] See Roozenburg/Eekels (1995), p. 346.
[52] See Schiele *et al*. (2011), p. 3.
[53] See Schiele (2006), p. 2.
[54] See Huston/Sakkab (2006), p. 2.
[55] See Schiele (2010), p. 139.

NPD process, except for the last stage 'commercialisation' (Table 2).[56] Schiele (2010) and other authors do not mention supplier involvement in the commercialisation stage of the NPD process. Collaborating with suppliers creates the advantage of gaining access to new technologies and markets, reducing the time to market, attaining economies of scale and scope, and diffusing the financial risks of investments in new product development.[57] These advantages all lead to cost savings. These advantages are the reason for buying organisations to collaborate with suppliers.[58] The overall goal of for-profit organisations is to generate profit. Although profit in this thesis is not mentioned specifically as a collaboration goal, cost savings are directly related to profit.

2.1.3 Quality and novelty of products: Access to the best resources of the supplier to create high quality and novel products.

Buying organisations can benefit from collaboration with suppliers by gaining access to their source of new technology. As stated by Essig and Amann (2009) *"Industrial customers must be aware of the status of their supplier's satisfaction (…) an unsatisfied supplier may produce poor quality output that lowers the quality of a buyer's products and thus influences the buyer's sales volumes and profitability."*[59] Essig and Amann (2009) use the concept for supplier satisfaction in their statement, which will be explained later in this thesis. In this context the focus is on a good relationship with the supplier because this relationship influences the NPD process regarding the quality of the products for the buying organisation. Schiele (2010) states that benefits of supplier involvement are higher quality, improved design and more innovation.[60] These benefits Schiele (2010) and Essig and Amann (2009) refer to match the second stage of the NPD process to 'generate technical concepts' (Table 2).[61] Primo & Amundson (2002) indicate that suppliers influence the manufacturability of new products.[62] This includes faster development time, better reliability and better overall product quality. This matches the third stage of the NPD process; 'technical and economical evaluation'.

[56] See Roozenburg/Eekels (1995), p. 346.
[57] See Langerak *et al*. (1997), p. 283.
[58] See Caniëls/Gelderman (2005), p. 144.
[59] See Essig/Amann (2009), p. 104.
[60] See Schiele (2010), p. 139.
[61] See Roozenburg/Eekels (1995), p. 346.
[62] See Primo/Amundson (2002), p.34.

2.2 Involved departments: Departments of the organisation and the contact with suppliers in the NPD process.

Manufacturing organisations are mainly divided in four departments:

- Research and development (R&D);
- Manufacturing;
- Marketing;
- Procurement.[63]

Each department has their own specific function.[64] Schiele (2010) points out that there are many reports of suppliers' incompetence and even project obstruction when unsuitable suppliers are selected. Therefore Schiele (2006) states that internal co-operation is required for external co-operation.[65] Schiele (2010) notes the need to design a sustainable internal organisational structure that supports cross-functional and inter-organisational development processes.[66] Keeping that in mind, Langerak et al. (1997) state the following: "*The integrated approach to innovation does not only include the internal functions such as R&D, production, and marketing, but can include suppliers and lead users in the new product development process."* The design of a NPD process has to fit the characteristics of the competitive environment of the organisation. According to Langerak *et al*. (1997) many organisations are organising their NPD process to improve the collaboration with parties in the environment. This enables the organisations to interact with suppliers, customers, and competitors in all phases of the new development process.[67] However, the literature does not provide a clear view of which of the departments is involved in the collaboration with suppliers in the different stages of NPD.[68]

2.3 Definition tools: General definition of tools translated into components that fit innovation.

Scientific papers about the definition of tools are scarce in innovation literature. In innovation literature, tools are mainly described as criteria for innovative collaborations and fail to provide a definition. Therefore a definition from information and software technology is used in this thesis. Brinkkemper (1996) gives the following definition: *"A*

[63] See Song *et al*. (1998), p. 292.
[64] See Song *et al*. (1998), p. 292.
[65] See Schiele (2006), p. 2.
[66] See Schiele (2010), p. 139.
[67] See Langerak *et al*. (1997), p. 283.
[68] See Appendix I.

tool is a possibly automated means to support a part of a development process.''[69] The definition of Brinkkemper (1996) can be divided into the following components:

– Possibly automated means;

– Support and part of a development process.

In Table 4 the components of the definition of tools of Brinkkemper (1996) are translated into components that fit innovation.

Component	Translation towards innovation
Means	A process or system designed or used for a specified purpose.
Automated	Technology used to collaborate whereby technology is defined as a manner like processes, methods or knowledge.
Support	Serve as a foundation or to maintain at a desired level.
Part of a development process	The NPD process.

Table 4 – Components translated towards collaboration tools for innovation.

2.3.1 Collaboration tools: Combining definitions of collaboration and tools.

The definition of collaboration and tools is provided in the latter paragraph. The IT-related definition is adjusted to a more suitable definition for this research. Creating such a definition is needed because the innovation literature does not mention a definition of collaboration tools. Therefore the definition of collaboration in paragraph 2.3.1 of Cagliano *et al*. (2002) and the definition of tools in paragraph 2.5 of Brinkkemper (1996) are combined. The following definition of collaboration tools is created and will be used in this thesis. Collaboration tools: '*A process or system designed or used for the purpose to closely co-operate with customers and suppliers to maximise the benefits of the business they are involved in. This process or system serves as a foundation or serves to maintain a certain level of NPD.*' With this newly created definition of collaboration tools, different papers concerning, for example, the areas of collaboration and innovation, are analysed.[70] The objective is to find collaboration tools which are not explicitly named as such by the authors. The different papers in combination with the definition of collaboration tools resulted in the list of Table 5. This list of tools gives an overview of collaboration tools. This list is created to identify collaboration tools used by the organisations in the interviews. The list of tools is not comprehensive, because of the broad definition of tools and collaboration.

[69] See Brinkkemper (1996), p. 276.
[70] See Appendix I.

Name tool	Author
Architecture of firms (characteristics)	Kay (1993) and Tidd (2001)
Brainstorm sessions	Shneiderman *et al*. (2006)
Co-design	Chelsom (1998)
Encouragement of performance through disciplinary arrangements	Kay (1993)
Engineered network	Doz *et al*. (2000) and Tidd (2001)
E-procurment tools	Carr/Smeltzer (2002) and Harink (2003)
Evaluation team (storage and tracking of metrice data)	Kahn *et al*. (2006)
Fifth generation	Rothwell (1992) and Tidd (2001)
Formal process NPD	Kahn *et al*. (2006)
Increasing trust	Bidault/Fischer (1994) and Tidd (2001)
Integrated logistics	Chelsom (1998)
Inter-organisational information systems (IOS)	Van Beek (2009)
Interpersonal relationships	Tidd (2001) and Fiol (1996)
Key performance indicators (KPI's)	Gunasekaran/McGaughey (2004)
Lectures	Shneiderman (2006)
Market research techniques • Concept testing • Product testing • Market testing • Pilots • Cross-functional teams	Griffin (1997) and Kahn *et al*. (2006)
Mutual knowledge	Bidault/Fischer (1994) and Tidd (2001)
Portfolio management	Kahn *et al*. (2006)
Primary source innovation supplier dominated	Patvitt (1991) and Tidd (2001)
Programs for updating or modification projects	Kahn *et al*. (2006)
Questionnaires	Van Beek (2009)
Reducing transaction costs	Bidault/Fischer (1994) and Tidd (2001)
Repeating deals	Bidault/Fischer (1994) and Tidd (2001)
Shared responsibility	Chelsom (1998)
Simultaneous engineering	Chelsom (1998)
Social bonds	Bidault/Fischer (1994) and Tidd (2001)
Social CRM	Van Beek (2009)
Sociological perspectives • Close supervision • Task discretion • Impersonal rules	Kay (1993)
Sources of power	Bidault/Fischer (1994) and Tidd (2001)
Synchronized flows	Chelsom (1998)
Training to manifest and sustain NPD awareness	Kahn *et al*. (2006)
Workshops	Shneiderman *et al*. (2006)

Table 5 – List of collaboration tools.

An example of a collaboration tool is the brainstorm session. Brainstorming is useful for generating higher user engagement and is mainly the first step in enabling more people to be creative.[71] The creativity in the session leads to generating ideas. Another example is the Fifth Generation (open innovation paradigm). This is based on the need for companies to open up their innovation process. The idea is that in order to create business value, companies have to combine internal and external developed technologies.[72] Key Performance Indicators (KPI's) are measurement tools used in collaborations to reduce uncertainty and to enhance control of supply channels.[73] With KPI's it is possible to measure the performance of suppliers. Another example is portfolio management. According to Kahn *et al*. (2006) portfolio management is "(…) *the screening out of product concepts to identify the preferable product concepts with which to proceed"*[74] Portfolio management can be used to control the NPD which influences the collaboration with suppliers. These tools focus on collaboration with suppliers and managing this relation. To use collaboration tools specifically to stimulate supplier satisfaction, however, is not mentioned.

2.3.2 Toolkit to support collaboration.

According to Foster and Kesselman (1997) a toolkit provides basic capabilities and interfaces.[75] The toolkit supports the collaboration in areas such as communication, information and resource location. These components define a metacomputing abstract machine, such as internet- and intranet systems, on which a range of alternative infrastructures, services, and applications can be constructed. According to Bessant and Caffyn (1997) a toolbox is a support package containing various resources to enable continuous improvement development.[76] A toolkit stimulates the collaboration and therefore influences the supplier satisfaction. The supplier satisfaction variables should be supported by the toolkit.

[71] See Schneiderman (2007), p. 5.
[72] See Chesbrough (2004), p. 23 and Rothwell (1992), p. 74.
[73] See Gunasekaran/McGaughey (2004), p. 334.
[74] See Kahn *et al*. (2006), p. 109.
[75] See Foster/Kesselman, 1997), pp. 115 – 116.
[76] See Bessant/Caffyn (1997), pp. 15

2.4 Supplier satisfaction: The value of satisfying suppliers and definition of supplier satisfaction.

As mentioned by Leonard-Barton (1992) a technical system is needed to structure the information flow, which is necessary for innovation. Beside a technical system, organisations can use stimulations. Stimulations like incentives or empowerment are the key to satisfy the employee or supplier which increases the idea generation for NPD. However, when these stimulations do not satisfy the supplier, they can also decrease innovation.[77] According to Schiele (2011) "*Customer satisfaction has been recognized as a relevant concept of business success. Despite its apparent significance, supplier satisfaction has been widely neglected and remained largely unexplored.*"[78] For this thesis the definition of Essig (2009) is used. *"Supplier satisfaction: a supplier's feeling of fairness with regard to buyer's incentives and supplier's contributions within an industrial buyer-seller relationship as relates to the supplier's need fulfilment, such as the possibility of increased earnings or the realisation of cross-selling."*[79]

2.5 Variables supporting supplier satisfaction and characteristics.

Table 6 entails an overview of a literature study on the most commonly used variables influencing supplier satisfaction. The literature study combined different scholars on different subjects. The search for these variables is based on papers about stimulation, idea generation and collaboration. Out of the literature study, core variables with sub-variables are formulated.

Variables	Characteristics
Technical competences (Leonard/Barton, 1992)	Technical knowhow (Essig, 2009) Technical core competences (Leonard/Barton, 1992)
Communication (Maunu, 2003)	Competences (Leonard/Barton, 1992) Conflict management (Claycomb, 2004) Communication media (Claycomb, 2004)
Business processes (Leonard/Barton, 1992)	Type relation (Essig, 2009) Contract (Essig, 2009) Payment/incentives (Leonard/Barton, 1992) Interaction/integration (IBM report, 2008)
Trust (Maunu, 2003) (Kingshott, 2004)	Power equity (Essig, 2009) Value creation (Leonard/Barton, 1992) Long-term relation (Song *et al*., 1998) Relation with other companies (Claycomb, 2004)
Cooperation (Claycomb, 2004)	Integration R&D manufacturer (Brown/Eisenhardt, 1995) Expectations suppliers (Leonard/Barton, 1992) Intensity of relation (Leonard/Barton, 1992)(Claycomb, 2004)

[77] See Leonard-Barton (1992), p. 119-121.
[78] See Schiele (2011), p. 12.
[79] See Essig (2009), p. 104.

Idea generation (Shneiderman, 2007)

Table 6 – Variables and characteristics supporting supplier satisfaction.

Technical competences

The technical competences of an organisation are connected to the core business of an organisation. Technical competences are embodied in technical systems and skills which trace back to the first products made by the organisation.[80] As stated by Leonard-Barton (1992), "*A core capability is an interrelated interdependent knowledge system.*" Once an organisation is known for a certain expertise it also attracts engineers with knowledge (or interest in this type of knowledge.) This is the case for large organisations. Small entrepreneurial organisations attract engineers or scientists by compensating them with wealth if a new technology successfully is introduced.[81] And from there Alvarez and Barney (2001) conclude that: "*Inventive capabilities – and the promise of the valuable new technologies they hold – often attract large organisations to alliances with entrepreneurial firms.*" Essig (2009) adds to this that organisations more and more use contract goods for which they use self-committed suppliers with a substantial amount of know-how.

Communication

Communication can be divided in internal and external communication. Internal communication for NPD is the internal communication in an organisation between the different departments involved in the process. The interaction between the different departments is needed to gain access to resources like information or financial assets. A potential problem with internal communication is the idiosyncratic language of the different units.[82] For example, the department of technical support will use more technical words which are not known by members of the marketing department.[83] The differences in levels of knowledge can lead to a closed attitude from one of the departments and will blur the cooperation.[84] The level of understanding can be increased by the frequency of communication between the different departments.[85] From the open innovation perspective the same understanding is pursued with the suppliers, although external communication focuses on information and supplies. "*Cooperative relationships seek to establish open lines of communication, nurture and sustain longer relationships between trading partners,*

[80] See Leonard-Barton (1992), p. 114.
[81] See Alvarez/Barney (2001), p. 140.
[82] See Moeneart *et al*. (2000), p.365.
[83] See Leonard-Barton (1992), p. 351.
[84] See Leonard-Barton (1992), p. 351.
[85] See Brown/Eisenhardt (1995), p. 354.

and development mechanisms to resolve conflicts to mutual benefits for both."[86] Intensive communication can develop a close relation, which increases the innovation power. But when this relation becomes too close, it can make people blind for innovation.

Business process

In older-style organisations most value is created in-house, whereas newer-style organisations also get 'great ideas' from outside the organisation.[87] Supplier satisfaction can improve the development of business relationships.[88] Therefore supplier policies should be considered in the business process of the organisation. A difference can be made in the type of supplier (see paragraph 2.2.1).[89] Examples of supplier policies linked with supplier satisfaction are the contracts with the suppliers (Essig, 2009) and payment and incentives (Leonard/Barton, 1992). Also KPI's between supplier and customer can be used to set mutual targets to improve the NPD process.[90] "*This helps build customer and supplier relationships and establishes targets that best meet the needs of both parties*."[91]

Trust

Trust is defined by Nooteboom (1997): *"The broad definition of trust is the expectation based on all sources of collaboration, including coercion and self-interest. The narrow definition is only based on the selfish sources. In the narrow definition trust means that you expect that someone will not behave opportunistically, even though he has an interest and opportunity to do so."*[92] This thesis uses the broad definition of trust, because in this thesis all collaboration tools are considered. Both self-interest and fear of coercion can be a factor in the relationship between the buying organisation and supplier. To enable the collaboration in the NPD process with suppliers it is important to create trust. There should be the possibility for suppliers to give their ideas without the fear of rejection or rip-off.[93] Successful relationships exhibit effective communication; high level of communication quality, information sharing; joint planning and goal set.[94] The relationships with suppliers can be stabilised by investments made by both parties in specific assets. These investments

[86] See Claycomb (2004), p. 20.
[87] See IBM report (2008), p. 10.
[88] See Essig (2009), p.108.
[89] See Van Echtelt (2008), p. 181.
[90] See Maunu (2003), p. 37.
[91] See Maunu (2003), p. 37.
[92] See Nooteboom (1997), p. 10.
[93] See Shneiderman (2007), p. 5.
[94] See Claycomb (2004), p. 21 and Fischer (2005), p. 4.

are mutual safeguards against opportunism.[95] Celly, Spekman and Kamauff (1999) use the metaphor 'prisoners' dilemma', because of the uncertainty that suppliers have to deal with.[96] Many suppliers invest in their relationship by making relationship-specific investments to show their commitment and good intentions, even without having the assurance of the buyer. As stated by Schiele (2011) investments are mainly done by suppliers, they have to bow to authority and financial risk.[97] The supplier is more willing to invest in relationships when there is a history of positive collaboration with the organisation and a benefit for both.[98] These investments done by suppliers can lead to cost savings for the buying organisation. Therefore, mutual trust is one of the pillars for their partnership.[99]

Cooperation

Collaboration increases when both parties benefit from the cooperation and therefore share information.[100] The mutual benefit for both parties in sharing information is influenced by different factors. One of these factors from the suppliers' side is the size of the organisation. Large organisations have formal mechanisms to facilitate greater information exchange and have established better information sources.[101] Beside the facilities for information sharing, the financial resources of a large organisation are also beneficial for a small organisation. Small entrepreneurial organisations are more flexible to respond to the emerging markets, but have less financial resources to commercialise new products.[102] Expectation management is about what each party involved in the NPD process expects from each other. Expectations are based on the type of relation with the supplier. The collaboration is mainly driven by perception of opportunity, and in a later phase this perception changes into the trustee-like stance.[103]

2.6 Supplier satisfaction variables translated in collaboration tools for the toolkit.

The supplier satisfaction variables are translated in tools which are mentioned by the interviewees. The selection of these tools is explained in chapter 3. For each supplier

[95] See Celly/Spekman/Kamauff (1999), p. 298.
[96] See Celly/Spekman/Kamauff (1999), p. 299.
[97] See Schiele (2011), p. 6.
[98] See Cagliano *et al*. (2002), p. 3 and Caniëls/Gelderman (2005), p. 144.
[99] See Cagliano *et al*. (2002), p. 4.
[100] See Celly/Spekman/Kamauff (1999), p. 310.
[101] See Claycomb (2004), p. 19.
[102] See Alvarez/Barney (2001), p. 143.
[103] See Saleh/Wang (1993), p. 14.

satisfaction variable the most mentioned tool is identified for the toolkit which supports the collaboration. In this section these tools are explained by the literature on an alphabetical order.

Approved vendor list

An approved vendor list is when an organisation defines the relation with its most important suppliers.[104] An approved vendor list helps organisations to:

- Reduce industrial buying risks;
- Keep suppliers from bothering other departments of the organisation;
- Allow negotiation for a better price;
- Development of long-term buyer-supplier relation.[105]

This creates a network based on long term, trust-based alliances. It provides flexibility and enables organisations to learn from each other. According to Bonaccorsi (2002) this leads to technological and managerial innovation. The learning process works better when the organisational environment promotes it. Jackson (1986) states that suppliers are judged on their performance and financial stability.[106] Specific communication channels are used by the suppliers to market themselves. To be on an approved vendors list leads to opportunities instead of the approved vendor list to be a barrier.

Communication structure

A communication structure is constructed as a social network. It is a pattern of friendship, advice, communication or support which exists among the members of a social system.[107] Communication structures are applied to be effective in codifying knowledge and to locate relevant receivers who must be receptive to the information.[108] It is also efficient to minimise costs of communication and avoidance of information leaks by involving suppliers in an early stage. A drawback of the communication structure is that when an organisation 'joins' the structure later in time compared to the others, it is more difficult to use the external sources in the communication structure.[109] Furthermore, it depends on the

[104] See Bonaccorsi (2002), pp. 144.
[105] See Roy (2003), pp. 605.
[106] See Jackson (1986), pp. 169.
[107] See Valente (1996), pp. 70.
[108] See Moeneart (2000), pp. 374.
[109] See Valente (1996), pp. 74.

individuals, social and personal characteristics, whether they can adapt to and use the communication structure.[110]

Contracts

Blomqvist (2004) defines a contract as follows: *"(...) 'Contract' refers to a formal, written contract between two or more competent parties, which creates obligations, whereby one party becomes bound to another to do or omit to do certain acts that are the subject of that contract. (...) Contracting binds the parties to carry out the actions needed to achieve the mutual goals, and enables joint rules for the collaboration to be established. Thus contracts help in creating and maintaining a long-term relationship between the parties*".[111] Organisations, according to Blomqvist (2004), should choose which issues are to be codified in a contract and what may be based on trust.[112] Communication and inter-personal contact are the pillars for successful collaboration. Contracts should enhance trust and not harm it. When high levels of trust exist, there is no need for a contract.[113]

Incentives

An incentive is something that incites or has a tendency to determination or action. Chao (2009) distinguishes between explicit incentives, such as financial compensation, and implicit incentives, such as career concerns.[114] Manufacturers may actively encourage the development efforts by using incentives.[115] An incentive a buying organisation can apply, is that they do not specify the technology to be used but allow suppliers to explore several technical alternatives to achieve goals. Moreover, incentives can lead to decision making which is optimal for the overall NPD process and to "*revealing truthful private information*".[116] Incentives have the largest effects when the performed tasks involve judgement, problem-solving and decision making.[117] Chao (2009) indicates that the use of variable funding creates greater incentives to invest more in existing product development and in new product development.[118] However, the side-effect can be that variable funding induces more focus on existing product improvement than in new product development.

[110] See Valente (1996), pp. 74.
[111] See Blomqvist (2004), pp. 498.
[112] See Blomqvist, (2004), pp. 501.
[113] See Neu (1991), pp. 247.
[114] See Chao et al. (2009), pp. 1557.
[115] See Bonaccorsi (2002), pp. 139.
[116] See Simatupang (2003), pp. 19.
[117] See Camerer (1999), pp. 34.
[118] See Chao et al. (2009), pp. 1565.

