Purchasing involvement in New Product Development at a chemicals company

by

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ABSTRACT

This thesis investigates how an organization can organize for Purchasing involvement in New Product Development (NPD), and makes specific recommendations for a large chemicals company. Purchasing, Marketing and Innovation literature were used to derive three research models for the assessment of three relevant aspects: (1) Enabling factors, (2) Purchasing tasks and processes and (3) Purchaser involvement structures. In-depth case studies of six NPD projects were performed with regard to Purchasing involvement, followed by a cross-case comparison. This analysis shows that Purchasing involvement in New Product Development decreases both new product costs and risk, without influencing project costs or development time. In addition, a tailored set of recommendations for the company was discussed and presented. In order to organize for Purchasing involvement in NPD, a company must (1) have people with the right skill-set readily available, (2) provide a structure that enables Purchasing involvement and (3) organize their formal NPD process such that Purchasing is included with their own set of tasks and that there is frequent personal contact between Purchasing and project management. Large NPD projects should integrate a Purchaser in their project team.
# TABLE OF CONTENTS

ABSTRACT ............................................................................................................................................ 0

I. LIST OF FIGURES .......................................................................................................................... 4

II. LIST OF TABLES .......................................................................................................................... 6

III. LIST OF ABBREVIATIONS .......................................................................................................... 7

IV. ACKNOWLEDGEMENTS ........................................................................................................... 8

V. MANAGEMENT SUMMARY ......................................................................................................... 9

CONTEXT ............................................................................................................................................. 14

1.1 Introduction ................................................................................................................................. 14
1.2 The Company .............................................................................................................................. 14
1.3 Relevance Research to the Company ........................................................................................ 16
1.4 Literature .................................................................................................................................. 17
1.5 Relevance Research to Existing Literature .............................................................................. 21

2 RESEARCH PLAN ......................................................................................................................... 23

2.1 Problem-solving Framework ..................................................................................................... 23
2.2 Problem Definition .................................................................................................................... 24
2.2.1 Problem Statement ................................................................................................................ 24
2.2.2 Research Questions and Assignment .................................................................................... 26
2.3 Research Model ......................................................................................................................... 27
2.3.1 NPD at SFI ............................................................................................................................ 27
2.3.2 Relevant Literature on Purchasing Involvement in NPD ....................................................... 29
2.3.3 Research Model .................................................................................................................... 36
2.4 Methodology ............................................................................................................................. 40
2.4.1 Research type ....................................................................................................................... 40
2.4.2 Quality of research ................................................................................................................. 42
2.4.3 Case selection ....................................................................................................................... 44
2.4.4 Data Collection ...................................................................................................................... 45
2.5 Conclusion .................................................................................................................................. 47

3 ANALYSIS ........................................................................................................................................ 48

3.1 Introduction .................................................................................................................................. 48
3.2 Case Study Project Emerald – Business Group Beryl ................................................................. 48
3.2.1 Introduction to the case study ............................................................................................... 48
3.2.2 Process .................................................................................................................................. 48
3.2.3 Purchasing and supplier involvement .................................................................................... 49
3.2.4 Analysis of tasks at project level .......................................................................................... 51
3.2.5 Analysis of tasks at strategic level ......................................................................................... 52
3.2.6 Analysis of enabling factors ................................................................................................. 52
3.2.7 Organizational structure Purchasing involvement ............................................................... 53
3.2.8 Conclusions ......................................................................................................................... 54
3.3 Case Study Project Red Beryl – Business Group Beryl ............................................................... 55
3.3.1 Introduction to the case study ............................................................................................... 55
3.3.2 Process .................................................................................................................................. 56
3.3.3 Purchasing and supplier involvement .................................................................................... 57
3.3.4 Analysis of tasks at project level .......................................................................................... 58
3.3.5 Analysis of tasks at strategic level ......................................................................................... 60
I. List of Figures

Figure V.1: Causal model ................................................................. 10
Figure V.2: Purchasing tasks for NPD with regard to supplier involvement ...................................................... 11
Figure 1.1: The SFI purchasing process ................................................. 15
Figure 2.1: The regulative cycle (Van Strien, 1997) ................................ 23
Figure 2.2: Project, object and realization design (van Aken et al., 2007) .......................................................... 24
Figure 2.3: Cause and effect diagram regarding purchasing involvement in NPD at SFI ................................. 25
Figure 2.4: The NPD project team organization ........................................ 28
Figure 2.5: The PMP of SFI .................................................................. 28
Figure 2.6: Purchasing’s relationship to the NPD process (Van Weele, 2010) .......................................................... 32
Figure 2.7: Structures for purchasing involvement in NPD projects (Lakemond et al., 2001) .................................... 36
Figure 2.8: Conceptual model ............................................................... 37
Figure 2.9: Research Model 1 – Purchasing tasks for NPD with regard to supplier involvement ................. 38
Figure 2.10: Research Model 2 – Purchasing involvement configurations for different contingencies
(based on Lakemond et al., 2001) .................................................. 40
Figure 2.11: Multiple case study design (adapted from Yin, 2003) .............................................................. 41
Figure 3.1: Process project Emerald 1 ................................................. 50
Figure 3.2: Organization diagram NPD team Project Emerald ................................................................. 52
Figure 3.3: Project Emerald: Integrated purchasing involvement on a part-time basis combined with a
coordinator role (adapted from Lakemond et al., 2001) ............................................................................ 53
Figure 3.4: Process project Red Beryl 1 ................................................. 57
Figure 3.5: Organization diagram NPD team .................................................. 60
Figure 3.6: Project Emerald: Integrated purchasing involvement on a part-time basis combined with a
coordinator role (adapted from Lakemond et al., 2001) ............................................................................ 61
Figure 3.7: Process project Opal 1 ......................................................... 64
Figure 3.8: Organization diagram NPD team Project Opal ................................................................. 68
Figure 3.9: Project Opal: Integrated purchasing involvement on a part-time basis
(adapted from Lakemond et al., 2001) .............................................. 68
Figure 3.10: Process project Ruby 1 ....................................................... 72
Figure 3.11: Organization diagram NPD team Project Ruby ................................................................. 75
Figure 3.12: Project Ruby: Indirect purchaser involvement on an ad hoc basis (Lakemond et al., 2001) ................. 76
Figure 3.13: Process project Sapphire 1 .................................................. 79
Figure 3.14: Organization diagram NPD team Project Sapphire ................................................................. 82
Figure 3.15: Project Sapphire: Insignificant indirect purchaser involvement on an ad hoc basis
(Lakemond et al., 2001) ................................................................. 83
Figure 3.16: Process project Diamond 1 .................................................. 86
Figure 3.17: Organization diagram NPD team Project Diamond ................................................................. 89
Figure 3.18: Project Diamond: Insignificant indirect purchaser involvement on an ad hoc basis
(Lakemond et al., 2001) ................................................................. 89
Figure 3.19: Causal model ................................................................. 92
Figure 3.20: Purchasing tasks for NPD with regard to supplier involvement ...................................................... 97
Figure 3.21: Purchasing involvement configurations for different contingencies ........................................... 101
Figure 4.1: Redesign directions with regard to research question 1 ............................................................ 110
Figure 4.2: Redesign directions with regard to research question 2 ............................................................ 112
Figure 4.3: Redesign directions with regard to research question 3 ............................................................ 113
Figure 4.4: Redesign directions with regard to research question 4 ............................................................ 114
Figure 6.1: Organization chart of SFI ....................................................... 124
Figure 6.2: Organization chart of the purchasing department of SFI ............................................................... 124
II. List of Tables