Chao (2009): "*The greater focus on existing product development leads to an incremental balance in the NPD portfolio and puts the firm at risk of underperforming in the long run.*"[119]

Key Performance Indicators

Key Performance Indicators (KPI's) are measurement tools used in collaborations to reduce uncertainty and to enhance control of supply channels.[120] When components are complex and no technical freedom is given, only a few suppliers might be able to meet the KPI's set by the buying organisation.[121] Therefore Bonaccorsi (2004) recommends trusting the suppliers from the start of the NPD process and by analysing the compatibility between suppliers' process capabilities and the levels of tolerances requested by the buying organisation. Gunasekaran (2004) also indicates that the system of KPI's should cover all the aspects of the NPD process.[122] Furthermore, not one party should dictate the KPI's, but all participants should be involved. A good KPI-program helps create a cross-functional and intra-organisational process planning and control where all the actors are committed to the common goal, such as enhanced competitiveness.[123] In this program care has to be taken as to not limit the decision making authority of the managers in the participating organisations, such as suppliers. To make sure collaborations will last in the future, the KPI's should be mutually advantageous.[124] Moreover, KPI's can be linked to incentives, as to motivate suppliers to act in a manner which is aligned with the strategic objectives of the buying organisation.[125]

One point of contact

To have successful collaboration information should be exchanged between organisations and interaction should be encouraged.[126] A single point of contact is used to access a wide range of specialist services. This point, or person, is acting as a channel and selection aid to the user for information. Neu (1991) states that intermediaries are the second institutional trust-creating mechanism: "*They provide exchange participants with a form of warranty or*

[119] See Chao et al. (2009), pp. 1565.
[120] See Gunasekaran/McGaughey (2004), pp. 334.
[121] See Bonaccorsi (2002), pp. 138.
[122] See Gunasekaran/McGaughey (2004), pp. 346.
[123] See Gunasekaran/McGaughey (2004), pp. 346.
[124] See Gunasekaran/McGaughey (2004), pp. 346.
[125] See Simatupang (2003), pp. 19.
[126] See Bessant (1995), pp. 99.

guarantee that a common set of rules is being followed and that exchange is possible even in the presence of moral hazard and information asymmetries."[127] However, it matters in which degree the one point of contact is seen as independent or credible actor.[128] When the one point of contact has a close relationship with certain other parties, the impartiality and ability to provide unbiased information can lead to distrust.

Portfolio

A portfolio is the screening out of product concepts to identify the preferable product concepts with which to proceed.[129] According to Core (2000) the innovator's search effort improves the prior information on the profitability of the new project and thus makes the decision on project adoption more reliable.[130] When a portfolio is used, it is easier to collaborate with the supplier because the suppliers can identify the process and the innovation areas in which to participate.[131] However, the effectiveness of the portfolio approach differs depending on the nature of the suppliers involved. Collaborations with different types of partners are more likely to lead to commercially successful innovation.[132]

Roadmap

Wheelright (1992) defines a roadmap as in instrument where the project types are indicated. Using the roadmap management can see where gaps exist in the strategy for innovation and make more informed decisions about what type of projects to add and when to add them: *"Well-planned and well-executed platform products typically offer fundamental improvements in cost, quality, and performance over preceding generations."*[133] Furthermore, in order to have successful outcomes it is needed to let the roadmap to be constructed by a cross-functional team and not by one department.[134] A roadmap is used by buying organisations to have detailed information on the new solution performance and on predictable consequences of the adoption of new technologies for the NPD process.[135] Bonaccorsi (2002) indicates that when a roadmap is known by the supplier in an early stage, it is easier for the supplier to apply new technologies serving the

[127] See Neu (1991), pp. 249.
[128] See Bessant (1995), pp. 102.
[129] See Kahn *et al*. (2006), p. 109.
[130] See Core (2000), pp. 2.
[131] See Faems *et al* (2005), pp. 248.
[132] See Faems *et al* (2005), pp. 248.
[133] See Wheelwright (1992), pp. 4.
[134] See Wheelwright (1992), pp. 5.
[135] See Bonaccorsi (2002), pp. 140.

NPD process of the buying organisation. However, a roadmap is about making choices and focus: projects have to be eliminated from the roadmap. A drawback is that most organisations have far too many projects at the same time and over-commit their development resources.[136] Then, according to Wheelwright (1992), there are not enough time and resources for the strategic mission of the NPD process.[137]

Workshops and events

A workshop is "*the practice of taking time out from day-to-day routines to deliberate on the longer-term direction of the organisation*."[138] Neu states (1991) that involving suppliers in workshops and events are used to create and signal trust.[139] Moreover, workshops lead to suppliers to conform themselves to social or constitutive expectations. According to Hodgkinson (2006) for these workshops to be effective, they should be linked to the organisation's informal discourse, everyday routines and wider decision-making processes.[140] However, apart from creating trust, it is difficult to state clear goals for a workshop and it is not clear whether the outcomes of a workshop could not have been concluded more clearly by another approach.[141]

2.7 Configuration: Conclusions of the literature combined.

The theoretical framework presented in this chapter is based on Figure 2 – Research Design (paragraph 1.2):

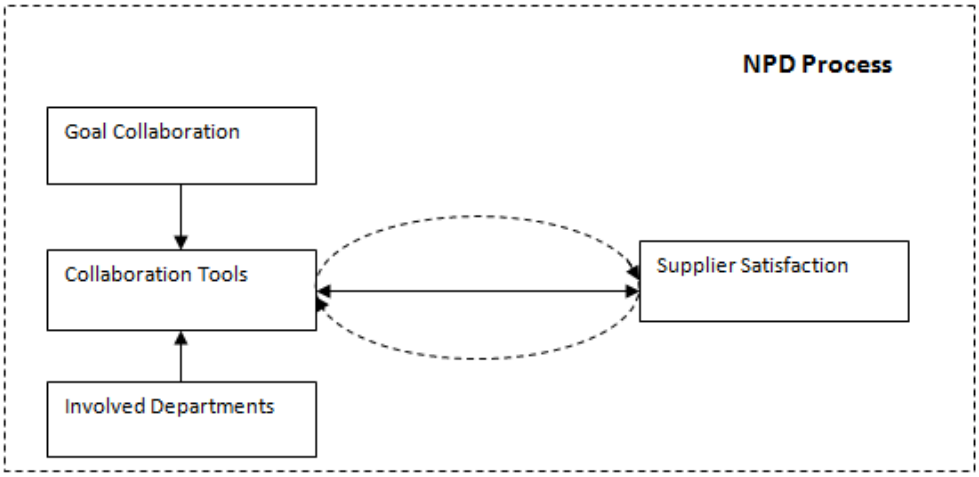

Figure 2 – Research Design.

[136] See Wheelwright (1992), pp. 3.
[137] See Wheelwright (1992), pp. 3-4.
[138] See Hodgkinson et al. (2006), pp. 479.
[139] See Neu (1991), pp. 248.
[140] See Hodgkinson *et al*. (2006), pp. 491.
[141] See Hodgkinson *et al*. (2006), pp. 491.

The NPD process, the goal of collaboration and the involved departments in the NPD process are addressed by the literature. The definition of collaboration tools is not addressed by the literature and constructed in this thesis. The literature also does not mention tools that influence supplier satisfaction. The variables that influence supplier satisfaction are known. All combined, this thesis sets out to find evidence for the influence of collaboration tools on supplier satisfaction.

Collaboration goals

Early supplier involvement in the 'idea finding' stage increases the responsiveness of the supplier in the NPD process (paragraph 2.3.2). Schiele (2010) states that involving the supplier can improve the creation of ideas and technical concepts of a product by limiting its complexity and decrease the danger of over-engineering as well. These steps all reduce costs and match the first three stages of the NPD process, except for the last stage 'commercialisation' (paragraph 2.3.3). Regarding the quality and novelty of products, the aspects Schiele (2010) and Essig and Amann (2009) refer to, match the second stage of the NPD process to 'generate technical concepts' (paragraph 2.3.4). Primo & Amundson (2002) indicate that suppliers influence the manufacturability of new products. This includes faster development time, better reliability and better overall product quality. This matches the third stage of the NPD process, 'technical and economical evaluation' (also paragraph 2.3.4). This results in Table 7:

NPD stage	Idea finding	Generate technical concepts	Technical and economical evaluation	Commerciali-sation
Collaboration goal	Cost savings	Cost savings	Cost savings	Revenue
	Increased responsiveness and higher flexibility	Quality and novelty of products	Quality and novelty of products	

Table 7 – Theoretical configuration of collaboration goals and involved departments in the NPD process.

Involved departments

All departments (procurement, R&D, manufacturing and marketing) can be involved in all the NPD stages through cross functional teams (paragraph 2.4). The design of a NPD process has to fit the characteristics of the competitive environment of the organisation. The literature does not provide a clear view of which departments are involved in the collaboration with suppliers in the different stages of the NPD process.

Collaboration tools

There is little knowledge to be found in the literature about collaboration tools in NPD. For this thesis a definition of collaboration tools is created (paragraph 2.6). Collaboration tools: "*A process or system designed or used for the purpose to closely co-operate with customers and suppliers to maximise the benefits of the business they are involved in. This process or system serves as a foundation or serves as to maintain a certain level of NPD.*" Table 5 entails a list of collaboration tools. Known is that the environment influences the internal and external collaboration (see paragraph 2.3). Depending on the environment, an organisation has different collaboration goals in the different stages of the NPD process. Collaboration tools are used to stimulate the supplier in the collaboration.

Supplier satisfaction variables

Although there is little knowledge about collaboration tools in the NPD, there is information about which variables influence supplier satisfaction. Regarding the tools in the toolkit a common denominator seems to be that the tools in the toolkit are related with trust and communication as a supplier satisfaction variable. This thesis uses the definition of Essig (2009): "*Supplier satisfaction: a supplier's feeling of fairness with regard to buyer's incentives and supplier's contributions within an industrial buyer-seller relationship as relates to the supplier's need fulfilment, such as the possibility of increased earnings or the realisation of cross-selling."*[142]From the literature the following supplier satisfaction variables (paragraph 2.7.1) are found:

- Technical competences;
- Communication;
- Business processes;
- Trust;
- Cooperation.

2.8 Configuration model: Literature overview to be analysed in practice.

The research design (Figure 2) is used to examine the literature. Figure 3 is the configuration of the literature framework of this thesis. Literature reflects that the environmental contingencies influence the whole NPD process. It determines which collaboration goal a buying organisation has. This is influenced by the NPD stage, even

[142] See Essig (2009), p. 104.

though it is not exactly clear whether the NPD stage has an influence on the collaboration goal. The collaboration goal influences which departments are involved and how and in which stage the supplier is involved. Literature indicates that all the departments are to be involved in all the stages of the NPD process. Also, even though the collaboration goal determines the involvement of the supplier, literature states that the supplier is to be involved in an early stage of the NPD process. This is because this leads to an increase of innovation. When the supplier is involved from an early stage of the NPD process, the supplier collaborates with all the departments of the buying organisation.

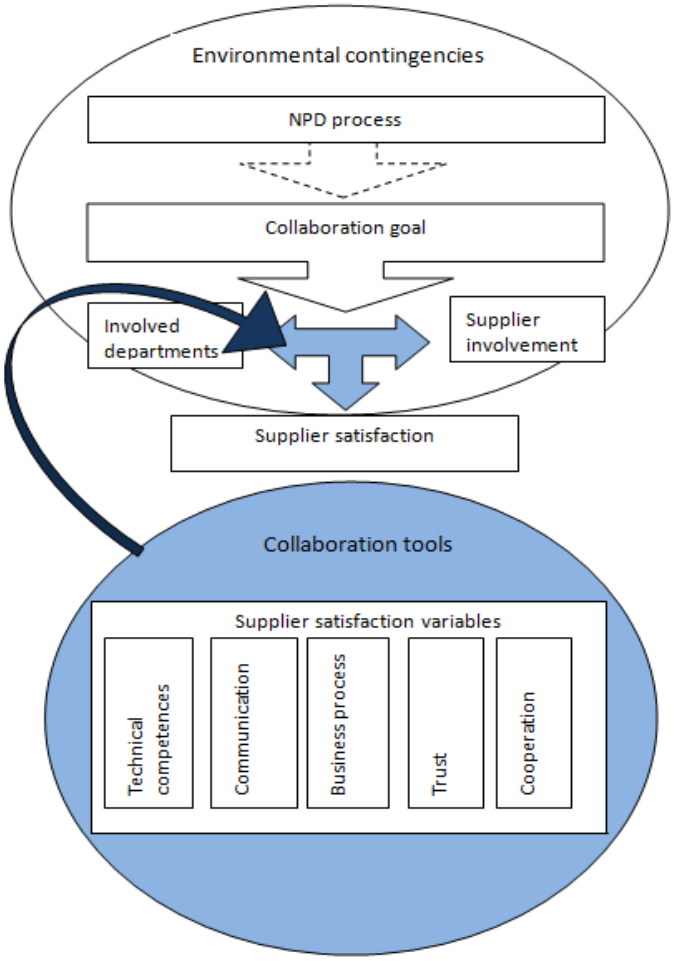

Figure 3 – Literature configuration.

The cut out of Figure 3 is where the collaboration tools are applied. Collaboration tools are not defined in the literature. Literature does state that in order to be innovative, collaboration with suppliers is needed. What leads to supplier satisfaction is given in the literature: the supplier satisfaction variables. It is unknown which composition of supplier satisfaction variables lead to an increase or decrease of supplier satisfaction. To examine

which collaboration tools lead to supplier satisfaction, a definition of collaboration tools is constructed in this thesis. This thesis examines which tools are applied and which of these tools lead to supplier satisfaction. The environmental contingencies influence the internal process of the buying organisation in NPD. In this process the collaboration tools are applied by the buying organisation to collaborate with the supplier. Supplier satisfaction is a result of this process. The supplier satisfaction variables are translated in tools which are distilled from the interviews. For each supplier satisfaction variable the most mentioned tool is identified for the toolkit that supports the collaboration.

3. Methodology: Conducting an explorative multiple case study.

There are different ways for conducting research. As explained earlier, this research focuses on the importance of collaboration tools in stimulating suppliers. Buying organisations have an influence on the way they cooperate with suppliers. Collaboration tools are applied to make sure the collaboration works and that the supplier is satisfied with the collaboration. Theory suggests that satisfied suppliers deliver better parts and insights for the buying organisation. However, for this research a note has to be made. Remarkable is the fact that only little research is conducted on the influence of collaboration tools on supplier satisfaction. Therefore an explorative case study is conducted in this thesis. The best insights for an exploratory study on this subject can be derived from real life situations, as in this thesis. This chapter concerns the methodology of this study and serves as the framework for this thesis, as well as to structure the interviews. The design of this thesis' explorative case study is further explained in this chapter.

3.1 Case study research: The basis for conducting a case study.

For this thesis the case study definition of Yin (1989) is used: "(…) *an objective, in-depth examination of a contemporary phenomenon where the investigator has little control over events*."[143] A case study research is about gathering a considerable volume of data within a selected setting to develop the full picture of the subject. The data is gathered by primary sources such as direct observations or secondary sources like documents. A case study examines one or multiple cases with related situations. In this thesis multiple cases are used where common relation is new product development. Different organisations in different industries are used to study the phenomenon in different settings. The focus is on current conditions of the collaboration tools for stimulating suppliers. A case study is appropriate, because there is no possibility to manipulate the procedures used by the organisations. According to Yin (1989) this method is only suitable for strictly describing a situation or an understanding of 'how' and 'why' these events occur.[144] That is why it is imperative not only to gain data by interviews or questionnaires, but also to assess the conditions of the surroundings. By assessing all conditions that might affect the outcomes, it is possible to build a plausible explanation of the relations. As stated by McCutheon and

[143] See McCutheon/Meredit (1993), p. 240.
[144] See McCutheon/Meredit (1993), p. 240.

Meredit (1993), a case study is especially useful when conditions are not known.[145] Therefore, a case study is an appropriate method for this research.

3.2 Explorative case study: The design of an explorative case study.

The case study method is used for the first stage of developing theory by describing or exploring the phenomenon (Yin, 1989).[146] Exploratory research is useful when there is not much theory about the subject which can be used to examine the constructs or cases.[147] Because there is not much written in the literature about innovation tools, other literature is used to define the settings. An exploratory case has an explicit goal and therefore commonalities and differences across different settings have to be defined. Listing all contracting conditions is used for framing the measures to define settings that are applicable across settings.

Description of setting and type of a semi-structured interview.

For all selected cases a uniform setting is created. All cases are organisations that produce a product and not a service. The organisations are asked for one project to be examined. An open interview is conducted with the key individuals, e.g. the project manager, NPD manager, purchase manager and the individual who acts as the point of contact regarding the supplier. The manager of the project is requested to invite at least two suppliers. The interviews are recorded and the questions have a semi-structured format. The semi-structured format creates the opportunity to ask follow-up questions to gain more detailed information about the process and tools used in the NPD process.

3.3 Research design: From data to theory.

The data gathered for the explorative multiple case study have to be strictly qualitative. Only then it is possible to gain insights in the complex social theory aspects. Qualitative data is: "*A multi-method research that uses an interpretive, naturalistic approach to its subject matter* (Denzin and Lincoln, 1994)". This thesis uses qualitative data which are gained by a multi-method because it uses observations and interviews. The observations are used to analyse the conditions of the settings that could influence the innovation process. Observations while conducting the interviews, for example the type of industry,

[145] See McCutheon/Meredit (1993), p. 240.
[146] See McCutheon/Meredit (1993), p. 241.
[147] See McCutheon/Meredit (1993), p. 243.

are used to examine whether they influence the choice of the applied collaboration tools. The interviews are conducted among the managers of the different buying organisations involved or responsible for product development. When possible, their suppliers are interviewed. The procurement managers are interviewed because they mainly serve as contact for the suppliers. Open interviews are also used to gain information from the suppliers about collaboration tools. Alliance managers who are responsible for a certain system integrator are interviewed. And system integrator managers who are the point of contact for these alliances are also taken into consideration. It is examined whether their type of collaboration is different from the collaboration buying organisations and suppliers have. If so, it is examined whether this influences the applied collaboration tools leading to supplier satisfaction. All these collaboration tools brought forth in the interviews are compared to the literature framework of chapter two, which results in the analysis in chapter five. The next paragraph describes the followed procedures to structure this thesis.

3.4 Conducting a case study: The procedure used for this thesis.

For conducting this case study a basic procedure is used. This basic procedure has the nine steps that are taken:

1	Observing the event surroundings (e.g. contract with supplier or type of industry).	Paragraph 3.4.1
2	Understanding the mechanisms (e.g. innovation platform) involved.	Theoretical framework
3	Gathering information through number of interviews with key individuals.	Paragraph 3.2.1
4	Use of open-ended questions to explore areas.	Paragraph 3.2.1
5	Gain other sources of information for clear understanding of the data (e.g. company reports).	Appendix IV
6	Analysing the setting of the organisation by observations.	Paragraph 3.5
7	A clear stated goal and theory base.	Introduction
8	Protocol for information gathering by setting interview guidelines and structure.	Appendix II
9	Proper communication with the case organisations to gain trust and cooperation.	Appendix II

Table 8 – Basic procedure case study (McCutcheon/Meredith, 1993).

The outcomes of the interviews are summarised. A third party matched the recordings to the summaries to prevent an author's bias and to check for completeness. The summaries are then sent to the respondents for fact-checking.

3.4.1 Observation event surroundings: Subtracting factors influencing the collaboration which are not part of the collaboration tools.

By observing the event surrounding the setting of the organisation in which the innovation takes place is described. This is needed for analysing factors that could have an influence on the NPD process. Factors that are normal to employees can be different for other organisations. Examples are the use of rooms which are specially decorated to inspire the project or unlimited financial support by the management board. By observing the surroundings, the collaboration tools and the effect of these tools can be analysed and other influencing factors can be subtracted.

3.4.2 Quality of research: Dealing with validity and reliability issues.

The quality of the outcome of this research depends upon rigour in dealing with validity and reliability. The chance of creating a bias is large because the case study method used deals with human beings and their interpretation of the question. To avoid bias the following measures from McCutheon and Meredit (1993) are taken:

Construct validity	Establish a territory from theory to define the construct.	Paragraph 2.8
Content validity	Define how the construct is measured and what it measures.	Paragraph 3.6
Internal validity	Establish the right cause-and-effect relationship by using multiple cases.	Paragraph 3.6
External validity	Use multiple cases to draw findings applicable to other cases or settings.	Paragraph 3.5
Reliability	Use a variety of data gathering methods, third party check on the interview recordings and the summaries.	Paragraph 3.4
Validity	Control questions to assure that what is measured reflects what is intended.	Appendix II

Table 9 – Measures for avoiding bias.[148]

There could be a bias in the outcomes of supplier satisfaction, because buying organisations recommended the suppliers that could be interviewed. Probably, they would recommend a supplier that they are satisfied with. For this thesis this bias is not problematic, because even with this bias collaboration tools that lead to supplier satisfaction can be examined.

3.5 Organisation outline: Description of the organisations.

To test the literature framework, eighteen organisations are interviewed. These organisations are chosen because they work in a highly technical, competitive and innovative environment. These organisations fit Table 3 ‘Environmental contingencies and

[148] See McCutcheon/Meredith (1993), p. 245-246.

innovation management' (paragraph 2.2) in the 'differentiated' and 'complex' quadrants. These quadrants are chosen because they are opposites: low in uncertainty and complexity versus high in uncertainty and complexity. Literature states that there is a relation between the type of product and the environmental contingency. That results in different collaboration goals for buyers towards suppliers. This thesis tests whether these collaboration goals influence the use of different collaboration tools which lead to supplier satisfaction. Therefore, both suppliers and buyers are interviewed.

Type of innovation management	Type organisation	Contingencies
Differentiated	e.g. Fast moving consumer products	Low uncertainty Low complexity
Complex	e.g. Application of software	High uncertainty Low complexity

Table 10 – Respondents characteristics.

Eleven organisations are manufactures and are chosen to examine the collaboration tools leading to supplier satisfaction. Six of these organisations are multinational buying organisations and are manufacturers. Three produce fast moving consumer goods and fit the 'differentiated' quadrant and three fit the 'complex' quadrant. They are interviewed specifically on the buyer-supplier relationship in NPD. Six of their suppliers were interviewed. Some buying organisations' suppliers could not be interviewed, because of confidentiality reasons. From two buying organisations the procurement departments are also interviewed. This is used to examine whether there is a difference considering the collaboration with the supplier between the innovation manager and the procurement department. The other five organisations are manufacturers as well and are interviewed on collaboration in the alliance with the system integrator.

Nr.	Organisation	Supplier	Procurement	Quadrant
1	Blue	-	-	Differentiated
2	Pink	-	-	Differentiated
3	Yellow	S/ Yellow	-	Differentiated
4	Orange	S/Orange	P/Orange	Complex
5	Green	S1/Green and S2/Green	-	Complex
6	Red	-	P/Red	Complex

Table 11 – Coding organisations, suppliers and procurement department.

Nr.	Alliance	System Integrator	Quadrant
1	A	SI/A	Complex
2	B	SI/B	Complex
3	C	SI/C	Complex
4	D	SI/D	Complex
5	E	SI/E	Complex

Table 12 – Coding alliances and system integrators.

These five fit the ‘complex’ quadrant. The twelfth organisation is a system integrator and collaborates with highly technical organisations. The system integrator also fits the ‘complex’ quadrant. To ensure an open interview and to ensure the respondents can speak freely, the respondents are anonymous in this thesis. And have been labelled for instance SI/Green or S2/Yellow. The thesis’ supervisors do know which organisations are interviewed.

3.6 Measurements: How the different variables are measured.

This paragraph describes how variables are measured. The interview protocol can be found in Appendix II. The following variables have been derived from the literature framework (see also Figure 2: research design in paragraph 1.2):

- NPD process;
- Collaboration goal;
- Collaboration tool;
- Supplier satisfaction.

These variables are then linked to the literature framework. The questions in the interviews are semi-structured. The key questions are as follows:

1.	In which stage of the NPD process is the supplier involved?
2.	What is the goal of collaborating with suppliers / buying organisations?
3.	Which departments of the organisation are involved in the collaboration with suppliers / buying organisation?
4.	Which collaboration tools are used in the NPD process with suppliers / buying organisation?
5a.	For buying organisation: How satisfied do you think your supplier is with the collaboration?
5b.	For suppliers: How satisfied are you with the collaboration with the buying organisation?

NPD process

The first question refers to the stage the supplier is involved in the NPD process. This is related to Table 1 and 2 (paragraph 2.1). The literature states that it is preferred to involve the supplier in an early stage.

Question	Variable	Items
1. In which stage of the NPD process is the supplier involved?	Supplier involvement	Idea finding
		Generate technical concepts
		Technical and economical evaluation
		Commercialisation

Collaboration goals

The literature states that there are different goals for collaboration. The question aims to define the relation between the collaboration goal and the collaboration tools.

Question	Variable	Items
2. What is the goal of collaborating with suppliers / buying organisations?	Collaboration goal	Cost savings
		Increased responsiveness and high flexibility
		Quality and novelty of products
		Generate revenue

Departments involved

Question four refers to the departments of the buying organisations involved in the collaboration on NPD with the suppliers. The aim is to examine whether this has an influence on the collaboration tools.

Question	Variable	Items
3. Which departments of the organisation are involved in the collaboration with suppliers / buying organisation?	Departments involved	R&D
		Manufacturing
		Marketing
		Procurement

Collaboration tools

Following question one and two, question three refers to the collaboration tools the organisations use. The aim is to examine whether the stage where the supplier is involved in the NPD process, collaboration goal and the involved departments influence the usage of the different collaboration tools. Then these tools are classified in five categories: technical competences, communication, business process, trust and cooperation.

Question	Variable	Items
4. Which collaboration tools are used in the NPD process with suppliers / buying organisation?	Collaboration tools	Technical competences
		Communication
		Business processes
		Trust
		Cooperation

All tools mentioned in the interview are listed and categorised by the supplier satisfaction variable. The supplier satisfaction variables are translated in tools which are mentioned by

the interviewees. For each supplier satisfaction variable the most mentioned tool is identified for the toolkit which supports the collaboration.

Level of supplier satisfaction

This question aims to indicate the level of supplier satisfaction perceived by the buying organisation. Suppliers are asked to indicate their actual level of satisfaction. When these outcomes are compared, this thesis will explore the possible influence of the used collaboration tools on the perceived and actual supplier satisfaction. The indication of the actual level of satisfaction follows the theory of Likert (1932). The respondents can answer with 1 (very low) up to 5 (very high).

Supplier satisfaction (organisational perspective)			
Question	**Variable**	**Items**	**Score**
5a. For buying organisations: How satisfied do you think your supplier is with the collaboration?	Supplier satisfaction	1 to 5	1 = Very low
			2 = Low
			3 = Average
			4 = High
			5 = Very high
Supplier satisfaction (supplier perspective)			
Question	**Variable**	**Items**	**Score**
5b. For suppliers: How satisfied are you with the collaboration with the buying organisation?	Supplier satisfaction	1 to 5	1 = Very low
			2 = Low
			3 = Average
			4 = High
			5 = Very high

4. Results: Outcomes of the multi case study.

In chapter two the literature is analysed to create the theoretical framework of this thesis. This resulted in a basis for analysing the collaboration tools in practise. The methodology states how the framework is used for the explorative multi case study. It shows which variables are examined, how they are measured and which relationships between the variables are examined. This chapter gives the results of the questions posed in the interview protocol. These results will be analysed in chapter five.

4.1 Supplier involvement: The stage of the NPD process where organisations collaborate.

Table 13 shows that all suppliers and buying organisations indicate that collaboration starts at stage 2 of the NPD process after the generation of the concept.

	Stage 1 Idea finding	**Stage 2** Generate technical concepts	**Stage 3** Technical and economical evaluation	**Stage 4** Commercialisation
Organisation				
Green		√		
Blue		√		
Pink		√		
Orange		√		
Yellow		√		
Red		√		
Supplier				
Supplier 1 Green	**(√)**	√		
Supplier 2 Green		√		
Supplier Orange		√		
Supplier Yellow		√		
Procurement				
Procurement Orange		√		
Procurement Yellow		√		
Alliance				
A				√
B				√
C				√
D				√
E				√
System integrator				
System integrator A				√
System integrator B				√
System integrator C				√
System integrator D				√
System integrator E				√

Table 13 – Stage of NPD in which the supplier becomes involved.

The reason for collaborating at stage 2 after generating the concept is that the idea (and the possible Intellectual Property (IP)) is owned by the buying organisation. One of the organisations stated that if the supplier would be involved at an earlier stage, the discussion concerning the product would be too hypothetical and, therefore, would make no sense and slow down the NPD process. The supplier has technical knowledge of the part they produce and by discussing the problems in the concept, the supplier is able to come up with suggestions concerning their part and can be used to solve the problem.

One supplier S1/Green states that they also collaborate in stage 1, idea finding. They came up with an example of idea generating in which they collaborated with the organisation. The example was a new type of the existing product of the buying organisation which was improved by the supplier with the latest technology that was new for the buying organisation. This would indicate that S1/Green becomes involved in stage two, to refine existing ideas, and not stage one as S1/Green itself mentioned.

Most of the suppliers are satisfied by being involved in the second stage of NPD process. One of the suppliers S/Yellow is searching for opportunities to become involved in the first stage of NPD.

Alliances and the system integrator are all collaborating in stage 4 of the NPD process. The collaboration with the system integrator is aimed at commercialising the product of the alliance and to gain a larger market share. System integrators give advice on different markets in which they already operate to serve the alliance. They also provide information about ‘how’ the market is changing, which can be used to generate new ideas.

4.2 Collaboration goals: The reason organisations collaborate.

To examine whether the use of the collaboration tools is influenced by the goal of the collaboration, the organisations are first questioned about their collaboration goal. The collaboration goals are described in the literature framework (paragraph 2.3). Table 14 shows the collaboration goal for each organisation. The collaboration goal mentioned by suppliers is how they see the collaboration goal.

	Cost savings	Increase responsiveness and higher flexibility	Increase quality and/or novelty of the new product	Generate revenue
Organisation				
Green			√	
Blue	√			
Pink	√			
Orange		√		
Yellow			√	
Red	√			
Supplier				
Supplier 1 Green			√	
Supplier 2 Green			√	
Supplier Orange	√			
Supplier Yellow			√	
Procurement				
Procurement Orange	√			
Procurement Red	√			
Alliance				
A				√
B				√
C				√
D				√
E				√
System integrator				
System integrator A				√
System integrator B				√
System integrator C				√
System integrator D				√
System integrator E				√

Table 14 – Collaboration goal in buyer-supplier relationship.

All suppliers were involved in the NPD process because of the strategic parts they produce. The suppliers who produce a highly technical product mentioned that the buying organisations demand many specifications. These specifications are required because most of these customers are directly connected to governmental organisations, such as the Ministry of Defence or the Ministry of Health. These specifications are also the reason why most of their supplies are expensive. Not only do the specifications increase the price of the supplies, but it limits the amount of suppliers as well. Because of the limited amount of suppliers, higher prices for supplies are accepted by the buying organisations because that way quality has a higher priority than price.

One buying organisation Orange once made a wrong decision when selecting a supplier. Because of the specifications that were demanded and the small market for their strategic parts, there were only two possible suppliers who could deliver the strategic part. The selected supplier apparently delivered sub standard quality parts. Then buying organisation Orange used one of their competitors as a supplier for their strategic part. The innovation manager ensured that the quality specifications are met. Therefore the collaboration goal is increased responsiveness. Orange procurement department, however, has the task to select suppliers that meet the specifications set by the innovation manager. The collaboration goal for the procurement department is cost savings, because price is the way to be distinctive from the competitors. Orange supplier, S/Orange, also states that the collaboration goal is to save costs.

The buying organisation always searches for innovative solutions to ensure the best price and quality that fit the specifications demanded by the customer. Buying organisation Orange gains insight in the cost structure of the supplier's strategic part to examine what drives up the price. They do this by analysing the costs and quality of the different parts that make up their strategic part in an open dialogue with the supplier.

Sometimes buying organisations expand their scope and find new suppliers in other branches. Or the strategic part, which is often a new combination of regular parts, is broken down into separate regular parts where multiple suppliers can be contacted for. If it is possible to find multiple suppliers, competition becomes involved among suppliers which decrease the price. One of the buying organisations, Red, stated that they always try to find multiple suppliers for one part. If single source is the only option, they will give the supplier the feeling of not being the only supplier. The goal of the collaboration with the suppliers is to save on costs. The procurement department P/Red has the same task as the procurement department of Orange. The collaboration goal for the Red procurement department is also similar: cost savings.

Buying organisation Green operates in the same complex environment. Both the supplier and the buying organisation state that the collaboration goal is to increase the quality and novelty of the products. The strategic part in this collaboration is the technical competence. It is noteworthy that the buying organisation Green does not see the collaboration on the

delivered part with one supplier S2/Green as strategic. The supplier S2/Green, however, does see the part they deliver as strategic.

Buying organisation Blue also works with strict quality specifications of the government. This drives up the price of the parts. The time to market and the large amounts to be produced is required by the consumer market. Therefore price, or cost savings, is a key collaboration goal. Novelty of products is not a main goal, but also necessary to differentiate the buying organisation from competitors.

The consumer market requires low prices and large amounts. That is why the collaboration goal for buying organisation Pink is ‘cost savings’. The product Pink produces does require strategic parts from suppliers. However, many suppliers can deliver the parts. Therefore, there is more competition among the suppliers. This leads to cost savings, which is also the collaboration goal.

Buying organisation Yellow, like Pink, also deals with the consumer market. They produce a fairly homogenous product. To differentiate from competitors, Yellow collaborates with suppliers to increase the quality and novelty of new products. S/Yellow states the same collaboration goal as the innovation manager Yellow. S/Yellow delivers solutions for the concepts, but they do not deliver the parts themselves because they cannot produce large amounts. Yellow uses the solutions to find suppliers who can.

As stated, alliances only collaborate with the buying organisations in stage four of the NPD process. The collaboration goal for the alliances is to increase the time to market and generate revenue. The systems integrator confirms this collaboration goal.

4.3 Departments involved: Which departments are involved in the collaboration.

Table 15 in this section shows which departments of the buying organisations collaborate with the suppliers on NPD. It also shows the collaboration of the system integrators with the alliances.

	Research and development	Manufacturing	Procurement	Marketing
Organisation				
Green	√	√	√	
Blue			√	
Pink		√	√	
Orange	√	√	√	
Yellow	√			
Red		√	√	
Supplier				
Supplier 1 Green	√	√	√	
Supplier 2 Green	√	√	√	
Supplier Orange	√	√	√	
Supplier Yellow	√			
Procurement				
Procurement Orange	√	√	√	
Procurement Red		√	√	
Alliance				
A	√	√		√
B	√	√		√
C	√	√		√
D	√	√		√
E	√	√		√
System integrator				
System integrator A	√	√		√
System integrator B	√	√		√
System integrator C	√	√		√
System integrator D	√	√		√
System integrator E	√	√		√

Table 15 – Departments involved in collaboration with supplier.

As indicated in Table 15, there are different departments among the buying organisations that collaborate with their suppliers. The buying organisations, procurement departments and suppliers within the several collaborations all have the same perspective with regard to which departments are involved.

As stated earlier, the alliances and system integrator also all have the same collaboration goal: to generate revenue. However, all the alliances and system integrators indicate that they collaborate with the manufacturing, R&D and marketing departments instead of just with the marketing department. The procurement departments are not mentioned by the alliance managers, because the decision to collaborate with their system integrator is taken

on a higher international level of the several alliances. Furthermore the system integrators are used to market the product and not to manufacture or to deliver parts.

4.4 Collaboration tools: Tools used for collaboration that can lead to supplier satisfaction.

The theoretical framework provides a definition of 'collaboration tools'. These tools were classified in five categories; technical competences, communication, business process, trust and cooperation. Appendix V depicts the complete list of all the collaboration tools used in the case studies and the above mentioned classification. First a table and a description are given of all the tools used in the collaboration by the buying organisation, the supplier and by both. The relationship between system integrator and alliance is also seen as a buyer-supplier relationship. Not to deliver parts, but to market the products. Second, the collaboration tools applied by the buying organisation and the collaboration tools used by both the buying organisation and the supplier are presented. Lastly, the collaboration tools only used by the buying organisation are depicted. By separating the collaboration tools in this manner, it will be shown which collaboration tools used by buying organisations lead to supplier satisfaction.

4.4.1 Tools applied in the collaboration: the buying organisations perspective, the supplier's perspective, alliances perspective and system integrators perspective.

The table in Appendix III depicts the overall use by all organisations of the different variables that can lead to supplier satisfaction. It shows per organisation which collaboration tools, categorised by supplier satisfaction variable, are applied. The table below, Table 16, shows all tools applied without the tools mentioned by the procurement departments.

	Technical competences	Communication	Business process	Trust	Cooperation	Total
Organisation						
Green	0	3	0	0	6	9
Blue	0	7	5	2	2	16
Pink	1	2	1	1	4	9
Orange	3	4	7	2	2	18
Yellow	2	6	2	2	3	15
Red	1	1	6	2	4	14

Total	***7***	***23***	***21***	***9***	***21***	***81***
Supplier						
Supplier 1 Green	2	7	2	2	5	18
Supplier 2 Green	3	6	2	1	4	16
Supplier Orange	4	4	5	2	3	18
Supplier Yellow	1	8	0	2	3	14
Total	***10***	***25***	***9***	***7***	***15***	***66***
Procurement						
Procurement Orange	2	6	6	2	3	19
Procurement Red	1	2	4	0	8	15
Total	***3***	***8***	***10***	***2***	***11***	***34***

Table 16 – All tools applied buying organisations and suppliers.

As seen in Table 16, different collaborations use different collaboration tools and there is a large variation. It should be noted that the numbers can appear to be biased, because not every respondent mentions the same amount of collaboration tools. According to the buying organisations the communication, business process and cooperation tools are mentioned most and are applied by all organisations, albeit not with the same frequency. Technical competences and trust are mentioned the least. When the amount of tools mentioned in the collaboration between buying organisations and suppliers, the following results follow:

Green	Use less tools than mentioned by suppliers	<
Yellow	Use more tools than mentioned by supplier although the difference is only one tool	≥
Orange	Use exactly the same amount of tools	=

Table 17 shows the tools applied solely by the buying organisation and which are recognised by the supplier as being applied by the buying organisations. This is depicted, because this table could show a relationship between which collaboration tools used by buying organisations and are recognised by the suppliers, can lead to supplier satisfaction.

	Technical competences	**Communication**	**Business process**	**Trust**	**Cooperation**	**Total**
Organisation						
Green	0	3	0	0	1	4
Blue	0	7	5	0	1	13
Pink	0	2	1	0	1	4
Orange	0	4	7	0	1	12
Yellow	0	4	7	0	1	12
Red	0	1	6	0	2	9
Total	***0***	***21***	***26***	***0***	***7***	***54***
Supplier						
Supplier 1 Green	2	0	1	2	2	7
Supplier 2 Green	3	2	2	1	1	9

Supplier Orange	3	0	3	2	1	10
Supplier Yellow	1	4	0	1	1	7
Total	***10***	***6***	***6***	***6***	***5***	***33***
Procurement						
Procurement Orange	1	3	3	2	3	12
Procurement Red	1	2	4	0	8	15
Total	***2***	***5***	***7***	***2***	***11***	***27***

Table 17 – Tools applied by the organisation and recognised by the supplier.

Noteworthy is that trust and technical competence collaboration tools are not mentioned at all. The suppliers mention technical competence collaboration tools the most, where in the former table communication tools are mentioned most.

	Technical competences	**Communication**	**Business process**	**Trust**	**Cooperation**	**Total**
Organisation						
Green	0	0	0	0	0	0
Blue	0	0	0	0	0	0
Pink	0	0	0	0	0	0
Orange	0	0	0	0	0	0
Yellow	0	0	0	0	0	0
Red	0	0	0	0	0	0
Supplier						
Supplier 1 Green	0	4	0	0	1	5
Supplier 2 Green	0	4	0	0	1	5
Supplier Orange	0	3	0	0	0	3
Supplier Yellow	0	4	0	1	1	6
Procurement						
Procurement Orange	0	0	0	0	0	0
Procurement Red	0	0	0	0	0	0

Table 18 – Tools applied by both the buying organisation and supplier.

Table 18 depicts that none of the buying organisations mention collaboration tools applied by both the organisation and supplier. Although the supplier does mention some collaboration tools applied by both. The collaboration tools most mentioned by suppliers are communication tools, some cooperation and one mentioned trust.

Next, Table 19 depicts the total amount of collaboration tools which are applied by the alliances and system integrators.

	Technical competences	Communication	Business process	Trust	Cooperation	Total
Alliance						
A	3	4	4	0	3	14
B	3	5	8	3	1	20
C	1	3	5	3	4	16
D	3	7	3	3	4	20
E	2	11	7	4	4	28
Total	***12***	***30***	***27***	***13***	***16***	***98***
System integrator						
System integrator A	3	4	4	5	5	21
System integrator B	4	5	5	3	4	21
System integrator C	2	7	7	8	4	28
System integrator D	7	8	3	5	3	26
System integrator E	3	5	4	4	3	19
Total	***19***	***29***	***23***	***25***	***19***	***115***

Table 19 – All tools applied by alliances and system integrators.

The table shows that A does not mention any trust collaboration tools. Furthermore, E mentions communication tools the most, and overall the alliances apply communication and business process collaboration tools the most. Regarding the system integrators the amount of different types of collaboration tools applied is more equally spread. The alliances mention communication tools the most, followed by trust and business process collaboration tools. Overall, the alliances themselves use less collaboration tools than the system integrators, except for E.

A	**Use less tools than mentioned by system integrator**	<
B	Use less tools than mentioned by supplier although the difference is only one tool	≤
C	Use less tools than mentioned by system integrator	<
D	Use less tools than mentioned by system integrator	<
E	Use more tools than mentioned by system integrator	>

All collaboration tools applied by the alliances are depicted in the top half of the table below. The collaboration tools applied by the alliances, and recognised by the system integrators as being applied, are depicted in the bottom half.

	Technical competences	Communication	Business process	Trust	Cooperation	Total
Alliance						
A	3	3	4	0	3	13
B	3	5	8	3	1	20
C	1	3	5	3	4	16
D	3	7	3	3	4	20
E	1	10	5	4	3	23
Total	***11***	***28***	***25***	***13***	***15***	***92***
System integrator						
System integrator A	1	1	1	3	1	7
System integrator B	0	1	1	2	2	6
System integrator C	0	2	6	3	2	13
System integrator D	2	1	1	2	0	6
System integrator E	0	1	0	0	0	1
Total	***3***	***6***	***9***	***10***	***5***	***33***

Table 20 – Tools applied by alliance and recognised by system integrator.

Overall, the table indicates that the alliances mention more collaboration tools to be applied in collaboration with the system integrators than the system integrators recognise. For example, in the collaboration between E and SI/E, the alliances mention far more collaboration tools than the system integrator recognises: 23 versus 1. The totals show that the alliances apply communication and business process collaboration tools, where the system integrators recognise trust and business process collaboration tools the most.

	Technical competences	Communication	Business process	Trust	Cooperation	Total
Alliance						
A	0	1	0	0	0	1
B	0	0	0	0	0	0
C	0	0	0	0	0	0
D	0	0	0	0	0	0
E	0	1	1	0	1	3
System integrator						
System integrator A	2	2	0	0	4	8
System integrator B	2	2	2	1	0	7
System integrator C	0	0	0	2	0	2
System integrator D	0	3	2	1	3	9
System integrator E	0	0	1	0	1	2

Table 21 – Tools applied by both the alliance and system integrator.

Table 21 shows that the alliances indicate that no collaboration tools are applied by both the alliance and the system integrator, except for one in the case of A and three in the collaboration with E. The system integrators do indicate that both the system integrator and the alliance apply certain collaboration tools. Also, the SI/E indicates that the system integrator and the alliance use less collaboration tools applied by both than indicated by the alliance. Furthermore, the SI/D indicates that both parties apply nine collaboration tools, where the alliance indicates that none are applied by both.