TABLE 2.1: PROJECT LEVEL PURCHASING ACTIVITIES WITH REGARD TO SUPPLIER INVOLVEMENT IN NPD CATEGORIZED PER DEVELOPMENT STAGE ......................................................................................................................... 31
TABLE 2.2: LONG TERM, STRATEGIC PURCHASING ACTIVITIES WITH REGARD TO SUPPLIER INVOLVEMENT IN NPD ................................................................. 32
TABLE 2.3: DATA SOURCES ................................................................................................................................................................................................. 46
TABLE 2.4: FORMAT FOR SUMMARY PROJECT FINDINGS ................................................................................................................................. 47
TABLE 3.1: SUMMARY FINDINGS PROJECT EMERALD ......................................................................................................................................................... 55
TABLE 3.2: SUMMARY FINDINGS PROJECT RED BERYL ................................................................................................................................................. 63
TABLE 3.3: SUMMARY FINDINGS PROJECT OPAL ...................................................................................................................................................... 70
TABLE 3.4: SUMMARY FINDINGS PROJECT Ruby ...................................................................................................................................................... 77
TABLE 3.5: SUMMARY FINDINGS PROJECT SAPPHIRE ............................................................................................................................................. 84
TABLE 3.6: SUMMARY FINDINGS PROJECT DIAMOND ............................................................................................................................................. 91
TABLE 3.7: SUMMARY FINDINGS OF ALL INDIVIDUAL CASE STUDIES ................................................................................................................. 92
TABLE 3.8: PURCHASING TASKS RELATED TO SUPPLIER INVOLVEMENT FOUND AT SFI PROJECTS .............................................................. 93
TABLE 6.1: GENERAL OVERVIEW OF ENABLING FACTORS FOUND IN LITERATURE ........................................................................................................ 128
TABLE 6.2: SOURCES OF EVIDENCE FOR THE INDIVIDUAL CASE STUDIES ........................................................................................................... 131
TABLE 6.3: PURCHASING ACTIVITIES AT PROJECT LEVEL AT PROJECT EMERALD (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 133
TABLE 6.4: PURCHASING ACTIVITIES AT PROJECT LEVEL AT PROJECT RED BERYL (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 134
TABLE 6.5: PURCHASING ACTIVITIES AT PROJECT LEVEL AT PROJECT OPAL (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 135
TABLE 6.6: PURCHASING ACTIVITIES AT PROJECT LEVEL AT PROJECT Ruby (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 136
TABLE 6.7: PURCHASING ACTIVITIES AT PROJECT LEVEL AT PROJECT SAPPHIRE (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 137
TABLE 6.8: PURCHASING ACTIVITIES AT PROJECT LEVEL AT PROJECT DIAMOND (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 138
TABLE 6.9: PURCHASING ACTIVITIES AT STRATEGIC LEVEL AT PROJECT EMERALD (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 139
TABLE 6.10: PURCHASING ACTIVITIES AT STRATEGIC LEVEL AT PROJECT RED BERYL (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 139
TABLE 6.11: PURCHASING ACTIVITIES AT STRATEGIC LEVEL AT PROJECT OPAL (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 140
TABLE 6.12: PURCHASING ACTIVITIES AT STRATEGIC LEVEL AT PROJECT Ruby (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 140
TABLE 6.13: PURCHASING ACTIVITIES AT STRATEGIC LEVEL AT PROJECT SappHIRE (PERCENTAGE OF INTERVIEWEES INDICATING PRESENCE OF PURCHASING ACTIVITIES IN THE INNOVATION PROJECT) ............. 141
TABLE 6.14: SUMMARY FINDINGS OF ALL INDIVIDUAL CASE STUDIES ................................................................................................................. 141
TABLE 6.15: PURCHASING TASKS RELATED TO SUPPLIER INVOLVEMENT FOUND AT SFI PROJECTS ........................................................................... 143
III. List of Abbreviations

APAC – Asia, Pacific, Australia, China

BG – Business Group

BI – Business Intelligence

CPO – Chief Purchasing Officer

CTO – Chief Technology Officer

NPD – New Product Development

OECD Countries – Countries that have signed the Convention on the Organization of Economic Co-operation and Development; Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New-Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

P2P – Purchase to Pay Methodology

PMP – Project Management Process

Purchaser – employee of the purchasing department

Purchasing – the purchasing department

Purchasing tasks – tasks typically performed by employees of the purchasing department

R&D – Research and Development

SFI – Science Faceting Inc.

SSM – Strategic Sourcing Methodology

VP – Vice President
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V. MANAGEMENT SUMMARY

Context

As one of the biggest international players in the Chemical sector, innovation is strategically very important to SFI. They have set their corporate goals accordingly. From 2005 to 2010 SFI reached their goal of getting an additional €1 billion of sales from innovation.