Overall, all the tables in this paragraph indicate that even though more buying organisations than alliances are interviewed, alliances mention more collaboration tools than the buying organisations. Both use communication and business process collaboration tools most. System integrators mention trust and business process tools most, where the suppliers mention technical competences most.

4.4.2 Tools used translated into specific tools per supplier satisfaction variable.

In the section above the tools are mentioned for each respondent and categorised per supplier satisfaction variable. In this section a more in-depth analysis is conducted of the specific tools mentioned per supplier satisfaction variable. In Appendix IV the procedure of the selection is specified. The tools which are applied the most according to Appendix IV are listed in Table 22. The list below is a ranking of the tools in the order of the amount the tools are mentioned from most to least mentioned:

1. Incentives
2. Portfolio
3. Roadmap
4. Contracts
5. Approved vendor list
6. Communication structure
7. KPI’s
8. One point of contact
9. Workshops and events

From the interviews the following table is constructed. This shows for each interviewed party which tool of the toolkit is applied. In the table the buying organisations are classified by complex environments (C) and differentiated environments (D). When tools

are applied the boxes are ticked and between brackets is displayed by whom the tool is applied. S for the supplier, O for the organisation and B for both.

	Communication structure	One point of contact	Contracts	Workshops	Events	Approved vendor list	Portfolio	KPI's	Roadmap	Incentives
Buying organisation										
Green (C)	√ (O)							√ (O)	√ (O)	√ (O)
Red (C)	√ (O)		√ (O)	√ (O)		√ (O)			√ (O)	
Orange (C)	√ (O)		√ (O)			√ (O)	√ (O)			
Blue (D)	√ (O)	√ (O)	√ (O)			√ (O)	√ (O)		√ (O)	√ (O)
Pink (D)				√ (O)	√ (O)	√ (O)				√ (O)
Yellow (D)		√ (O)	√ (O)			√ (O)		√ (O)	√ (O)	√ (O)
Supplier										
S1/Green	√ (B)		√ (O)				√ (S)		√ (O/B/S)	
S2/Green	√ (B)	√ (O)	√ (B)				√ (S)	√ (O)	√ (O)	√ (S)
S/Orange	√ (S)	√ (B)	√ (O)				√ (S)	√ (O)		√ (S)
S/Yellow	√ (B)	√ (O)					√ (S)			√ (S)
Procurement										
P/Orange		√ (O)	√ (O)			√ (O)	√ (O)		√ (O)	√ (O)
P/Red	√ (O)	√ (O)	√ (O)	√ (O)	√ (O)	√ (O)			√ (O)	√ (O)
Alliance										
A		√ (O)	√ (O)			√ (O)	√ (O)			√ (O)
B	√ (O)	√ (O)	√ (O)				√ (O)	√ (O)	√ (O)	√ (O)
C			√ (O)		√ (O)		√ (O)	√ (O)	√ (O)	√ (O)
D	√ (O)		√ (O)		√ (O)		√ (O)	√ (O)		√ (O)
E	√ (O)		√ (O)		√ (O)	√ (O)	√ (O/S)	√ (B)	√ (O)	√ (O/S)
System integrator										
SI/A		√ (S)			√ (B/O)		√ (B)	√ (B)	√ (S)	√ (O/B/S)
SI/B	√ (O)	√ (B)	√ (B)		√ (O)	√ (B)	√ (O/B/S)	√ (B/S)		√ (O)
SI/C	√ (S)	√ (S)	√ (S)			√	√ (S)		√ (O/S)	√

						(O/B/S)				(O)
SI/D	√ (B)			√ (S)	√ (O)	√ (O)	√ (S)	√ (B)	√ (O/B)	√ (B/S)
SI/E			√ (B)			√ (O/S)	√ (S)	√ (S)		√ (S)

Table 22 – Toolkit tools applied per buying organisation, supplier, alliance and system integrator.

4.5 Supplier satisfaction: Level of (perceived) satisfaction concerning the collaboration.

In this section, Table 23 depicted the supplier satisfaction with regard to collaboration with the buying organisation. On the one hand it shows how satisfied the supplier is. On the other hand buying organisations were asked how satisfied they think their supplier is in the collaboration on NPD. This also shows whether there is a gap between these perceptions.

	1 Very poor	2 Poor	3 Average	4 Good	5 Very good
Organisation					
Green				√	
Blue				√	
Pink			√		
Orange				√	
Yellow				√	
Red				√	
Supplier					
Supplier 1 Green				√	
Supplier 2 Green			√		
Supplier Orange				√	
Supplier Yellow				√	
Procurement					
Procurement Orange				√	
Procurement Red				√	
Alliance					
A				√	
B				√	
C			√		
D		√			
E				√	
System integrator					
System integrator A				√	
System integrator B				√	
System integrator C			√		
System integrator D				√	
System integrator E				√	

Table 23 – Level of (perceived) satisfaction concerning the collaboration.

Almost all the organisations indicate that the suppliers' satisfaction is good, none very poor, poor and, noteworthy, none very good. Also, the perceived and actual level of satisfaction mostly matches. There is also no difference between the perceived supplier satisfaction between the buying organisation and their procurement departments. Pink indicates that their supplier probably is averagely satisfied, because Pink thinks the supplier would want a better price for their parts. Also, S2/Green stated they are averagely satisfied. The buying organisation uses KPI's to stimulate suggestions for improvements on innovation by the supplier. The supplier is measured on these KPI's, so that they comply and give suggestions. The stated reason for the average satisfaction was that when they give the buying organisation new ideas for improvements, the buying organisation uses these suggestions but chooses a different supplier to apply the improvements. All alliances rate the supplier satisfaction as good, except for C who describes it as average and D as poor. The explanation for the rating by C, is that a couple of years ago C gave a big business opportunity to a competing system integrator. According to C the trust still has to be restored. The system integrator confirms this, but did not give a reason for the average rating of the supplier satisfaction. D did not give a reason, but they expected the supplier to be poorly satisfied. The system integrator, however, rated their supplier satisfaction as good.

4.6 Supplier satisfaction: Level of (perceived) satisfaction related to the supplier satisfaction variables.

In this paragraph the supplier satisfaction variables are related to the levels of supplier satisfaction of the supplier and as perceived by the buying organisation. By doing so, it is attempted to examine whether there is a relationship between the different categories of collaboration tools applied and supplier satisfaction.

	Supplier satisfaction variable	Poor	Average	Good
Organisation				
Green	Communication			3
	Cooperation			1
Blue	Communication			7
	Business process			5
	Cooperation			1
Pink	Communication		1	

	Business process		1	
	Cooperation		3	
Orange	Communication			4
	Business process			7
	Cooperation			1
Yellow	Communication			6
	Business process			2
Red	Communication			1
	Business process			6
	Cooperation			2
Supplier				
Supplier 1 Green	Technical competences			2
	Business process			1
	Trust			2
	Cooperation			2
Supplier 2 Green	Technical competences		3	
	Communication		2	
	Business process		2	
	Trust		1	
	Cooperation		1	
Supplier Orange	Technical competences			3
	Communication			3
	Business process			2
	Cooperation			1
Supplier Yellow	Technical competences			1
	Communication			4
	Trust			1
	Cooperation			1
Procurement				
Procurement Orange	Communication			3
	Business process			3
Procurement Red	Communication			2
	Business process			4

Table 24 – Tools applied by buying organisation and the tools recognised by supplier as tools applied by buying organisation.

Regarding the buying organisations and the suppliers, Table 24 indicates that buying organisations that fall in the differentiated dimension (section 2.3) all apply mainly communication collaboration tools. Furthermore, Pink indicates their suppliers are averagely satisfied and apply four tools, which is less than the other buying organisations. The buying organisations in the complex dimension Red and Orange apply relatively more business process collaboration tools. Green mentions communication collaboration tools the most, on a total of four collaboration tools mentioned. The suppliers of the latter three buying organisations indicate that these buying organisations apply more categories of collaboration tools than mentioned by the buying organisations themselves. S2/Green indicates to be averagely satisfied. The table shows that the collaboration tools applied on them are not focussed, but are spread over the different categories of collaboration tools.

	Supplier satisfaction variable	Poor	Average	Good
Alliance				
A	Technical competences			3
	Communication			3
	Business process			4
	Cooperation			3
B	Technical competences			3
	Communication			5
	Business process			8
	Trust			3
	Cooperation			1
C	Technical competences		1	
	Communication		3	
	Business process		5	
	Trust		3	
	Cooperation		4	
D	Technical competences	3		
	Communication	7		
	Business process	3		
	Trust	3		
	Cooperation	4		
E	Technical competences			1
	Communication			10
	Business process			5
	Trust			4
	Cooperation			3
System integrator				
System integrator A	Technical competences			1
	Communication			1
	Business process			1
	Trust			3
	Cooperation			1
System integrator B	Communication			1
	Business process			1
	Trust			2
	Cooperation			2
System integrator C	Communication		2	
	Business process		6	
	Trust		3	
	Cooperation		2	
System integrator D	Technical competences			2
	Communication			1
	Business process			1
	Trust			2
System integrator E	Communication			1

Table 25 – Tools applied by alliance and the tools recognised by system integrator as tools applied by alliance.

All the alliances and system integrators are in the complex dimension of the environmental contingencies. Table 25 above indicates that one of the alliances rates the level of supplier satisfaction as poor and one rates it as average. Note that SI/C and C alliance both rate the level of supplier satisfaction as average. The C alliance spreads the application of their collaboration tools over the different categories, with a total of 16 collaboration tools mentioned. SI/C indicates that the alliance applies less tools and the business process collaboration tools are applied most. D alliance rates the perceived level of supplier satisfaction as poor. A total of 20 collaboration tools are applied, mainly communication collaboration tools. The SI/D recognises six collaboration tools which are applied by the alliance. No specific category of collaboration tools is mentioned most. SI/D rates their level of satisfaction as good. Overall, the system integrators rate their level of satisfaction as good, while not many collaboration tools which are applied by the alliances are recognised.

4.7 Results: Conclusion.

This chapter presented the outcomes of the interviews of this thesis: the goals of the collaborations are specified, the involved departments and the collaboration tools are stated. Then the collaboration tools are related to the level of supplier satisfaction. Outcomes that stood out are highlighted. In the next chapter the results will be analysed by relating them to the theoretical framework. Tools which are mentioned the most by the interviewees are translated in a toolkit. The next chapter analyses whether the tools which are applied support the supplier satisfaction according to the literature.

5. Analysis: Comparing the theoretical framework with practice.

In this chapter the literature will be compared with the practice. Each section first presents a short summary of what the literature states. Then the practice will be provided. The last part is a comparison of the two and points out the differences between literature and practice. Possible explanations for these incongruencies are offered.

5.1 NPD process stage: Relation NPD stage and supplier involvement.

Literature states, in short, that the suppliers should be involved as early as possible. The first stage of the NPD process is idea finding. Therefore, it would be expected that ideally the suppliers are involved at stage one.

This thesis shows that in the cases that are examined, suppliers generally become involved in the end of stage two, generating technical concepts, or early stage three, technical and economical evaluation. This suggests that suppliers become involved in the middle of the NPD process. When the concept of the new product is internally developed on paper or as a concept, the supplier becomes involved to solve problems and to analyse how to further develop the new product efficiently. Mainly, the supplier is involved in order to solve the problems for manufacturing the concept.

One buying organisation gives a reason for suppliers not to become involved at the first stage: Yellow points out that before there is a concept, the discussion about the idea is very hypothetical and theoretical. The innovation manager indicated that their supplier is an expert in his own specific product, not so much in the field of the buying organisation, and not, for instance, to generate new ideas. The innovation manager therefore found it not suitable to involve the supplier at the first stage, as it would also slow down the NPD process. Especially in the consumer market the time to market is crucial.

Also, the literature states that suppliers should be ‘early involved’. This thesis shows suppliers are involved at an early stage of the NPD process. However, early involvement occurs in stage two and not at stage one. The suppliers are asked to generate ideas, which refers to stage one, to improve the concept, which refers to stage two.

All alliances are involved in the very end of stage four of the NPD process: commercialisation. One possible reason is that the alliances are involved only to commercialise the new product. Therefore, they are not so much involved in the NPD process, especially the part concerning innovation.

5.2 Collaboration goal: Relationship between dimension and supplier involvement, and relationship between collaboration goal and collaboration tools.

According to the literature depending on the organisations contingencies there are different collaboration goals. The literature does not indicate which specific collaboration goal suits a specific stage of the NPD process, except for commercialisation. As stated, the literature indicates that the following goals are connected to the different NPD stages:

NPD stage	Idea finding	Generate technical concepts	Technical and economical evaluation	Commercialisation
Collaboration goal	Cost savings	Cost savings	Cost savings	Revenue
	Increased responsiveness and higher flexibility	Quality and novelty of products	Quality and novelty of products	-

Table 26 – Theoretical configuration collaboration goals and involved departments in the NPD process.

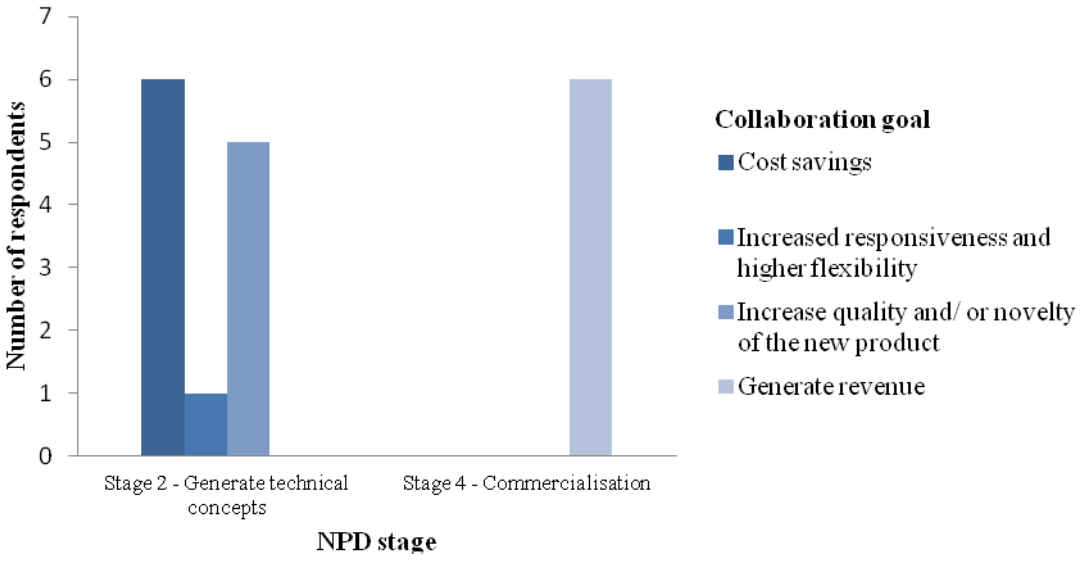

Figure 4 – Relation between collaboration goal and the NPD stage in which the supplier is involved.

Figure 4 above shows in general which collaboration goals the buying organisations have at what stage. As seen above, there is a difference between the literature and the practice. All collaboration occurs at stages two and four. In stage two all collaboration goals are used, except the goal to generate revenue. All buying organisations indicate cost savings to be a collaboration goal at stage two, five mention the goal increased responsiveness and higher flexibility. Also, in practice the goal to generate revenue is mentioned to occur at stage four. These results match the theory. Since no organisation indicated they collaborate at stages one and three, there are no collaboration goals for those stages.

The innovation manager of Orange indicated the collaboration goal is to gain responsiveness and higher flexibility. This is because the innovation manager stated he is to make sure the specifications are met. P/Orange is supposed to ensure a low price for the supplier's parts. The supplier also indicates that cost savings are the collaboration goal for Orange.

5.2.1 Type of product/environment and relation with supplier involved.

Figure 5 differentiates the collaboration goals per environment. In short, literature indicates that the differentiated dimension requests a high speed of development and a high degree of novelty with regard to the competitors. The complex dimension requests a high flexibility to adapt to new technologies.

The results show that of the organisations that fit the 'differentiated' dimension focus on the collaboration goals; cost savings, increased quality and novelty of products. The buying organisations in the complex dimension focus on increased responsiveness and higher flexibility as well. Both match with the literature.

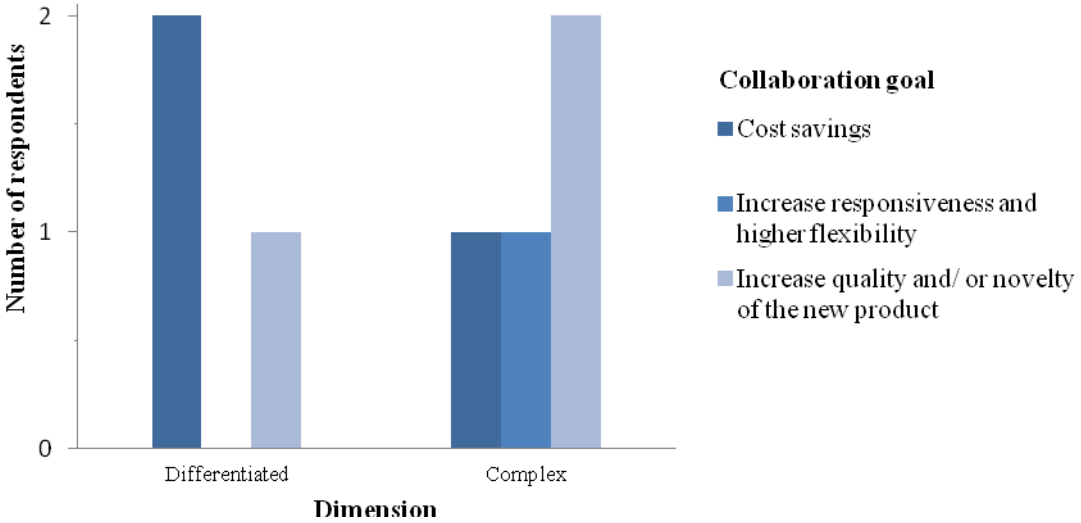

Figure 5 – Relation between dimension and collaboration goal of the buying organisations.

5.2.2 Relationship between collaboration goal and collaboration tools.

Literature states that certain variables lead to supplier satisfaction. The collaboration tools in this thesis are classified according to these variables. Figure 6 shows how many times these variables are mentioned by the buying organisations and relates them to the collaboration goal of the same buying organisation. A bias can occur, because some organisations named more tools than others.

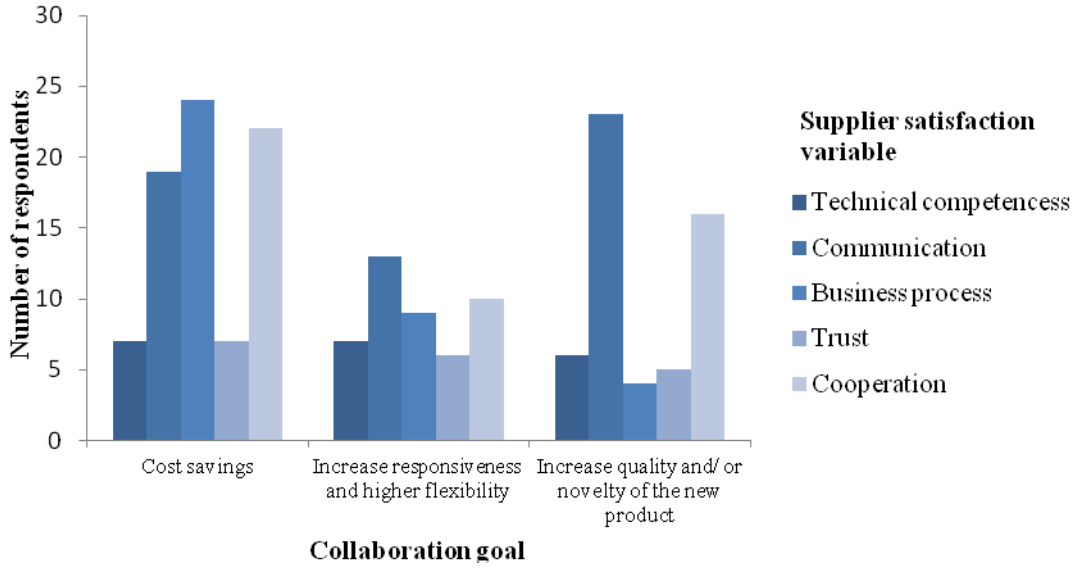

Figure 6 – Relation between collaboration goal and supplier satisfaction variables.

All types of variables that lead to supplier satisfaction are mentioned for all collaboration goals. However, the frequency differs. For example: communication is mentioned most by buying organisations which have improvement of quality and novelty of products as the collaboration goal. Business process tools are mostly mentioned when the collaboration goal is to achieve cost savings.

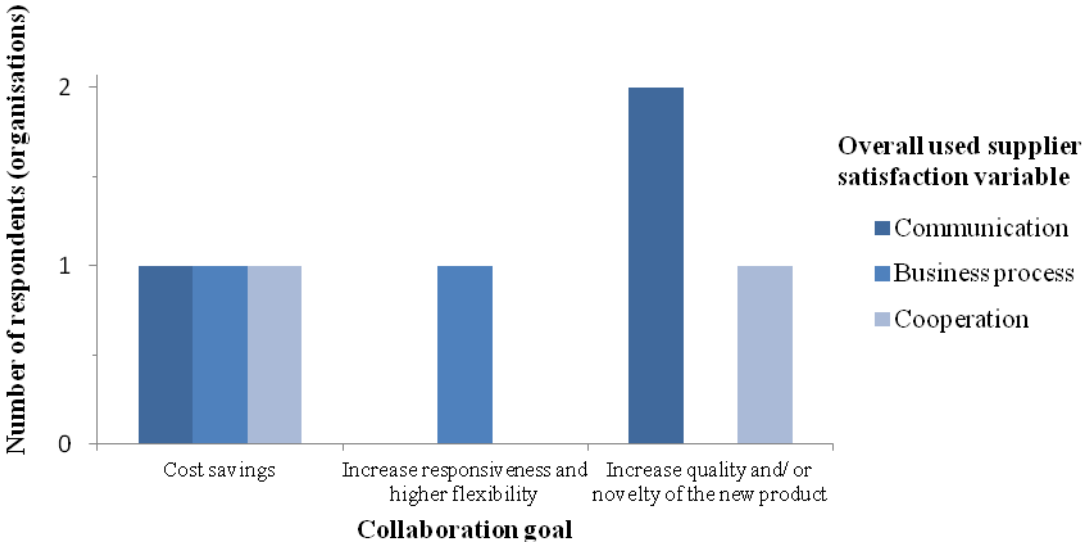

Figure 7 – Relation between collaboration goal and overall used supplier satisfaction variables.