An increasing amount of companies, including SFI, strongly believes in the open innovation approach; innovation that includes global access to resources, transcending the firm and its boundaries to a more open and collaborative innovation with external parties. In open innovation, external resources and paths to market are just as important as internal resources and paths to market.

SFI Purchasing used to have a cost focus in the past, but is now moving towards having other goals such as sustainability goals as well. Purchasing management and employees feel that they can contribute to innovation too, by being the link between suppliers and innovation projects. In addition, cooperation and pursuing goals other than cost savings helps SFI Purchasing to become a preferred customer of the suppliers in a world where resources become increasingly scarce.

Suppliers are a very relevant external party in the value chain and when it comes to cooperation in innovation, and thus are important for SFI’s open innovation approach. Literature finds many advantages of including suppliers in the NPD process and using Purchasing in achieving supplier involvement. As the result of a strategic workgroup, initiated by Purchasing top management, Purchasing is now eager to establish a structure and culture enabling supplier involvement in NPD and to have Purchasing involved in NPD. This master thesis project will study Purchasing involvement at SFI in order to direct Purchasing towards a structure in which they can optimally contribute NPD projects’ performance at SFI.

In this study, innovation management literature, purchasing management literature, supply chain management literature and marketing management literature are combined to design a framework for assessing Purchasing involvement in NPD and analysing the gap between practices at SFI and best practices explained in literature.

Research Plan

In order to structure the problem mess, an extensive preliminary investigation was conducted. As a result, a cause and effect diagram was constructed (figure 2.3) in which the problem came forward. This lead to the definition of the following main research question:

What organizational and procedural changes are necessary to create a structure that enables Purchasing to be involved in NPD at SFI?

To answer this research question, a theoretical framework and preliminary assessment of the formal NPD procedures of SFI were used to a research design and detailed methodological plan.

The research design consists of three parts (figure 2.8, 2.9 and 2.10). First, the work of Wynstra et al. (2001) is used to derive a general conceptual model and this is combined with other literature in order to add all relevant enabling factors with regard to organizational and procedural aspects of Purchasing involvement in NPD. Second, the model with Purchasing tasks for NPD presented by Wynstra (1998) is adapted to fit the Stage-Gate model of Cooper, which is used by most companies to
structure their innovation process (Cooper et al., 2002a; 2004). By doing this, both the timing and the execution of Purchasing tasks can be assessed and compared to literature more easily. Third, a research model based on the model in Lakemond et al. (2001) was used to investigate Purchasing involvement structures.

In order to get a deep understanding of the situation at SFI, a multiple case study was deemed the most fit as a research method. Six NPD project at different BG’s were selected, of which some included Purchasing in the project and some did not. Interviews with at least a project manager, a team member and a purchaser were conducted in addition to investigating documents and archives to collect a sufficient amount of data to write a detailed individual case study. The six case studies were summarized using a predetermined table with variables representing all relevant aspects of the research models in order to conduct a cross-case analysis.

**Analysis**

The multiple case study and some general observations have lead to the following findings and observations.

Early involvement of Purchasing at NPD project was found to reduce product costs and project risk but did not affect the project costs or the development time. Whether Purchasing involvement in NPD leads to supplier involvement in NPD did not become clear. Figure V.1 shows the relations found between variables.

![Causal model](image)

**Figure V.1: Causal model**

Having the right people available proved to be an issue in projects that involved Purchasing late. Purchasers with technical experience are preferred for involvement in NPD projects. It was indicated that Purchasing currently may have too few competences with regard to NPD. In all projects, Purchasing displayed a reactive attitude. However, it is observed that Purchasing’s horizontal complexity leaves room to endeavor tasks beyond the regular set of Purchasing tasks. Another observation is that Purchasing goals are not congruent with those of NPD.
Projects with a positive attitude towards Purchasing from the start, also include Purchasing in the start phases of the project.

Information sharing and availability were an issue in Purchasing involvement in NPD; there is room for improvement between Purchasing and NPD projects.