Figure 7 shows what categorised tools are mentioned most per buying organisation, set off by their goal. Then it shows that for the goal of cost savings three variables are mentioned most. For increased responsiveness only business process tools are mentioned. To increase quality and novelty of products, both communication and cooperation are mentioned most.

5.3 Involved departments: Relationship involved departments and collaboration tools.

The departments involved in collaboration with the supplier should, according to the literature, be mixed in cross functional teams. Therefore, all departments could be involved. Results in this thesis have already indicated in practice not all departments to be involved in collaboration with the supplier. Table 27 shows the buying organisations and their most mentioned collaboration tools which lead to supplier satisfaction and their involved departments. From the cases studied in this thesis, it seems that for cooperation and business process the match is that both the manufacturing and procurement departments are involved.

Organisation	Variable	R&D	Manufacturing	Procurement	Marketing
Green	Cooperation	X	X	X	
Pink	Cooperation		X	X	
Yellow	Communication	X			
Blue	Communication			X	
Orange	Business process	X	X	X	
Red	Business process		X	X	
Alliance					
A	Business process	X	X		X
B	Business process	X	X		X
C	Business process	X	X		X
D	Communication	X	X		X
E	Communication	X	X		X

Table 27 – Supplier satisfaction variables used and departments involved in collaboration with the supplier.

In the alliances the same departments are involved in the collaboration: R&D, manufacturing and marketing. The procurement departments were not involved. This seems logical, because the system integrators were used to generate revenue by selling products and not by producing them. The collaboration is between the alliances and the system integrators are decided on a higher international level in the organisation. Therefore, there is a top down support arranged regarding the system integrators. The different departments are used to support the system integrator with the creation of product knowledge. The procurement departments are not involved in this process, because they only focus on the buying of parts and not on product development.

5.4 The toolkit: the tools leading to supplier satisfaction and applied most, by whom and how.

Literature states that the tools in the toolkit, approved vendor list, communication structure, contracts, incentives, KPI's, one point of contact, portfolio, roadmap and workshops and events, are to be applied in a certain manner. In this section Table 22 of paragraph 4.4.2 (Toolkit tools applied per buying organisation, supplier, alliance and system integrator) is analysed. Some examples and outcomes that stand out are given.

Overall the buying organisations and alliances only mention the tools they apply themselves in the collaboration with their suppliers. This is also the case with the

procurement departments. The suppliers mention the tools used by the supplier, both and applied by the buying organisation. The alliances mention the tools applied by themselves, except for E. System integrators mention a balanced mix of tools used by the supplier, both and the alliance.

All the buying organisations operating in a complex environment state to have a communication structure. Only buying organisation Blue which operates in a differentiated indicates to do so, the others do not. Buying organisation Pink states that their supplier is not thought to be satisfied. Pink does not apply a communication structure, only an approved vendor list. Although a workshop and event have been organised, this only occurred once in the recent history. The incentive for the supplier is said to be that the supplier is in the position to be a supplier for Pink to deliver parts. Pink states to rely on their market position and their reputation. Buying organisation Red states somewhat the same: suppliers want to collaborate with Red, because they are well known and possess a lot of knowledge of their market.

Buying organisation Green applies four tools from the toolkit: communication structure, KPI's, roadmap and incentives. Supplier S2/Green indicates not to be satisfied with the collaboration. Buying organisation Green states to apply a communication system. Supplier S1/Green applies more direct 'face-to-face'-communication than Supplier S2/Green, who does not apply this direct communication tool. Moreover, buying organisation Green states that they organise visits with Supplier S1/Green. During these visits the roadmap of the collaboration is discussed. These visits are not arranged with supplier S2/Green. In this case these findings could indicate that direct communication and the roadmap are positively related with supplier satisfaction. Because of the long relation between the buying organisation and Supplier S2, Supplier S2 does know that the buying organisation is closer with Supplier S1. This results in a decrease of willingness to be more involved in the innovation. The KPI's are met and the incentives coupled with the KPI's are a reason for Supplier S2 to continue the collaboration. Trust seems to be a factor in this case.

Alliances all apply incentives, the approved vendor list and a portfolio. Regarding the incentives, literature states that incentives are applied in collaborations which ask for

decision-making and problem-solving. In the case of the collaboration between alliances and system integrators this seems to comply: system integrators make the decision which alliance gets to deliver the product to the customers.

Regarding the tools in the toolkit a common denominator seems to be that the tools in the toolkit are related with trust and communication as a supplier satisfaction variable.

5.5 Supplier satisfaction: Relation of findings and supplier satisfaction.

Literature states that certain variables lead to supplier satisfaction. This thesis examines whether certain collaboration tools lead to supplier satisfaction. Chapter 4 showed that almost all of the suppliers in this thesis rate their level of satisfaction as good. The same applies to the alliances and the system integrators. Therefore, the relationships between collaboration tools and supplier satisfaction variables, supplier satisfaction and collaboration goal, and supplier satisfaction and involved departments do not present a clear view.

A relation found in stage two of the NPD process is that the collaboration goals most mentioned are cost savings and increased responsiveness and higher flexibility. The supplier satisfaction variables most applied are communication, cooperation and business process. These variables seem to increase supplier satisfaction. In stage four of the NPD process, the commercialisation stage, the collaboration goal to generate revenue is the only goal mentioned. Business process, cooperation and communication are the supplier satisfaction variables which are mentioned the most. These variables also seem to lead to supplier satisfaction. Regarding the departments involved gives a mixed view. Generally several, but not all, departments are involved in collaborating with the supplier. Literature states that all departments should be involved.

6. Conclusion.

After a brief sketch of the background in chapter one, this thesis provides an overview of the existing literature on collaboration tools. With this in mind the thesis continued with a methodological analysis in chapter three, which was tested in practise in chapter four. Chapter five provided an analysis of the results in comparisons with the hypotheses derived from the literature. In this conclusion we return to our original question and sub-questions as posed in the introduction.

6.1 Comparison results and analysis: Answering the main question and sub-questions.

In chapter one the focus of this thesis is presented. Do buying organisations use collaboration tools when collaborating with suppliers and which tools lead to supplier satisfaction? The main question of this thesis is: *'Which tools are used by organisations for collaboration with suppliers in new product development processes, why are these tools used and do these stimulate supplier satisfaction?'* The main question will be answered by first addressing the sub questions in the section below.

6.1.1 At what stage of the NPD process is the supplier involved?

Figure 8 shows that according to the literature, the most advantage of collaboration would be gained at the first stages of the NPD process. Then the intensity of the collaboration declines as the NPD process furthers.

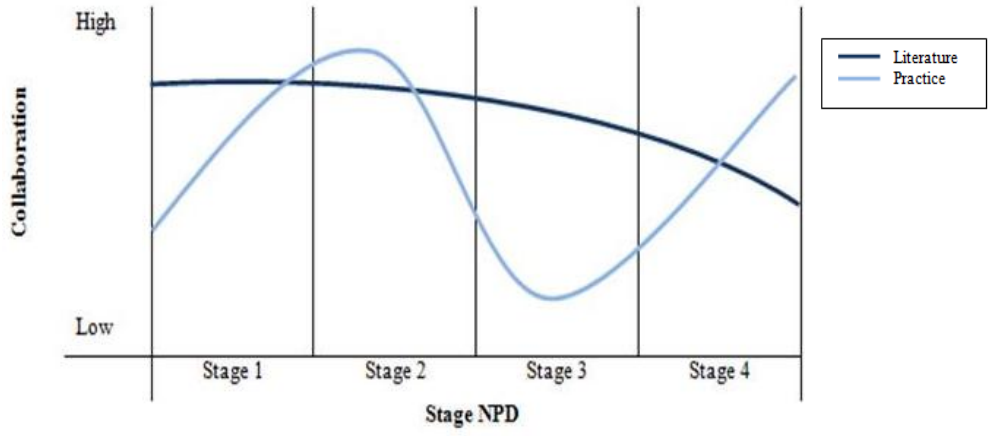

Figure 8 – Collaboration during the NPD stages literature and practice compared.

However, in practice the collaboration is most intense at stage two and stage four, as seen in Figure 8.

6.1.2 What is the buying organisations collaboration goal with regard to the supplier in the NPD process?

When an organisation creates an idea for a new product, they want to keep the IP rights. Therefore they collaborate less at the idea generating stage. Also, the buying organisation indicates that they can create ideas themselves, but they need to collaborate with suppliers to design the parts for the technical development; stage two. At stage three, manufacturing, the collaboration declines because at that stage cost savings is crucial. The relationship between buyers and suppliers is less open and the buying firm acts more dominantly. At stage four, commercialisation, the collaboration intensifies, because the new product has to be brought to market. At stage four a different supplier is collaborated with in order to decrease the time to market, which is crucial for highly technical and innovative new products. A remarkable outcome in this thesis is that the manufacturers of fast moving consumer goods use small suppliers to gain innovative knowledge and new ideas. The buying firms use a different supplier who can produce the large quantities of the parts once it is developed in collaboration with the innovative small supplier.

6.1.3 Which departments of the buying organisation are involved in collaboration with suppliers?

This thesis shows that cross functional teams collaborate with the suppliers during the NPD process. This is also what comes forth in the literature. Regarding the procurement departments it is indicated they do not collaborate at the commercialisation stage, stage 4. The reason is that the procurement department is only required to attract suppliers to produce products, not to commercialise them.

6.1.4 Which collaboration tools are used by the buying organisations in the NPD process?

Chapter four indicates that buying organisations mostly apply business process followed by communication collaboration tools. There is a clear different view of the suppliers regarding the collaboration tools used by the buying organisations: suppliers indicate they recognise that buying organisations mainly apply technical competence collaboration tools. The alliances mainly mention communication and business process collaboration tools. System integrators, however, recognise that the alliances apply trust followed by business process collaboration tools most. A toolkit is constructed of the tools which are applied

most: approved vendor list, communication structure, contracts, incentives, KPI's, one point of contact, portfolio, roadmap and workshops and events.

6.1.5 Is there a relationship between the collaboration goal and collaboration tools?

Organisations which operate in the differentiated dimension mainly have cost savings as collaboration goal. They mainly apply communication and business process collaboration tools. The increased responsiveness and high flexibility on the one hand, and to improve quality and novelty of products on the other hand, are the collaboration goals of organisations in the complex dimension. The collaboration tools mostly mentioned are communication tools. The alliances operate in the complex dimension as well. To generate revenue is their collaboration goal. Communication and business process collaboration tools are mentioned to be applied the most. The tools in the toolkit are related to trust and communication. The goals increased responsiveness and high flexibility are better achieved with the toolkit.

6.1.6 Is there a relationship between the department involved in the NPD process and the collaboration tools used?

As mentioned above, cross functional teams consisting of the different departments are used in the collaboration. Therefore, there is not a clear relationship between the involved departments and the collaboration tools. The collaboration between the different departments, however, is needed to spread the technical knowhow. To protect this IP legal arrangements are made, which could be qualified as a business process collaboration tool as mentioned in the theoretical framework. Regarding the alliances, system integrators are used to commercialise the product. The different departments and the supplier collaborate at this stage. They need to communicate in an open fashion. They also use legal arrangements to protect the IP. However, the system integrator recognises that the alliances apply more trust collaboration tools.

6.1.7 Which collaboration tools affect supplier satisfaction?

Most of the suppliers rate their level of satisfaction as good. Therefore, the conclusions regarding the relationship between collaboration tools and supplier satisfaction are less clear. However, the most applied collaboration tool is communication. One supplier mentioned he was averagely satisfied. In this collaboration, not one category of

collaboration tools stands out, including communication. Therefore it could be said that there is a relationship between the collaboration tool communication and a positive supplier satisfaction. Regarding the tools in the toolkit a common denominator seems to be that the tools in the toolkit are related with trust and communication as a supplier satisfaction variable.

Organisations which operate in the differentiated dimension all mainly apply communication collaboration tools. The buying organisations in the complex dimension Red and Orange apply, next to communication tools, relatively more business process collaboration tools. The suppliers of the buying organisations indicate that these buying organisations apply more categories of collaboration tools than mentioned by the buying organisations themselves. Overall the system integrators rate their level of satisfaction as good, while not many collaboration tools applied by the alliances are recognised. The alliances mainly apply business process collaboration tools. Most of the alliances rate their level of supplier satisfaction as good.

Therefore this thesis concludes that business process and communication collaboration tools are more related to a positive supplier satisfaction than trust, cooperation and technical competences collaboration tools. When suppliers are poorly or averagely satisfied, not one category of collaboration tools stands out above the others.

6.1.8 Is supplier satisfaction an objective for selecting collaboration tools?

Only for the alliances at stage four of the NPD is supplier satisfaction an objective for selecting collaboration tools. In that case collaboration tools from the trust category are applied. An example is an event where system integrators are asked to speak as the professional on the subject. The only collaboration tool used by the organisations to gain supplier satisfaction, is to have an approved vendor list. What also affects the supplier satisfaction is the communication of the roadmap. This roadmap shows the developments of the buying organisation for the next three years to the supplier, so they can participate on these developments. Although these tools are used to bind the supplier and to create an open dialogue, it cannot be stated that these tools are selected for supplier satisfaction.

6.2 Lessons learned about collaboration tools.

This section describes the relationship between the collaboration goal, involved departments, collaboration tools applied and, ultimately, supplier satisfaction. The main question and sub-questions of this thesis are derived from the research design from the introduction of the thesis. Then the relationship will be explained.

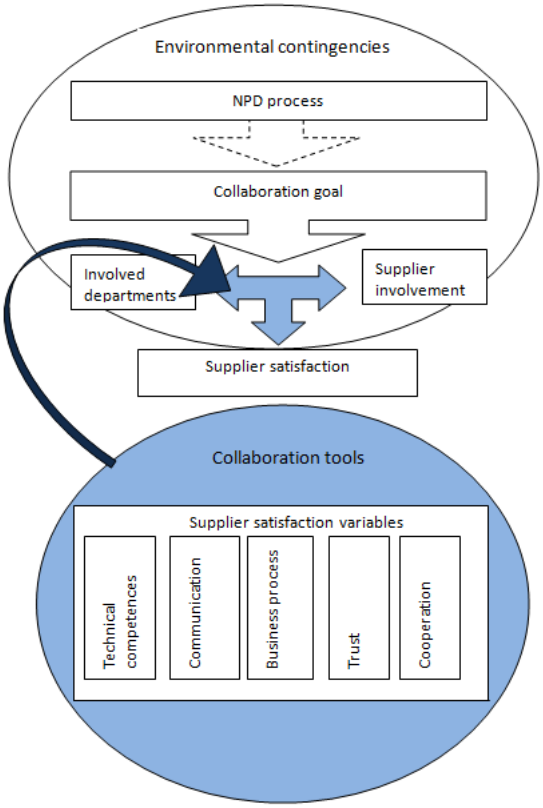

Figure 9 – Literature configuration.

The collaboration goal does affect the choice of the collaboration tools which are applied. A division can be made between the different dimensions, which in this thesis are the differentiated and complex dimensions, in which the buying organisations operate. In the collaboration cross functional teams are used, which is a combination of all the different departments. At stage four of the NPD process, however, the procurement department is not involved. In a NPD process it is needed to communicate and spread the technical knowhow among the different departments to achieve the collaboration goal. In this thesis almost all suppliers indicated that they are satisfied in the collaboration. However, a relation is found between communication and business process collaboration tools, and supplier satisfaction is found as well. A relationship between the choice for certain collaboration tools in order to achieve supplier satisfaction is found at the alliances and

system integrators. To achieve supplier satisfaction in the commercialisation stage more trust collaboration tools are applied.

6.3 Managerial implications: Advice on innovation collaboration tools supporting supplier satisfaction.

This thesis shows which collaboration tools lead to supplier satisfaction. This section indicates the managerial implications: which tools are mentioned most per category of supplier satisfaction variables and can be used to actually obtain supplier satisfaction in collaboration in the NPD process. Table 28 indicates the tools most mentioned as supplier satisfaction variables. It is a combination of what the literature states and outcomes of the interviews.

Tool	How to apply
Incentives	**Incentives for:** – Encourage development effort by suppliers without entering design co-ventures. – Improving performance effort-responsiveness. (e.g.: judgment, prediction, problem-solving, clerical tasks) Incentives for system integrators is a good example. **What to avoid:** – Incentives in risky choices, this does not affect mean performance but reduce variance in responses. **Supplier benefits:** – Pursuing technical advancements.
Portfolio	**Portfolio for:** – Risk reduction and for evaluating possible new projects. – Stimulating interorganisational collaboration for innovation. – Creating focus in the innovation strategy.
Roadmap	**Roadmap for:** – Shortening time to market. – Early supplier involvement (supplier can think of cost reduction solutions). **Link with:** – Portfolio – Approved vendor list – Contracts
Contracts	**Contract are for:** – Achieve mutual goals. – Enable joint rules. – Long-term relationships. – Only ground rules for successful cooperation. **Basis for contracts:** – Trust (no trust no contract, to align expectations) – Strong interpersonal relationships are sometimes more effective than contracts (communication structure).
Approved vendor list	**Approved vendor list for:** – Awareness creation and trust-based long-term network (creates flexibility of the supplier). – Joint learning.

	Basis conditions: – The organisation needs to promote the approved vendor list (e.g. workshops or events). – Being known in the business makes the supplier willing to become an approved vendor. **Supplier actions:** – Communication and marketing of supplier as innovative supplier (portfolio's can be used for this).
Communication structure	**Effective:** – Peer to peer communication. – System in which knowledge is codified. – System in which the relevant receivers are listed. – Electronic system and direct communication (face to face/ visits). **Efficient:** – Early supplier involvement (which can be done by roadmap/ approved vendor list. – Limit information leaks by non disclosure agreements and contracts. **Structure:** – One point of contact to stimulate the information flow. – Cross-functional on several levels. – Knowing your external partner by one point of contact or accountmanager (build trust).
KPI's	**KPI's for:** – Managing expectations by set of rules for interaction (trust is important). **Important:** – 'Degree of freedom' for the supplier. Larger tolerance levels to stimulate suppliers' commitment and input. – Relying on suppliers from the beginning of the NPD process. Especially for complex components.
One point of contact	**One point of contact for:** – Building trust. – Information promotion. – Facilitate continuing interactions and exchange between players. – Provide a wide range of specialist services. (communication matrix / overview of participants) – Warranty for following common set of rules. – Intermediaries are institutional trust-creating mechanisms.
Workshops/events	**Workshops for:** – Signal of trust (mostly approved vendors are invited to workshops and events, which creates new possibilities for the supplier). – Connecting the organisational informal discourse.

Table 28 – Specific tools mentioned which stimulate supplier satisfaction.

Open communication and personal contact are seen as the most valuable tool to enhance supplier satisfaction. Different forms of communication are applied: face to face, direct communication, visits, one point of contact etc. Also new media, such as using the internet for conference calls, are used to increase face to face and other direct contact. Suppliers require and appreciate communication. The managerial implication here is that communication should be used by buying organisations to stimulate supplier satisfaction. The table shows that generally buying organisations and alliances use contracts and other legal tools. Contracts are not seen as a drawback. Open communication is used when the

relation has been formalised by using these contracts. Contracts provide access for suppliers to the buying organisations and for suppliers to become an approved vendor. The formalised relation is seen as an asset and consolidates the relation between buying organisation and supplier.

KPI's are also mentioned to enhance the supplier satisfaction. Suppliers and buying organisations can create the KPI's together. Thereby the supplier is involved in the process of how the supplier's performance is measured. This can be linked to an incentive system. Especially the alliances benefit from these systems. These incentives can also consist of more information and more access to the buying organisation. This improves the supplier involvement and supplier satisfaction. The supplier is also better able to adapt to the NPD process of the buying organisation in the future.

Roadmapping and portfolio are also applied by the buying organisation to show the suppliers what their future plans concerning NPD are. This enhances the suppliers' satisfaction. System integrators also use roadmaps and portfolios to share their plans with the alliances. One reason is to differentiate themselves from competitors and to show their qualifications. Some suppliers also use this tactic.

7. Suggestions for further research.

One clear aspect that comes forth from this thesis is that there is limited research done on collaboration tools. Therefore, a definition of collaboration tools was created. The collaboration tools were then categorised by supplier satisfaction variables by the author. This was meticulously done, but choices had to be made regarding the categorisation. This categorisation and the framework should be further researched.

This thesis used semi-structured interviews. The number of collaboration tools mentioned differs per interviewee. On the one hand this can lead to a bias; on the other hand, it can indicate that there is less collaboration. To counter this, an in-depth case study should be done of one or several collaborations. More respondents from different departments from both the buying organisation and the supplier should be interviewed regarding the collaboration process and the collaboration tools. A thorough observation of the collaboration can provide a more detailed insight than this explorative multiple case study has. Then this can be more specifically linked to supplier satisfaction variables.

Not all the suppliers of the buying organisations are interviewed in this thesis. This is partly so, because several buying organisations would not give their suppliers names due to confidentiality reasons. Other suppliers were asked to participate but would not do so for undisclosed reasons. Another reason is that the buying organisations were asked to introduce the author with the supplier. This resulted in the fact that not from every collaboration the same amount of suppliers were or could be interviewed, and not all procurement managers were or could be interviewed. Also, this introductions led to a bias: buying organisations would be more inclined to introduce suppliers with which the collaboration is productive and fruitful. They would be less inclined to introduce suppliers with which the collaboration was, for example, stopped or with suppliers with whom they have a stressful and negative relation. As mentioned before, a further more detailed single case study should be done to counter this bias.

Most of the interviewed organisations are located in the Netherlands. Some suppliers and headquarters are located abroad. Collaboration and the tools applied in the collaboration can be culturally defined. Therefore it is suggested to research this subject abroad as well.

All of the interviews were done in the same period. The research should be longitudinal as to be sure there is no bias due to the timeframe of this research is done. For example: the economic crisis could be a reason to stimulate cost savings more than in another time period.

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Appendix I Paper analysis: Involved departments and collaboration tools.

Paper search concerning involved departments

The database Web of KnowledgeSM is used to search for articles that match the research topic of this thesis. The following search topics are used: NPD, collaboration, supplier and departments. This resulted in a list of nine papers. Covering the following:

- Subject areas; Business economics, engineering, operations research management science, public administration.
- Publication years; 2005 (2), 2008 (2), 1998, 2003, 2006, 2010, 2011.
- Source titles; industrial marketing management, international journal of production research, journal of business research, journal of operations management, journal of product innovation management, journal of purchasing and supply management, management decision, technological forecast and social exchange, technovation.
- Web of Science categories; management (6), business (5), engineering industrial (3), operations research management science (3), engineering manufacturing (1), planning development (1).

These papers do not give a clear view of which departments are involved in the collaboration with suppliers in the different stages of NPD. The subject area computer science and document types proceedings paper are excluded.

Appendix II Interview protocol.

The interview protocol links the theory and practice. It serves as a guideline for the author and provides insights for the reader about the purpose of the interviews.

Purpose of conducting the interviews

The purpose of conducting interviews is to gain insight in the buyer-supplier relation concerning the collaboration tools used in the NPD process. Specifically the interview is used to explore three aspects in the collaboration:

1) The stage in the NPD process in which the supplier is involved
2) Whether collaboration tools are used, and if so, which collaboration tools
3) The influence of these collaboration tools on the supplier satisfaction

In short, to find evidence for collaboration tools that lead to supplier satisfaction.

Interview methodology

A total of 23 interviews are conducted. Each interviewee received a short description of the purpose of the interview. These interviews take between 30 and 60 minutes. Each interview is recorded and transcribed into a summary. A third party matched the recordings to the summaries to prevent an author's bias and to check for completeness. The summaries are then sent to the interviewee for fact-checking.

Selection of interviewees

The interviewees are selected through purposive sampling (Holloway, 2010). In this thesis, this leads to selecting respondents because of the experience and knowledge they have about buyer-supplier collaboration in a highly technical and innovative setting. Some participants are suggested by the thesis supervisors, others are chosen by the thesis author.

Interview guide

Below the interview guide is described. This guide (see Table 0.2) is the script that structures the interview. The interview guide contains the topics to be covered during the interview with the questions to be asked.

Introduction	Introduction of myself
Briefing	Purpose of research
	Purpose of interview
	Announce that the interview is recorded
	Explain the interview procedure
	Question: Do you have any questions before starting the interview?
Outline question 1 and 2:	*In innovative settings suppliers are essential for human and capital resources (Schiele, 2011). Early supplier involvement increases the responsiveness of the supplier in the NPD process (Schiele, 2006). Small and midsize entrepreneurial companies are more flexible to adapt to fast moving innovation (Huston/Sakkab, 2006).*
Question 1:	**In which stage of the NPD process is the supplier involved?**
Sub-questions:	– Please describe the NPD process of one innovative project? – Who generates the idea of a new product? – In which of the NPD process is the supplier involved? • Stage 1 – Idea finding • Stage 2 – Generate technical concepts • Stage 3 – Technical and economical evaluation • Stage 4 – Commercialisation
Question 2:	**What is the goal of collaborating with supplier/buying organisation?**
Sub-questions:	– Can you describe for which parts of the product the supplier is involved? • Why is the supplier involved? • Does the supplier provide strategic parts? • Does the supplier provide parts which can make a significant difference in the end product? – Can you describe the main goal of collaborating with the supplier? • Suggestions for cost savings? • To increase responsiveness and higher flexibility? • To increase quality and/or novelty of the new product? • To increase the organisation's profit?
Outline question 3:	*Organisations can be divided in four departments; R&D, manufacturing, marketing and procurement. To gain a sustainable internal organisational structure it has to support cross-functional and inter-organisational development processes (Schiele, 2010). Internal co-operation is required for external co-operation (Schiele, 2006).*
Question 3:	**Which departments of the organisation are involved in the collaboration with suppliers/buying organisations?**
Sub-questions:	– Can you describe the selection procedure of a supplier? • Which characteristics are important for selecting a supplier? • Does a historical relation with a supplier influence the selection? • Does the producing capacity of the supplier influence the selection of a supplier? • Does the price influence the selection of a supplier?

	– Which department has the final decision of selecting a supplier? – Which department collaborates with the supplier? – Which departments of your organisation and which departments of the supplier/ buying organisation collaborate with each other?
Outline question 4:	*Collaboration tools: 'a process or system designed or used for the purpose to closely co-operate with customers and suppliers to maximise the benefits of the business they are involved in. This process or system serves as a foundation or serves as to maintain a certain level of NPD.'.*
Question 4:	**Which collaboration tools are used in the NPD process with supplier/ buying organisation?**
Sub-questions:	– Do you know what collaboration tools are? • If no, the definition of collaboration tools is given. • If yes, can you describe what is meant with collaboration tools? The definition will be given. – Can you list and describe which collaboration tools are used by your organisation in the buyer-supplier relationship? • Which of these collaboration tools are processes? • Which of these collaboration tools are (technical) systems? – Can you describe the overall use of the collaboration tools?
Outline question 5:	*Supplier satisfaction (Essig/Amann, 2009): 'a supplier's feeling of fairness with regard to buyer's incentives and supplier's contributions within an industrial buyer-seller relationship as relates to the supplier's need fulfilment, such as the possibility of increased earnings or the realisation of cross-selling.' There is a lack of knowledge on collaboration tools and the innovation power that can be gained from these tools (Essig/Amann, 2009). An unsatisfied supplier may deliver poor quality output that lowers the buyer's products (Essig/Amann, 2009).*
Question 5a:	**(For buying organisations): How satisfied do you think your supplier is with the collaboration?**
Sub-questions:	– Which score do you think your supplier will give the collaboration with your organisation (on a 5 point scale, whereby 1 = very poor and 5 = very good) – Please explain your chosen score in terms of: • Technical competences • Communication • Business processes • Trust • Cooperation
Question 5b:	**(For suppliers): How satisfied are you with the collaboration with the buying organisation?**
Sub-questions:	– Which score do you give the collaboration with the buying organisation (on a 5 point scale, whereby 1 = very poor and 5 =

	very good) – Please explain your chosen score in terms of: • Technical competences • Communication • Business processes • Trust • Cooperation
Debriefing	Summarising the main points mentioned during the interview.
	Question: I have no further questions. Is there anything else you would like to bring up before finishing this interview?
Closure	Thank you for participating in this interview.

Table 29 – Interview guide.

Appendix III Table of collaboration tools.

Below, Table 30, depicts the overall use by all organisations of the different variables that can lead to supplier satisfaction. It shows per organisation which collaboration tools categorised by supplier satisfaction variable are applied. Furthermore it is divided in the amount of collaboration tools applied by the buying organisation, by both the buying organisation and the supplier and collaboration tools applied only by the supplier. Also totals are given. When applicable, also a division is made between the procurement department and the R&D manager. As mentioned, it was not always possible to interview all the organisations' suppliers and both the procurement and the R&D managers.

		Technical competences	Communication	Business process	Trust	Cooperation	Total
Organisation							
Green	Organisation	0	3	0	0	1	4
	Both	0	0	0	0	0	0
	Supplier	0	0	0	0	5	5
	Total	***0***	***3***	***0***	***0***	***6***	***9***
Blue	Organisation	0	7	5	0	1	13
	Both	0	0	0	0	0	0
	Supplier	0	0	0	2	1	3
	Total	***0***	***7***	***5***	***2***	***2***	***16***
Pink	Organisation	0	2	1	0	1	4
	Both	0	0	0	0	0	0
	Supplier	1	0	0	1	3	5
	Total	***1***	***2***	***1***	***1***	***4***	***9***
Orange	Organisation	0	4	7	0	1	12
	Both	0	0	0	0	0	0
	Supplier	3	0	0	2	1	6
	Total	***3***	***4***	***7***	***2***	***2***	***18***
Yellow	Organisation	0	6	2	0	0	8
	Both	0	0	0	0	0	0
	Supplier	2	0	0	2	3	7
	Total	***2***	***6***	***2***	***2***	***3***	***15***
Red	Organisation	0	1	6	0	2	9
	Both	0	0	0	0	0	0
	Supplier	1	0	0	2	2	5
	Total	***1***	***1***	***6***	***2***	***4***	***14***
Supplier							
S1/Green	Organisation	2	0	1	2	2	7
	Both	0	4	0	0	1	5
	Supplier	0	3	1	0	2	6
	Total	***2***	***7***	***2***	***2***	***5***	***18***
S2/Green	Organisation	3	2	2	1	1	9
	Both	0	4	0	0	1	5

	Supplier	0	0	0	0	2	2
	Total	***3***	***6***	***2***	***1***	***4***	***16***
S/Orange	Organisation	3	0	3	2	1	9
	Both	0	3	0	0	0	3
	Supplier	1	1	2	0	2	6
	Total	***3***	***4***	***5***	***2***	***3***	***17***
S/Yellow	Organisation	1	4	0	1	1	7
	Both	0	4	0	1	1	6
	Supplier	0	0	0	0	1	1
	Total	***1***	***8***	***0***	***2***	***3***	***14***
Procurement							
P/Orange	Organisation	0	3	3	0	0	6
	Both	0	0	0	0	0	0
	Supplier	2	3	3	2	3	13
	Total	***2***	***6***	***6***	***2***	***3***	***19***
P/Red	Organisation	0	2	4	0	0	6
	Both	0	0	0	0	0	0
	Supplier	1	0	0	0	8	9
	Total	***1***	***2***	***4***	***0***	***8***	***15***
Alliance							
A	Organisation	3	3	4	0	3	13
	Both	0	1	0	0	0	1
	Supplier	0	0	0	0	0	0
	Total	***3***	***4***	***4***	***0***	***3***	***14***
B	Organisation	3	5	8	3	1	20
	Both	0	0	0	0	0	0
	Supplier	0	0	0	0	0	0
	Total	***3***	***5***	***8***	***3***	***1***	***20***
C	Organisation	1	3	5	3	4	16
	Both	0	0	0	0	0	0
	Supplier	0	0	0	0	0	0
	Total	***1***	***3***	***5***	***3***	***4***	***16***
D	Organisation	3	7	3	3	4	20
	Both	0	0	0	0	0	0
	Supplier	0	0	0	0	0	0
	Total	***3***	***7***	***3***	***3***	***4***	***20***
E	Organisation	1	10	5	4	3	23
	Both	0	1	1	0	1	3
	Supplier	1	0	1	0	0	2
	Total	***2***	***11***	***7***	***4***	***4***	***28***
System integrator							
SI/A	Organisation	1	1	1	3	1	7
	Both	2	2	0	0	4	8
	Supplier	0	1	3	2	0	6
	Total	***3***	***4***	***4***	***5***	***5***	***21***
SI/B	Organisation	0	1	1	2	2	6
	Both	2	2	2	1	0	7
	Supplier	2	2	2	0	2	8
	Total	***4***	***5***	***5***	***3***	***4***	***21***
SI/C	Organisation	0	2	6	3	2	13
	Both	0	0	0	2	0	2
	Supplier	2	5	1	3	2	13
	Total	***2***	***7***	***7***	***8***	***4***	***28***
SI/D	Organisation	2	1	1	2	0	6
	Both	0	3	2	1	3	9
	Supplier	5	4	0	2	0	11

	Total	***7***	***8***	***3***	***5***	***3***	***26***
SI/E	Organisation	0	1	0	0	0	1
	Both	0	0	1	0	1	2
	Supplier	3	4	3	4	2	16
	Total	***3***	***5***	***4***	***4***	***3***	***19***

Table 30 – All tools used by organisations categorised by supplier satisfaction variables

Appendix IV Selection toolkit tools.

1. Organisations

Tools used by	Supplier satisfaction variable	
Organisation	communication, business process	(cooperation*)
Both	none	
Supplier	cooperation	(trust, technical competences*)

* The tools between brackets are mentioned, but far less than those that are mentioned most.

Remarkable

Organisation Pink thinks that their supplier is 'average' satisfied because of the cost reduction they demand from their supplier.

- Although there is no supplier interviewed to confirm this.
- The amount of tools applied by Pink is almost equal to the amount Green applied. Greens supplier is satisfied. So it could be possible that suppliers of Pink are satisfied.

Overall

- Cooperation tools are applied by organisation and used by the supplier (seen by the organisation).
- Remarkable is that the organisations use different tools than their supplier. The tools used by the organisation on the one hand and by the supplier on the other hand, cover all the supplier satisfaction variables.
- Remarkable is that Pink thinks that their supplier is 'average' satisfied and Pink applies less tools that the other two organisations that are also classified as differentiated.

Supplier satisfaction variable	Specific tools mentioned the most
Communication	• Visits • Open communication
Business process	• Contracts • Portfolio
Cooperation	• Roadmap • Supplier involvement (workshops/events like supplier days)

2. Suppliers

Tools used by	Supplier satisfaction variable	
Organisation	technical competences	(The other supplier satisfaction variables*)
Both	communication	(cooperation*)
Supplier	cooperation	(communication, business process*)

* The tools between brackets are mentioned, but far less than those that are mentioned most.

Remarkable

Supplier 2 of Green states to be 'average' satisfied. They blame the communication about the NPD. Supplier 2 would be satisfied when they would receive information about the buying organisation's long term planning earlier.

– There are two communication tools (applied by the buying organisation) mentioned by S2/Green. S1/Green mentions no communication tools are applied by the buying organisation. But S1/Green mentions 3 communication tools applied by them self. And S2/Green mentions no communication tools are applied by them self.

Other remarks

– According to the suppliers mainly technical competence tools are applied by the buying organisation. Although the buying organisations do not mention any technical competence tools are applied by them.
– The amount of cooperation tools applied by the buying organisation and seen by the supplier are almost equal. Organisation and supplier both indicate that the supplier applies more cooperation tools.
– According to the supplier trust tools are applied by the buying organisation. However, the buying organisations state to apply none of these trust tools.
– Business process tools are applied by a few suppliers and buying organisations, but very little.

Overall

– There is a difference between the tools applied by the suppliers and buying organisations and the tools recognised to be used by the other. Buying organisations indicate to apply many business process and communication tools. This is not recognised by the suppliers. On the other hand, suppliers do recognise that buying organisations use many technical competence tools, which are not mentioned to be applied by the buying organisations themselves. Overall interviewees, both from buying organisations and suppliers, state to apply more tools than the other. The suppliers mention that there are also tools applied by both the buying organisation and the supplier, where the buying organisations do not recognise this.

Supplier satisfaction variable	Specific tools mentioned the most
Technical competences	• Investments in knowledge (prototypes/competences)
Communication	• Direct communication
Cooperation	• KPI's • Open communication and direct communication (new media) • Generate insights in what is requested and/or developed in the coming years (KPI's/roadmaps)

3. Procurement departments

Tools used by	Supplier satisfaction variable	
Organisation	business process, communication	
Both	none	
Supplier	cooperation	(The other supplier satisfaction variables*)

* The tools between brackets are mentioned, but far less than those that are mentioned most.

Remarkable

- The procurement department have the same level as supplier satisfaction as their buying organisation.

Overall

- The procurement department and the buying organisation mention the same list of tools. Procurement sees more tools to be applied by the suppliers than recognised by the buying organisations. It could be possible that the procurement departments see more of the suppliers' effort, because of the close collaboration with the suppliers.

Supplier satisfaction variable	Specific tools mentioned the most
Business process	• Approved vendor list • Contracts
Communication	• Streamline the communication (one point of contact)
Cooperation	• Supplier involvement activities (roadmaps/supplier days/workshops)

4. Alliances

Tools used by	Supplier satisfaction variable	
Organisation	communication, business process	(The other supplier satisfaction variables*)
Both	some	
Supplier	none	

* The tools between brackets are mentioned, but far less than those that are mentioned most.

Remarkable

- Alliance C thinks that their system integrator is 'average' satisfied and alliance D thinks that the system integrator is 'poor' satisfied. Although, there are no differences in the amount of tools applied compared with the other alliances which are 'good' satisfied.

Overall

- Alliances mention to apply many tools themselves. Alliances do not recognised tools to be used by system integrators or by them both.

Supplier satisfaction variable	Specific tools mentioned the most
Communication	• One point of contact • Communication tools (face to face/new media) • Events
Business process	• Contract/agreements • Alliance mapping/plan

5. System integrators

Tools used by	Supplier satisfaction variable	
Organisation	Trust, business process	(communication, cooperation)
Both	Cooperation, communication	(The other supplier satisfaction variables*)
Supplier	Communication, technical process, trust	(business process, cooperation)

* The tools between brackets are mentioned, but far less than those that are mentioned most.

Remarkable

System integrator C states to be 'average' satisfied. This corresponds with the assumed level of supplier satisfaction by the alliance C. This is because Alliance C gave a mayor deal to a different system integrator. The contact between system integrator C and their alliance was broken off for a while. This contact is recently restored.

Overall

- The SI mentions more tools in total are applied in the collaboration between the alliance and SI. The SI mentions to apply more tools than the alliance. Alliance states to use more tools that the SI. Alliances only recognise tools to be applied by themselves, not by the SI or by both.
- Both the alliance and the SI indicate to apply business process tools. However, they only recognise them to be used by themselves, not by the other party.
- The SI and the alliance roughly apply the same amount of trust tools. Furthermore, the SI recognises the amount of trust tools to be applied by the alliance. The SI recognises some trust tools to be applied by both the SI and the alliance, where this is not recognised by the alliance.
- The alliance indicates to apply more cooperation tools than the SI recognises. The SI states that a large portion of the cooperation tools are applied by both. These combined give roughly the same amount of cooperation tools as to be applied by the alliances as seen by the alliance themselves.

Supplier satisfaction variable	Specific tools mentioned the most
Technical competences	• Focus points (portfolio/differentiation
Communication	• One point of contact • Information push (reviews, etc.) • Personal contact
Business process	• Stimulations (plans/portfolio
Cooperation	• Planning (KPI's/roadmap)
Trust	• Show appreciation (awards) • Incentive based stimulations (awards/rewards)

6. List of selected tools

Buying organisation and alliance

When the tools which are applied the most by alliances and buying organisations are combined, the following list of tools is constructed:

- Direct communication (communication matrix)
- Contracts

- Workshops/events
- Approved vendor list

Supplier and system integrator

When the tools which are applied the most by system integrators and suppliers are combined, the following list of tools is constructed:

- Portfolio
- KPI’s
- Roadmap
- Direct communication
- Incentives

Appendix V Interviews and tools

In this section the cases are briefly summarised and the tools mentioned are listed.

Buying organisation Yellow

Yellow is a big multination brewery. Its primary focus is on the production, retail and marketing of beer. In addition to its core business, Yellow also engages commercialisation of results of basic scientific research, especially within the biotechnology field. The interviewee is the head of ingredients and research.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	Only R&D
Collaboration goal	Increase quality and/or novelty of the new product
Stage NPD	Stage 2
Dimension	Differentiated

By whom	Name tool	Satisfaction variable	Explanation
Organisation	NDA	Business process	To be able to have open communication also regarding IP rights.
Organisation	Open systems	Business process	Supplier is able to see all information about the project.
Organisation	One point of contact	Communication	One person to contact for all issues
Organisation	Open communication	Communication	Share information and be honest to each other
Organisation	Problem solving	Communication	Direct solving problems, and that's easier because the contact person is higher management.
Organisation	Share information	Communication	Share information as much as possible so the supplier knows what is expected and which problem to solve.
Organisation	Visits buying firm	Communication	Good treatment everything arranged
Organisation	Visits supplier	Communication	On a regular base (3/4 times a year)
Organisation	Meetings	Cooperation	To give the supplier a presentation of the idea/concept to explain the problems that have to be solved.
Organisation	R&D	Cooperation	The research department involves the supplier in the second NPD stage to solve problems in the concept not for producing the product.
Organisation	Roadmap	Cooperation	Communication with supplier in stage 2/3 so the supplier knows what will be produced on the short term
Organisation	Reliable	Technical competences	The quality of the products made by the supplier. Mostly done by procurement by assessing the supplier.
Organisation	Specifications	Technical competences	Clear description of the specifications written down about when goal is reached in how much time.
Organisation	Confidence in supplier	Trust	Giving confidence in supplier because of technical reliability, realistic view supplier, supplier is not commercial.

Organisation	Task division	Trust	Agreements on how will do what in the second NPD stage and what is expected by whom.

Supplier Yellow

S/Yellow is a UK based enzyme research, development and manufacturing company. S/Yellow supplies enzymes for Yellow, the multinational brewery. They pride themselves on quality, customer service, technical knowledge and a desire to be innovative. The interviewee is the new product development manager.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and procurement
Collaboration goal	Increase quality and/or novelty of the new product
Stage NPD	Stage 2
Dimension	Differentiated

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Direct communication	Communication	Direct communication with contact person who is higher management
Both	Email	Communication	Not much used because of the confidentiality of the information.
Both	New media	Communication	The use of new media like conference calls with visuals
Organisation	One point of contact	Communication	One contact person as the contact person at the organisation
Both	Open communication	Communication	Very open and transparent communication to share all information which is possible under the NDA. The information gained by supplier is an added value for their portfolio.
Both	Phone	Communication	Regular phone calls
Organisation	Sector information	Communication	The collaboration with organisation is for gaining sector information for Breweries which can be used by supplier for other customers in different sectors.
Organisation	Visits	Communication	Face to face communication supporting the relation.
Organisation	Brainstorm	Cooperation	Finding solutions for the problems in the concept of organisation. By brainstorming possibilities are discussed and lead to specific tasks for each party.
Both	Cross-functional contacts	Cooperation	Supporting the collaboration by directly contacting the department with the information needed.
Organisation	Meetings	Cooperation	Meetings for discussing the progress and each other's results.
Supplier	Investments	Technical competences	Investments done by the supplier as service towards the organisation (customer intimacy)
Supplier	Customer satisfaction	Trust	Done by an external agency commissioned by supplier.
Both	Long-term relation	Trust	The long-term relation between the companies makes is easier to collaborate without gaining much money from the organisation.