The use of the formal NPD process at SFI differed a lot per project; it is completely up to the project manager how the formal NPD process is used. However, the exact use did not seem to be of influence on Purchasing involvement. At the BG that included Purchasing in the formal procedures as a function with its own set of NPD tasks, it was natural to involve Purchasing from the start. Most and probably most popular NPD tasks for Purchasing were found in the first stages of the formal NPD process. Even if Purchasing was involved late, the tasks that were executed were tasks that are typically done in the first stages. But little structure with regard to strategic long-term Purchasing tasks was found. Figure V.2 summarizes the Purchasing tasks found per development stage.

![FIGURE V.2: Purchasing tasks for NPD with regard to supplier involvement](image)

No full-time dedicated purchasers were identified. Large projects preferred to integrate their Purchasers in their project team. Project complexity did not play a role with regard to Purchaser involvement structure. A coordinator role was found only when an integrated Purchaser initiated involvement of other Purchaser experts.

These findings are discussed and interpreted in the conclusion & discussion chapter.
Conclusion & Discussion

Per topic, the findings are compared with literature in order to formulate redesign directions. All redesign directions lead to the subsequent redesign. The redesign is organized according to three general areas of redesign; procedures/tasks, structure and people. These topics look a lot like the three areas of attention originally presented by Wynstra et al. (2001) but include also the exact Purchasing involvement structures as discussed in Lakemond et al. (2001).

Procedures/tasks

- Include Purchasing in the PMP/tools, with their own set of tasks.
- Make it mandatory to involve Purchasing in the kick-off meeting at the start of the process (Scoping stage) and at the gates of every NPD project. The project manager and Purchaser should discuss possible contributions and involvement structures.
- The possible decision of not involving Purchasing must be justifiable by the project manager to higher management.
- Large projects must integrate Purchasing in the team unless the project manager and Purchaser agree that this is not (yet) necessary.

Structure

- Purchasing should make a system leading to execution of the long-term strategic tasks on a structural basis.
- Improve two-way information sharing and information availability for NPD projects and Purchasing.
- Work on improving the Purchasing image by communication and by positive contributions to projects in which Purchasing is involved.
- Make sure that the right enabling factors are present as much as possible; a high degree of specialization, congruent principles of specialization, horizontal complexity, overlapped reporting relationship/ congruent goals, multifunctional team structure, project team composition includes Purchasing and physical co-location.
- Make Purchasing goals more congruent with NPD goals, at least for those Purchasers that are to be involved in NPD.
- Organize the Purchasing department such that Purchasing can endeavor NPD activities beyond their normal tasks. Having a separate unit for Purchasers specialized in NPD tasks and having a Purchaser coordinator for NPD are good ways to do this.

People

- Purchasers need to be more pro-active.
- Increase human resource availability for NPD by appointing specialized Purchasers to NPD tasks or an NPD unit within Purchasing.
- With regard to NPD involvement, technical education or experience should be an important aspect in hiring process and/ or current Purchasers without technical experience should be given the chance to gain more experience in this field by training or job rotation.

Purchasing involvement structures

- SFI must integrate Purchasing in large projects.
• SFI must integrate Purchasing in projects with a need for risk mitigation (for example secured supply & costs).

• Purchasing should be involved in every NPD project. However, it can differ to what extent Purchasing is involved.

• Purchasing and the project managers should discuss together if part-time or full-time integrated Purchaser involvement is needed and possible.

• The project manager and Purchasing should thus review the structure of involvement after every stage of the Stage-Gate NPD model.

The most important contributions of this work to existing literature are as follows. This study nuances literature so far by explaining that Purchasing involvement in NPD decreases project risk and product cost and does not have effect on project costs and development time. Also, by using an adapted model that combines the Stage-Gate innovation funnel with Purchasing tasks provides a good way to assess both the timing and presence of these tasks. By using this model, most companies can directly assess their formal procedures for Purchasing tasks, and the findings can be compared to innovation literature as well.

Due to time constraints, long-term effects of Purchasing involvement in NPD have not been investigated.
1.1 INTRODUCTION

In this master thesis, Purchasing involvement in NPD projects is investigated. Research for this master thesis project took place at an international chemicals company. For confidentiality reasons, the actual names of the company, its business groups and its projects have been masked. In order to get a complete picture of the research environment, this section will elaborate on the company environment and theoretical context. First, the company will be described in general. Then, the research project’s relevance to the company is discussed by explaining the importance of innovation to the company and the potential added value of Purchasing. Third, the theoretical context is sketched by reviewing the most relevant academic literature. To conclude with, the relevance of this research project to existing literature is discussed.