Buying organisation Blue

Blue is an international health care pharmaceutical company. They produce medicines that treat six major disease areas. In addition, it is engaged in the important area of vaccines and are developing new treatments for cancer. The interviewee is specialised new product development in dental care.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	Only procurement
Collaboration goal	Cost savings
Stage NPD	Stage 2
Dimension	Differentiated

By whom	Name tool	Satisfaction variable	Explanation
Organisation	**Accountmanager**	**Business process**	**Each supplier has his/her own accountmanager who manages the contact. To gain trust.**
Organisation	Close working relation	Business process	Working close together with the engineers to manage innovation.
Organisation	Contracts	Business process	To gain exclusiveness of an innovation for X years or in a certain area/branch.
Organisation	Imbedding supplier	Business process	Contact with the supplier by accountmanager so the supplier has the feeling being embedded in the organisation.
Organisation	Policies (internal organisation)	Business process	There is a policy within organisation about how to work with externals, important because of the rules and regulations.
Organisation	Communication	Communication	Clear communication and set objectives. This supports the commitment of both parties.
Organisation	Communication	Communication	Email, phone, visits 2 ways.
Organisation	Open communication	Communication	The supplier informs the buying organisation on time when the supplier decides to take something out of production. So organisation can search for new possibilities.
Organisation	Open innovation team	Communication	Who searches for innovations in the market, contact the possible supplier to search for a 'fit' into the innovation.
Organisation	Single point of contact	Communication	Human factor, agreements and communication. To make sure they stick to the contract, what to do with conflicts and search for contacts within the organisation.
Organisation	Visits by procurement	Communication	Showing interest in the supplier and check them to ensure the rules and regulations set in the pharmaceutical branch.
Organisation	Visits supplier	Communication	To check the supplier and to create open dialogue on what organisation wants of the supplier so the supplier can think of how they can support the organisation.
Organisation	Buying large amount of supplies	Cooperation	The amount of sales rewards the buying firm with the status of good customer. And the possible sales make suppliers willing to collaborate more.
Organisation	Roadmap	Cooperation	Used by the open innovation team for their search for suppliers. And is communicated only with the

			suppliers of which the organisation thinks that they can produce it.
Organisation	Investments in supplier	Trust	Invest in suppliers so they can innovate for organisation (e.g. to make prototype)
Organisation	IP right	Trust	Supplier stays the owner of IP. When it is too scarce the organisation looks for possibilities to buy the use of it or to buy the IP. Just to reduce risk.

Buying organisation Pink

Pink is a Dutch soft drinks manufacturer, distributor and sales organisation. Pink has a very wide range of products consisting of the company's own brands and soft drinks produced under license. The interviewees are the innovation manager and the senior buyer.

Question topic	Answer
Rate supplier satisfaction	Average
Departments collaborate with supplier	Manufacturing and procurement
Collaboration goal	Cost savings
Stage NPD	Stage 2
Dimension	Differentiated

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Approved vendor list	Business process	These suppliers become involved in an earlier stage to give feedback on the concept for improvements or innovations.
Organisation	Communication	Communication	Mainly email, phone
Organisation	Procurement	Communication	The procurement department keeps the contact with suppliers to gain insights of the suppliers' innovations.
Organisation	Award day	Cooperation	Was only once but ideas of organising this again. During this day ideas were generated in groups and the best idea was rewarded.
Organisation	Meetings	Cooperation	Coming together during the project to collaborate.
Organisation	Supplier day	Cooperation	Suppliers are invited to present their ideas for cost reduction or new products.
Organisation	Workshop	Cooperation	Invite several suppliers to innovate and generating ideas in a discussion format.
Organisation	Invitation preferred suppliers	Technical competences	From the approved vendor list are the suppliers selected and invited to present possible improvements or innovation.
Organisation	Sales	Trust	According to organisation is the large volume of sales a tool of gaining trust.

Buying organisation Orange

Orange is a leading defence contractor and a major player in civil and commercial markets around the world. Its five businesses are organised by market segment –defence, security, space, civil aerospace, ground transportation – and operate as a single organisation, sharing advanced technologies. Interviewees are the business innovation team manager and the purchase managers of sensors.

Question topic	Answer R&D department	Answer procurement
Rate supplier satisfaction	Good	Good
Departments collaborate with supplier	R&D, manufacturing and procurement	R&D, manufacturing and procurement
Collaboration goal	Increase responsiveness and higher flexibility	Cost savings
Stage NPD	Stage 2	Stage 2
Dimension	Complex	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Commodity team	Business process	For contacting supplier. Combination of engineers (for functionality) and procurement (for price). To spread information and knowledge this team changes every 2 years as part of the strategy.
Organisation	Contracts	Business process	A contract for suppliers that have proven themselves. Contract consists of description product quality, design, production files stay property of the organisation. This is mostly done with less commercial suppliers.
Organisation	Portfolio	Business process	The core business of the organisation and gives an indication/direction towards outsourcing.
Organisation	Procurement	Business process	Responsible for long-term relationship with supplier and the continuity. Communicate with suppliers to keep the system updated and prevent adolescent whereby the supplier warning when product will be taken out of production. Related to innovation from supplier side.
Organisation	Production series	Business process	Producing 4 products instead of the requested 2. More sales for the supplier and reducing delivery time for a next order. (normal production takes approx 2 years)
Organisation	Subcontractor	Business process	Responsible for gaining the lowest price. The organisation collaborates with the supplier to know what increases the price of the supplier's product and search for solutions.
Organisation	System listing suppliers	Business process	Procurement tool for who delivers what, which price and for which product used. Mainly regular parts.
Organisation	Calls	Communication	Regular phone calls
Organisation	Open communication	Communication	Share as much as possible with the supplier. 'If the supplier approaches your customers with the same product, you have shared too much.' And communication to know what increases the price of the supplier and search for solutions.
Organisation	Peer to peer communication	Communication	Engineers collaborating with engineers suppliers.

Organisation	Visits protocol	Communication	Face to face communication supporting the relation.
Organisation	Business case	Cooperation	Collaboration with supplier for new concepts. Goal to generate business on long-term.
Organisation	Project cell	Cooperation	Stationing the supplier in-house in a project team to innovate along with engineers of buying organisation for 4 weeks in the concept phase.
Organisation	Requirements	Technical competences	In detail the requirements for products needed used by procurement. This tool is used to reduce the price and to give the supplier the possibility to innovate or think along.
Organisation	Risk budget	Technical competences	Budget for risks in the concept phase. Because testing cost money.
Organisation	Testing prototypes	Technical competences	Collaboration with supplier by testing the prototype with the supplier so the supplier can improve their part with the results.
Organisation	Budget	Trust	Budget special for maintaining the relation with suppliers.
Organisation	Small projects	Trust	New suppliers are contracted for small projects to see how the collaboration works and to gain knowledge.

Procurement

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Approved vendor list	Business process	A reward for suppliers and stimulates the collaboration.
Organisation	Gentleman contract	Business process	Contract with supplier for 3 years which stated the guarantee of working with them instead of others. As part of the acquisition of the assembly line of the organisation by the supplier.
Organisation	Portfolio	Business process	Selling departments. Hereby the department becomes a supplier and gets more responsibility for one part of the product. At the same time it generates more competition between the suppliers which lowers the price and stimulates the supplier of gaining more knowledge.
Organisation	Informal contacts	Communication	Because of the resent acquisition the contacts are informal and not structured. Problem is that one point of contact does not work and creates misunderstanding.
Organisation	One point of contact	Communication	In practice not optimal because of the informal line from before the acquisition.
Organisation	Visits	Communication	Visit of the supplier. Creating the dialogue on how thing are going.
Organisation	Project cell	Cooperation	Supplier involved in project and positioned in-house for 4 week. Would be better to do this at the supplier to gain more knowledge.
Organisation	Roadmap	Cooperation	Good for collaboration with suppliers but the many rules hinder innovation.
Organisation	Supplier involvement	Cooperation	Innovation with suppliers on existing innovations.
Organisation	Outsourcing on prospect	Technical competences	The price is less important because of single supplier and the quality has higher priority than price.
Organisation	Specifications	Technical competences	According to procurement the buying organisation gives too much specifications what causes the supplier not to innovate or think for themselves. And setting these requirements cost time and therefore money.
Organisation	Controlling	Trust	Controlling the supplier by controlling the production of the supplier a lot (this takes uncertainty away at the supplier). This is actually done because organisation afraid of losing control.
Organisation	Outsourcing	Trust	Good for collaboration with suppliers and gaining knowledge for innovation. But when there are a few orders, outsourcing becomes too expensive.

Supplier Orange

S/Orange is a high-tech system supplier which designs and builds complete mechatronic systems for its customers. Interviewee is the account manager.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and procurement
Collaboration goal	Cost savings
Stage NPD	Stage 2
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Framework agreement	Business process	These are official agreements on how things are arranged after the acquisition. The metaphor of a divorce was used by the supplier.
Organisation	Gentleman contract	Business process	With this contract there is a warranty of orders from the organisation and there is an agreement on communication. So when the supplier is approached by a customer of the organisation the supplier will communicate this with the organisation for collaboration.
Supplier	Portfolio	Business process	An overview of what the focus areas are from the supplier so the organisation knows what competences are generated by the supplier.
Organisation	Revenue warranty	Business process	Only for 3 years (gentlemen's agreement)
Supplier	Supply chain management	Business process	Supplier keeps track on the supply chain to prevent problems and to be able to serve the organisations on the best way.
Supplier	Communication matrix	Communication	The supplier has a communication matrix in which the official communication lines and who communicates with who is written down.
Both	Conflict management	Communication	When problems appear these are directly solved when possible. Or these conflicts are escalated to the higher management as agreed on.
Both	One point of contact	Communication	From supplier side the accountmanager is the person for the first contact and main contact.
Both	Open communication	Communication	Open communication to manage expectations and to keep the focus.
Supplier	Hire engineers (temporary)	Cooperation	Supplier wants to be involved in the development of products but because of the large orders they have a shortage of engineers. To be able to be involved in the development they hire extra engineers to manage the production and development.
Organisation	KPI's organisation	Cooperation	KPI's are set by the organisation so the supplier has insight in how they are measured and what to improve to satisfy the organisation.
Organisation	Meetings peer to peer	Cooperation	Peer to peer communication. Engineers have direct contact with the organisation engineers.
Supplier	Investments	Technical competences	Investments done by the supplier as service towards the organisation (customer intimacy)
Supplier	Prototypes	Technical competences	Making prototypes to show the organisation what the technical competences of the supplier are and show commitment towards the organisation.
Organisation	Testing by organisation	Technical competences	The organisation tests the developments with the supplier (including the parts delivered by the

			supplier) to collaborate and discuss with the supplier on how the problems can be solved.
Supplier	Track rack	Technical competences	An overview of all products made by the supplier. This is used to show the prospects and customers what their technical competences are.
Supplier	Budget	Trust	A budget for investments and prototyping to serve the organisation.
Supplier	Open costing	Trust	Open costing, open up the books on what the production of a product cost.

Buying organisation Green

Green helps Dutch health care organisations with their innovation processes and efficiency. They develop, implement and manage IT-solutions for ehealth, primary processes and business processes. Interviewees are a team leader and the product manager of the care department.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and procurement
Collaboration goal	Increase quality and/or novelty of the new product
Stage NPD	Stage 2
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Conference calls	Communication	Communication with all persons involved to discuss the progress and possible problems.
Organisation	Face to face conversations	Communication	The process is discussed and explained face to face.
Organisation	Visits	Communication	4 times a year visit the supplier on location. During this visit are also the expectations discussed.
Organisation	Exchange	Cooperation	Exchange of engineers in two-ways to support collaboration.
Organisation	KPI's	Cooperation	A list of measurements are composed with the supplier. There are different rates linked with performance (good performance is high rate and vice versa) There are also soft measurements on e.g. initiatives for innovation.
Organisation	Management system	Cooperation	System of buying organisation to collaborate with suppliers. This system contains the tasks for the supplier on the development and suggestions can be given by the supplier. The tasks are also rated by the supplier on time and costs.
Organisation	Roadmap	Cooperation	Planning for what will be developed the next 3 year. The first year in detail, second in big lines, third year in areas. This is communicated with supplier and can have changes every half year because of the regulations.
Organisation	Use of supplier suggestions	Cooperation	The suggestions made in the system by the supplier are analysed and can be rewarded by implementing it. This gains trust at the supplier.
Organisation	Visit supplier with customer	Cooperation	To improve the collaboration.

Supplier I Green

S1/Green is an innovative entrepreneur developing software for bigger software companies. They innovate, optimise and simplify software and the related development process. Interviewee is the senior manager chief technology officer.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and procurement
Collaboration goal	Increase quality and/or novelty of the new product
Stage NPD	Stage 2 (sometimes 1)
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Contracts	Business process	Business agreements
Supplier	Inviting customers	Business process	Inviting the customer to take a close look in the kitchen.
Both	Email	Communication	Communication tool.
Both	Open communication	Communication	Mainly gained by video calls and other new media.
Both	Peer to peer contact	Communication	Engineers collaborating with engineers suppliers.
Both	Personal contact	Communication	Direct contact with the person in the organisation.
Supplier	Skype/ teamviewer	Communication	New media for communication.
Supplier	Video calls	Communication	New media for communication.
Supplier	Voice over IT system	Communication	New media for communication.
Supplier	Become partner	Cooperation	From supplier perspective
Supplier	Project plan supplier	Cooperation	A project plan states projects that are done by the supplier to gain knowledge which eventually can serve the customer (commercial).
Organisation	Roadmaps	Cooperation	Planning for what will be developed the next 3 year. The first year in detail, second in big lines, third year in areas. This is communicated with supplier and can have changes every half year because of the regulations.
Both	Same goal	Cooperation	Having a clear and same view on what to achieve with each other. This is important for the supplier for collaboration and managing the expectations.
Supplier	Technical roadmap	Cooperation	A planning of the technical areas that receive the focus of the supplier. This is communicated with the customer so the supplier can adapt the interest of the organisation.
Supplier	Added value customer	Technical competences	If the organisation collaborates with the supplier on new and innovative products the supplier becomes enthusiastic. This is when the supplier sees the added value for them. Supports technical competences and collaboration.
Supplier	Prototypes	Technical competences	The supplier makes prototypes of the suggestions for customers so the customer has a more tangible example of how this could work for them.
Supplier	Enterprise wiki	Trust	An internal Wikipedia for collecting technical information and is used to gain knowledge.

Supplier	Non commercial innovation	Trust	The supplier is willing to develop or innovate with customers without getting paid. Here for is the gained technical information and knowledge drives the supplier.

Supplier II Green

S2/Green is a large multinational operating in consulting, technology, outsourcing, and local professional services. Their IT department works with the client's IT professionals to assess the environment, devise a strategy, and design a more cohesive, integrated system. Interviewees are the service delivery manager and the service coordinator.

Question topic	Answer
Rate supplier satisfaction	Average
Departments collaborate with supplier	R&D, manufacturing and procurement
Collaboration goal	Increase quality and/or novelty of the new product
Stage NPD	Stage 2
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Process	Business process	Process of organisation although the process isn't used that well by the organisation self.
Organisation	System	Business process	System by organisation
Both	Informal contacts	Communication	Because of the history together. Former organisation was divided into two parts where the supplier bought the specific knowledge part. This is needed by the buying organisation.
Organisation	One point of contact	Communication	One person to contact with questions of any kind.
Both	Open communication	Communication	Open communication to manage expectations and to keep the focus.
Both	Peer to Peer contact	Communication	Engineers collaborating with engineers suppliers.
Both	Video conferences	Communication	Communication tools to have meetings with all involved people without travelling to one location. And the visuals support also the body language.
Organisation	Visits	Communication	Used by the organisation this year for the first time
Organisation	Forecast	Cooperation	Forecast of what will be developed the next period and what is requested from the suppliers. This gives the supplier the possibility to think along with the buying organisation. Although the supplier says that it could be shared in an earlier stage and better.
Organisation	KPI's	Cooperation	KPI's of the organisation gives a good overview and is transparent. The incentives are a good stimulation. Also the fact that it is put on paper together.
Organisation	Roadmap	Cooperation	Isn't used that much for collaborating with the supplier.
Both	Transparent collaboration	Cooperation	All builders know the designers.
Supplier	Investments	Technical competences	Educating employees, extra people without raising the price for customer. Extra service towards the customer. It is clearly communicated what is done for the organisation.
Supplier	Offshore	Technical competences	The use of other departments of the supplier where technical knowhow is generated.
Supplier	Specific knowledge	Technical competences	Technical knowledge of supplier is needed.

			The supplier knows this.
Supplier	Cross-sell	Trust	When more possibilities to generate business than more collaboration and input supplier. Problem is that suppliers say that they do not get these opportunities and the organisation states that the supplier too much tries to gain more. So supplier tries this on higher management level and organisation states that they do not have enough contact on higher level.

Buying organisation Red

Red is a Dutch multinational that produces and supplies diagnostic imaging and patient observation systems and other medical devices for diagnostic treatments. Interviewees are the senior director development and the purchasing manager.

Question topic	Answer R&D	Answer Procurement
Rate supplier satisfaction	Good	Good
Departments collaborate with supplier	Manufacturing and procurement	Manufacturing and procurement
Collaboration goal	Cost savings	Cost savings
Stage NPD	Stage 2	Stage 2
Dimension	Complex	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	MBRM meeting	Business process	Presentation for supplier about that the expectations are and who responsible for what. Mainly management and creating the opportunity to solve problems.
Organisation	Open relation	Business process	To gain trust but is influenced by changing management or contact persons.
Organisation	Procurement team	Business process	Responsible for contact with supplier and maintain the relation.
Organisation	Product specific contract	Business process	Project agreement about delivery time, price and quality. So managing expectations.
Organisation	Relation development	Business process	Employees stay in general long at the department although people become more mobile and change more often. There is a continuity built in to make sure that there is always a stable factor.
Organisation	Umbrella contract	Business process	General contract about payments, legal aspects and IP.
Organisation	Communication	Communication	Open communication, technical contact (by engineers), formal and informal.
Organisation	Co-workshops	Cooperation	Workshop about which capabilities are needed from supplier. Depending on what the supplier does or outsources.
Organisation	Early supplier involvement	Cooperation	Workshops, design-in (kind of draft for improvement at the supplier).
Organisation	Roadmap	Cooperation	Information for long-term relation suppliers to create dialog for innovations to increase the price. Although supplier always a commercial nature have.
Organisation	Workshops	Cooperation	1 on 1 workshops for innovations with several suppliers. Best idea rewarded with contract and therefore suppliers sent best engineers.
Organisation	Technical database	Technical competences	Collecting and storing information.
Organisation	Budget	Trust	Budget for relation management. E.g. visits (going to supplier or invite supplier).
Organisation	Reliability check	Trust	This creates a more open communication with suppliers and therefore trust.

Procurement

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Approved vendor list	Business process	They try to keep this list as small as possible.
Organisation	Commodity group	Business process	Procurement for more business units. This creates synergy and relation with supplier.
Organisation	Development contract	Business process	Special contract during the development project
Organisation	Webportal	Business process	Suppliers have personal page with their forecast, performance (KPI).
Organisation	Communication	Communication	Focus on announcing appreciation, give focus and point for approvements.
Organisation	One point of contact	Communication	Maintain long-term relation by the accountmanager.
Organisation	Kickoff workshop	Cooperation	Workshop to set the focus for the project.
Organisation	Personal relations	Cooperation	Maintaining contacts
Organisation	Project procurement	Cooperation	A special procurement team for each different project. All procurement teams are aligned with the overall procurement manager.
Organisation	Roadmaps	Cooperation	Informing the approved vendors about the developments on short-term. This manages also the relationship with suppliers.
Organisation	Supplier day	Cooperation	Top 60 suppliers are invited for a 2-days event. Day contains presentations whereby the management appreciation enounces, awards (runner-up, most innovative), directions for the following period.
Organisation	Supplier quality day	Cooperation	Supplier invited where the quality processes are checked.
Organisation	Updates	Cooperation	On management level updates
Organisation	Workshops	Cooperation	Workshops with several suppliers on different days to think together about an innovation or problem within the concept.
Organisation	Feedback	Technical competences	Feedback from suppliers is asked by buying organisation for suggestions for improvements.

Alliance A

A is a multinational and brings innovative solutions. It is a large IT and consulting services company for information processing systems, products and services. Interviewee is the alliance director for SI/A.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explantion
Organisation	Agreement	Business process	Written agreement when the company and SI are cooperating for a specific market
Organisation	Tenders	Business process	A tender is an opportunity of the firm on which the SI's can apply
Organisation	Alliance plan	Business process	Plan in which the targets for the next period are described in measurable targets. Composed together with the SI to gain commitment by creating a common goal.
Organisation	Incentives	Business process	When the SI advices a potential customer and this lead to a sale than the partner receives a fee (not at governmental organisations)
Organisation	One point of contact	Communication	One person to contact for all issues. The alliance manager for daily contact on different levels within the organisation. Mostly experienced employees
Organisation	Webportal	Communication	Communication via a teamroom in which all the information is but also information is shared
Organisation	Conference calls	Communication	Weekly and monthly calls about prospects
Both	Alliance manager	Communication	One person of contact who manages the collaboration with the partner and has as goal to push the collaboration to a higher level. He knows the strategy and goal to optimise the collaboration
Organisation	Support	Cooperation	All kind of support towards the partner for realisation of the project at the customer
Organisation	Collaboration	Cooperation	Working together in projects by integrating people of alliance and SI in the different projects
Organisation	Sales meet sales	Cooperation	Conversation with the sales departments to decide who has the most knowledge of the customer of who has the best contacts. In this meeting an agreement is made upon who contacts the customer for new developments
Organisation	Portfolio	Technical competences	Overview of hard- and software on which the focus lies for investments (acquisitions and mergers)
Organisation	Training	Technical competences	Training to gain knowledge of the product to generate more market
Organisation	Lab	Technical competences	Knowledge from the company lab which provides the partner with knowledge to serve the customer better

Alliance B

B promotes, distributes and sells software and related products. B also provides commercial services, advices and training with respect to computer software. Interviewee is the alliance manager.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Growth goals	Business process	Jointly set goals
Organisation	Customer decides which SI	Business process	Customers of the alliance decide which SI implements the product of the alliance.
Organisation	Support	Business process	Investments for all kinds of support for the SI, such as training, budgets. To enhance opportunities and sales for the alliance
Organisation	KPI's	Business process	To measure the performance
Organisation	Agreement	Business process	A collaborationdocument which states which sales are to be done the coming period. The tasks of both parties are stated in an agreement.
Organisation	NDA	Business process	A non disclosure agreement to support the close collaboration at customer level (mainly on opportunities).
Organisation	Shared strategy	Business process	Jointly set the strategy in sales and opportunities to gain a common focus
Organisation	Investments	Business process	Investments of the SI in getting knowledge.
Organisation	Open and transparent	Communication	Open communication
Organisation	Portal	Communication	A system of the alliance so the SI can show what they are doing to generate business and sales
Organisation	Communication scheme	Communication	An internal communication system
Organisation	One point of contact	Communication	One person to contact for all issues. The alliance manager for daily contact on different levels within the organisation. Mostly experienced employees
Organisation	Partnering on higher level	Communication	Collaboration on a higher level between the SI and the alliance
Organisation	Value engineering	Cooperation	A tool for the SI's and customers to check which product of the alliance is most suitable for potential customers
Organisation	Portfolio	Technical competences	To show what the focus on your strengths to differentiate yourself from competitors, to show your products, used to generate knowledge
Organisation	Training	Technical competences	Training to gain knowledge of the product to generate more market
Organisation	Online training	Technical competences	Online training is offered by the alliance to the SI to gain certificates.

Organisation	Certificates	Trust	The organisation offers training to the SI which results in certificates. These certificates are important for the status of the SI. The more certificates the more privileges.
Organisation	Show appreciation	Trust	The alliance uses letters of appreciation in which the appreciation towards the SI is stated on paper, the SI is also mentioned in other marketing activities. This is appreciated by the SI.
Organisation	Sales mix	Trust	Marketing and communication tools of the alliance can be used by the SI to do sales or to create opportunities.

Alliance C

C is a multinational which gives support to the distribution channels and the end-users, including a hotline support facility and management consultancy services. C is a leader in software, services, and solutions concerning IT. Interviewee is the alliance manager.

Question topic	Answer
Rate supplier satisfaction	Average
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Marketing campaigns	Business process	Marketing campaigns in which the SI is also promoted
Organisation	Investments	Business process	Investments in the SI in getting knowledge. But is offered in common projects.
Organisation	Partner model	Business process	The SI is selected for knowledge of the client to enhance the success regarding opportunities. Several SI's are used to enhance the chance of success and rate of sales of the alliance.
Organisation	Salesplan	Business process	The alliance plans for the coming year which target is to be obtained with which clients and markets
Organisation	Incentives	Business process	Cash incentives for the SI to stimulate them in sales of the alliance their product instead of the competitor's product.
Organisation	Calls	Communication	Regular phone calls
Organisation	Partner conferences	Communication	Conferences in which the SI is asked to speech as a professional of some topics
Organisation	Events	Communication	Event where partners and customers are invited for. With hands-on workshops to generate new ideas out of the market
Organisation	Success planning	Cooperation	Alliance has a strategy for which business and market opportunity will be generated with which SI.
Organisation	Arrangements	Cooperation	Agreements on how much to invest, studytours and marketingcampaignes etc.
Organisation	KPI's	Cooperation	To measure the performance
Organisation	Pampering keypersons	Cooperation	Pampering of higher-level key personnel of the SI who has the knowledge and power to make a difference regarding opportunities
Organisation	Standardising	Technical competences	To standardise the product of the alliance to achieve cost reduction. Custom-made systems by extension of the base by using optional modules
Organisation	Different types of agreements	Trust	Several agreements to create awareness and focus in the collaboration
Organisation	Studytour	Trust	Trips to generate knowledge for the SI regarding the product of the alliance. Also used as pampering
Organisation	Interpersonal skills	Trust	To be able to work together on a personal level

Alliance D

D offers business hardware and software systems that helps organisations overcome complexity and to apply innovation. B engineers hardware and software to work together in the cloud and in data centres. Interviewees are two alliance managers.

Question topic	Answer
Rate supplier satisfaction	Poor
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Incentives	Business process	Cash incentives for the SI to stimulate them in sales of the alliance their product instead of the competitor's product.
Organisation	More partners	Business process	To enhance the chances for sales and markets, more collaboration partners are used. This also generates competition between the several SI's
Organisation	Agreement	Business process	A collaboration document which states which sales are to be done the coming period. The tasks of both parties are stated in an agreement.
Organisation	Communication tools	Communication	An internal communication system
Organisation	Partner as speaker	Communication	Conferences in which the SI is asked to speech as a professional of some topics
Organisation	Thermometer sessions	Communication	Meetings for discussing the progress and each others results on several levels.
Organisation	Alliance manager	Communication	One point of contact who has the overview and manages the process
Organisation	Quarterly business reviews	Communication	Newsletter which is sent to the SI's to keep them updated about the developments of the alliance
Organisation	Conference calls	Communication	Communication with all persons involved to discuss the progress and possible problems.
Organisation	Platform online	Communication	An online platform where the SI can gather information regarding the product of the alliance
Organisation	Non legal agreements	Cooperation	Agreements which are not documented, mainly used in the governance market
Organisation	Awards	Cooperation	Awards are given by the alliance. If the SI is given an award they can also profit of the benefits like more insight information and more sales.
Organisation	KPI's	Cooperation	To measure the performance
Organisation	Risk analysis	Cooperation	The SI is selected for knowledge of the client to enhance the success regarding opportunities. Several SI's are used to enhance the chance of success and rate of sales of the alliance.
Organisation	Product knowledge	Technical competences	Information about the product is shared with the SI
Organisation	Events	Technical competences	Event where partners and customers are invited for. With hands-on workshops to generate new ideas out of the market
Organisation	Portfolio	Technical competences	To show what the focus on your strengths to differentiate yourself from competitors, to show your

			products, used to generate knowledge
Organisation	Sales sessions	Trust	Conversation with the sales departments to decide who has the most knowledge of the customer of who has the best contacts. In this meeting an agreement is made upon who contacts the customer for new developments
Organisation	Partner network	Trust	A digital network of the alliance, with a personal log-in for SI's. To gain information about products and sales done by the SI, the higher the status the more access the SI gets
Organisation	Exclusive events	Trust	A tool used by the alliance which can be earned by the SI by performing

Alliance E

E is a multinational IT company with a portfolio that spans printing, personal computing, software, services, and IT infrastructure. Interviewee is the business alliance manager.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Cultural fit	Business process	Cultural fit is created by the alliance. With this is meant to quickly gain trust and be able to switch/link quickly. By knowing what the SI does and can do.
Both	Targets	Business process	Targets set together for each party. So which business will be generated with the SI.
Organisation	Alliance strategy	Business process	Alliance has a strategy for which business and market opportunity will be generated with which SI.
Organisation	NDA	Business process	A non disclosure agreement to support the close collaboration at customer level (mainly on opportunities).
Organisation	Push strategy	Business process	To push the SI consultancies and architects in sales of the alliance product.
Supplier	Investments	Business process	Investments of the SI in getting knowledge.
Organisation	Alliance mapping	Business process	Mapping of all SI's and making a selection in which SI is used in which business or market opportunities.
Organisation	Events	Communication	Event where partners and customers are invited for. With hands-on workshops to generate new ideas out of the market
Organisation	Marketing and communication	Communication	Marketing and communication tools of the alliance can be used by the SI to do sales or to create opportunities.
Organisation	Lectures	Communication	Lectures to keep the SI up to date with the latest technology of the alliance their products
Organisation	Reports	Communication	Publishing reports about the market in which the knowledge of both (alliance and SI) is used to inform customers and potential customers. Create awareness
Organisation	Knowledge events	Communication	Event where partners and customers are invited for. With hands-on workshops to generate new ideas out of the market
Organisation	Regular communication tools	Communication	Email, phone, visits 2 ways.
Both	Shared website	Communication	A website made by the alliance but is mainly used to communicate which persons do what in the collaboration and to communicate new employees. Not very active
Organisation	Newsletter	Communication	Newsletter which is sent to the SI's to keep them updated about the developments of the alliance
Organisation	Contact matrix	Communication	The supplier has a communication matrix in

			where the official communication lines and who communicates with who is written down.
Organisation	Open communication	Communication	A open communication structure
Organisation	Roundtables	Communication	CEO's of both come together to set a common focus but also discuss the collaboration
Organisation	Partner knowledge	Cooperation	Knowledge of the SI is used for opportunities of the alliance but also for product development
Organisation	Sponsoring	Cooperation	Funding which the SI can use to arrange events or other activities to promote the alliance
Organisation	Roadmap	Cooperation	The alliance shows with which clients they will be approaching for their markets
Both	Joint plan	Cooperation	Making a plan together in which the direction and goals are set. To create a common focus. But is very specific about which financial target in which time (measurable)
Organisation	Portfolio	Technical competences	To show what the focus on your strengths to differentiate yourself from competitors, to show your products, used to generate knowledge
Supplier	Portfolio	Technical competences	To show what the focus on your strengths to differentiate yourself from competitors, to show your products, used to generate knowledge
Organisation	Budget	Trust	Budget which the SI can use to gain knowledge, marketing activities, etc. To create opportunities and sales.
Organisation	Trust	Trust	Create trust between both parties.
Organisation	Preferred alliances	Trust	Is used as a tool for preferred customers to show dedication
Organisation	Chinese wall agreement	Trust	Although the alliance has their own consultancies which can do the same as the SI there are Chinese wall agreements which create a fair separation.

System integrator A

SI/A is a large multinational operating in consulting, technology, outsourcing, and local professional services. Their IT department works with the client's IT professionals to assess the environment, devise a strategy, and design a more cohesive, integrated system. Interviewee is the alliance manager.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Incentives	Business process	To encourage the SI to switch organisations to alliance systems
Supplier	Business case	Business process	Especially for trainings, to map what knowledge is needed
Supplier	Investments	Business process	To invest in knowledge and the portfolio when there is an opportunity for training
Supplier	Templates	Business process	All documents are put in templates
Both	Feedback	Communication	Feedback is asked from the customer and the alliance
Organisation	Web portal	Communication	Open and closed websites on which all information is given, needed by the partner, and that is where the feedback can be given
Supplier	One point of contact	Communication	One point of contact who has the overview and manages the process
Both	Calls	Communication	Phone calls
Both	Events	Cooperation	Alliance event where partners (SI's) and customers are invited for. With hands-on workshops to generate new ideas out of the market
Both	Business partner council	Cooperation	3 times a year all business partners come together to talk about generating business
Both	KPI's	Cooperation	Parameters to monitor on several levels the business generated for the alliance. These parameters are the basis for incentives
Both	Virtual team	Cooperation	One point of contact who has the overview and manages the process
Organisation	Awards	Cooperation	To show appreciation and to stimulate the collaboration
Organisation	Industry frameworks	Technical competences	Industry standard product but the partner makes it specialised by combining modules. This makes it possible for the partner to make their own speciality
Both	Value proposition events	Technical competences	Lectures and training of the SI
Both	Portfolio	Technical competences	An overview of all products made by the supplier. This is used to show the prospects and customers what their technical competences are.
Organisation	Roundtables	Trust	Type of meeting
Supplier	Directing revenue	Trust	All revenue of SI is being labelled towards one of the strategic alliances. With these labels it is

			possible to request funding for e.g. training
Organisation	Personal funding	Trust	To fund the alliance managers
Supplier	Market research	Trust	To research the market so the alliance can be better served
Organisation	Study tour	Trust	The alliance organises study tours to share knowledge and as a social event

System integrator B

SI/B is a large multinational operating in consulting, technology, outsourcing, and local professional services. Their IT department works with the client's IT professionals to assess the environment, devise a strategy, and design a more cohesive, integrated system. Interviewee is the alliance manager.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Supplier	Governance	Business process	The governance of the SI set at higher level for all strategic alliances of the SI. The governance can be compared with a preferred customer status given by the SI.
Organisation	Investments	Business process	Investments are done by the alliance. Investments like training of the SI employees.
Both	Agreement	Business process	A collaboration document which states which sales are to be done the coming period. The tasks of both parties is stated in an agreement.
Both	KPI's	Business process	To measure the performance
Supplier	Internal growth targets	Business process	The SI has internal growth targets on how much sales have to be generated for the alliance the coming period
Organisation	Communication system	Communication	An internal communication system
Both	Personal contact	Communication	Direct contact with the person in the organisation.
Both	Accountmanager	Communication	SI and alliance have an accountmanager who manages the relation and to structure the collaboration/sales etc.
Supplier	Coffee sessions	Communication	The contactpersons of the alliance are invited to come over to the SI to have a personal and work related conversation. Goal is to strengthen the relation.
Supplier	Reviews	Communication	To generate input/knowledge for NPD of the alliance
Organisation	Partner events	Cooperation	Events organised together (alliance and SI) for customers and possible customers.
Supplier	Focus points	Cooperation	Sized down the number of alliances. Doing more with less alliances.
Supplier	Business case	Cooperation	A research of the SI on the market size and the possible opportunities for the SI with the alliance.
Organisation	Value engineering	Cooperation	A tools created by the alliance which is used by both (alliance and SI) towards the customer to create awareness of the added value of the alliance product for the customer.
Both	Portfolio	Technical competences	To show what the focus on your strengths to differentiate yourself from competitors, to show your products, used to generate knowledge

Supplier	Competences	Technical competences	To show what the focus on your strengths to differentiate yourself from competitors, to show your products, used to generate knowledge
Supplier	Knowledge management tools	Technical competences	Tools of the SI to manage the internal communication. Problem is that there are too much of these tools. Accountability has a larger successfactor.
Both	Training	Technical competences	Training to gain knowledge of the product to generate more market
Organisation	Letter of appreciation	Trust	The alliance uses letters of appreciation in which the appreciation towards the SI is stated on paper. This is appreciated by the SI.
Both	Innovationboard	Trust	CTO of alliance and SI come together and organise innovation workshops for the customer to explain the innovation possibilities for the customer with the product of the alliance.
Organisation	Awards	Trust	Awards are given by the alliance. If the SI is given an award they can also profit of the benefits like more insight information and more sales.

System integrator C

SI/C is a large multinational operating in consulting, technology, outsourcing, and local professional services. Their IT department works with the client's IT professionals to assess the environment, devise a strategy, and design a more cohesive, integrated system. Interviewee is the alliance manager.

Question topic	Answer
Rate supplier satisfaction	Average
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Organisation	Ranking	Business process	Which alliance can be used best for which opportunity
Organisation	Stimulate own initiatives	Business process	The alliance stimulates the SI to generate opportunities for the alliance
Organisation	Partner sales plan	Business process	A collaboration document which states which sales are to be done the coming period
Organisation	Partner business plan	Business process	A long term plan for opportunities, sales-driven
Organisation	Penalties	Business process	Documents which has penalties when IP is infringed
Organisation	Go to market strategy	Business process	The strategy how the SI brings the product of the alliance to the market
Supplier	Governance	Business process	To create a culture by making agreements
Organisation	Portal	Communication	A system of the alliance so the SI can show what they are doing to generate business and sales
Organisation	CEO roundtable	Communication	The higher management sit together to discuss the collaboration and future plans
Supplier	Who meets who plan	Communication	A communication matrix
Supplier	Reviews	Communication	To generate input/knowledge for NPD of the alliance
Supplier	Technovision	Communication	The alliance shows what the market development is
Supplier	One point of contact	Communication	One point of contact who has the overview and manages the process
Supplier	Open communication	Communication	A open communication structure
Organisation	Funnel sharing	Cooperation	To share insights in the NPD process
Organisation	Roadmap	Cooperation	The alliance shows with which clients they will be approaching for their markets
Supplier	Arrangements	Cooperation	1 on 5 arrangements. Every euro per product should generate 5 euro's of business
Supplier	Wining and dining	Cooperation	To enhance the collaboration by getting to know each other on a personal level
Supplier	Knowledge source	Technical competences	To give information on technical topics
Supplier	Portfolio	Technical competences	An overview of all products made by the supplier. This is used to show the prospects and

			customers what their technical competences are.
Organisation	Exclusive visits	Trust	A tool used by the alliance which can be earned by the SI by performing
Supplier	Knowledge of partner	Trust	The alliance ensures that the SI is up to date concerning the product
Both	Power	Trust	Market power, both the alliance and the SI have partners which are useful for one another
Supplier	Trust customer	Trust	The customers trust the SI, which is seen by the alliance. Based on sales of the SI
Organisation	Road to success	Trust	Contracts in which is documented how the sales are to be pushed (sales meet sales, how the SI broadens the service to the alliance)
Organisation	Funding	Trust	Investments by the alliance in the SI
Both	Network	Trust	The alliance and the SI use each other's network for sales and knowledge
Supplier	Big 5 alliances	Trust	Is used as a tool for preferred customers to show dedication

System integrator D

SI/D is a large multinational operating in consulting, technology, outsourcing, and local professional services. Their IT department works with the client's IT professionals to assess the environment, devise a strategy, and design a more cohesive, integrated system. Interviewee is the alliance manager.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Both	Shared goal	Business process	To make sure that both the SI and the alliance focus on the same goals
Both	Investments	Business process	The SI makes sure that people are trained and the alliances makes knowledge available for the SI
Organisation	Task division	Business process	Agreements on who does what
Supplier	Reviews	Communication	To generate input/knowledge for NPD of the alliance
Supplier	Advisory board	Communication	Brainstorms and sessions to discuss market developments
Supplier	Semester review	Communication	Continuous communication and evaluation on different levels of management
Both	Sales to sales meeting	Communication	The sales departments of the SI and the alliance make plans on what to do the coming period
Supplier	Coffee sessions	Communication	Small meetings to discuss the NPD and on a personal level
Both	Alliance manager	Communication	One point of contact who has the overview and manages the process
Organisation	Alliance debrief	Communication	The SI and the alliance debrief their organisations on the market developments and outcomes of other events
Both	Communication system	Communication	An internal communication system
Both	Planning	Cooperation	By planning on the long term it is possible to do bigger projects
Both	KPI's	Cooperation	Parameters to monitor on several levels the business generated for the alliance. These parameters are the basis for incentives
Both	Roadmap	Cooperation	The alliance shows with which clients they will be approaching for their markets
Supplier	Focus points	Technical competences	Sized down the number of alliances. Doing more with less alliances.
Supplier	Training	Technical competences	Training to gain knowledge of the product to generate more market
Organisation	Free training and courses	Technical competences	Training and courses provided by the alliance to expand the knowledge of the SI
Supplier	Thought leadership	Technical competences	Expanding knowledge on personal level of the employees of the SI. These thought leaders create also a bond with the alliance.

Organisation	Events (alliance initiative)	Technical competences	Event where partners and customers are invited for. With hands-on workshops to generate new ideas out of the market
Supplier	Workshops	Technical competences	Workshops done with the customer to gain knowledge of the customer to serve the alliance
Supplier	Competences	Technical competences	To show what the focus on your strengths to differentiate yourself from competitors, to show your products, used to generate knowledge
Supplier	Proactive advice	Trust	The SI gives the alliance advice on their products without having the request. The information is gathered by the SI from the market and other alliances
Organisation	Pre-sales engineering	Trust	The thought leaders (experts of the SI) come together with the engineers of the alliance to support sales
Both	Long-term planning	Trust	A planning on the long-term between the SI and alliance to create a common focus. This also creates the opportunity to attract larger projects.
Supplier	Person promotion	Trust	Create awareness by the alliance that the person and SI are good. So when the alliance has a sales opportunity they will think of the SI instead of the competitors of the SI.
Organisation	Awards	Trust	Awards are given by the alliance. If the SI is given an award they can also profit of the benefits like more insight information and more sales.

System integrator E

SI/E is a large multinational operating in consulting, technology, outsourcing, and local professional services. Their IT department works with the client's IT professionals to assess the environment, devise a strategy, and design a more cohesive, integrated system. Interviewee is the alliance manager.

Question topic	Answer
Rate supplier satisfaction	Good
Departments collaborate with supplier	R&D, manufacturing and marketing
Collaboration goal	Generate revenue
Stage NPD	Stage 4
Dimension	Complex

By whom	Name tool	Satisfaction variable	Explanation
Both	Contracts	Business process	Especially for when problems occur
Supplier	Push strategy	Business process	The SI actively 'pushes' the alliance for new business
Supplier	Investments	Business process	To invest in marketing, sales, education, workshops etc.
Supplier	Partner selection	Business process	Searching for clients in the portfolio
Supplier	Training	Communication	Train employees on knowledge trends out of the market to stay updated.
Supplier	Counterparts	Communication	A relation with the counterpart of the alliance to know what the development is for the future
Supplier	Internal website alliances	Communication	Internal relation database considering the alliance (not up-to-date)
Organisation	Registration system	Communication	All partners have a system to register generated opportunities
Supplier	Relation management	Communication	To keep the channels of communication open
Supplier	KPI's	Cooperation	To measure the performance
Supplier	Sales plan	Cooperation	The SI plans for the coming year which target is to be obtained with which clients and markets
Both	Marketing	Cooperation	To show each other their appreciation for the collaboration
Supplier	Focus	Technical competences	Sized down the number of alliances. Doing more with less alliances.
Supplier	Differentiation	Technical competences	To specialise and differentiate from other SI's
Supplier	Portfolio	Technical competences	An overview of all products made by the supplier. This is used to show the prospects and customers what their technical competences are.
Supplier	Partners for knowledge	Trust	The SI uses the alliance to acquire knowledge
Supplier	Trust	Trust	Mutual trust
Supplier	References	Trust	The alliances are used as a reference to generate trust
Supplier	Knowledge partner	Trust	The SI uses the alliance to acquire knowledge