1.2 THE COMPANY

Company profile

Science Faceting Inc. (SFI) is a Euronext listed chemicals company which produces half fabricates and products in the life sciences and material sciences area. Its end markets include human and animal nutrition and health, personal care, pharmaceuticals, automotive coatings and paint, electrical and electronic, life protection and housing. Over the past 50 years, SFI has transformed itself from a mining company to a chemicals company. In 2009, the company had net sales of around €8 billion and employed 22,700 people worldwide. It is headquartered in the Netherlands but has locations in 49 countries on five continents. SFI was ranked the global number one in the Dow Jones Sustainability Index in the chemical sector.

The organizational structure is a decentralized one, using empowered Business Groups (BG’s). Their activities are clustered in five areas: Nutrition, Pharmaceuticals, Performance Materials, Polymer Intermediates and Base Chemicals and Materials. Other clusters are the Managing Board of Directors, Corporate Staff, Functional Excellence, Regions and Shared Services. This master thesis project was executed in assignment of the Purchasing department, a part of the group Shared Services. An organization chart of the company can be found in appendix 1.

The purchasing department

The SFI Purchasing department has a very complex organization. Appendix 2 shows how the general Purchasing organization is organized. The department consists of two divisions contributing to the complex organization structure; Purchasing Chemicals and Utilities and Purchasing Indirect Goods and Services. The Purchasing department has also segmented their organization according to Categories of products and services, for example ICT or Technical Goods and Services. These centralized Categories consist of Purchasers who are specialized in their category of products or services. Purchasers in these Categories are supposed to execute Purchasing activities on both BG and corporate level and provide support to the BG’s and regional hubs if necessary. The BG’s have their own Purchasers for Chemicals and Utilities while Purchasing Indirect Goods and Services is entirely centralized. A more detailed organization chart of Direct Chemicals and Utilities can be viewed in appendix 3. Appendix 4 show the matrix structure of Purchasing Indirect Goods and Services: it is
carved up in Categories and geographical areas. The geographical areas have been divided in regional hubs, which in turn consist of local hubs as well. In total, 161 employees work at SFI Purchasing Chemicals and Utilities, of which 117 work at the BG’s. Purchasing Indirect Goods and Services employs 179 people.

**Purchasing methodology**

The purchasing process applied at SFI consists of a strategic/tactical component and an operational component as can be seen in figure 1.1. The strategic/tactical part is elaborated on in more detail in the Strategic Sourcing Methodology (SSM) which is shown in appendix 5. The SSM follows a three phase approach and results in a contract and a program ready for implementation. First, the market and needs are analyzed in order to develop a strategy to get the best value for the least total cost of ownership. Second, potential suppliers are selected which can deliver this value at minimal costs and risks. Finally, the contract is negotiated and the implementation of the contract is planned. The operational component is called Purchase-to-Pay (P2P) and includes the ordering process from requisitioning to payment. For this research project, the SSM process is mainly of interest and will be referred to later.

Purchasing activities at SFI require a cross-functional approach. It is recognized that buyers, technical people, facilitators and the key users are required for a successful process. However, management explained that this is often not as easy as it seems; sometimes a ‘mentality shift’ is needed to truly achieve a cross-functional cooperation.

![Figure 0.1: The SFI purchasing process](image-url)
Innovation

Innovation is very important throughout the whole company. Top management extensively communicated their goals for 2010 in a five-year plan. SFI has set the target of generating an additional €1 billion of sales from innovation. Another target is to be an intrinsically innovative company with ‘excellent innovation practices and an above-average return on innovation investment and with employees to whom innovation comes naturally’. Operational excellence is also considered an important factor in sustainable value creation and competitiveness.

In order to achieve their innovation goals, SFI already made a lot of effort. In this realm, the company has moved toward an open innovation approach – which is elaborated on in section 1.4. SFI has a Venturing and Business Development Unit, which looks for opportunities both internally and externally in all areas in order to accelerate commercialization of promising ideas. For example, an initiative to look for new sources of innovation is the set up of an open industrial park and R&D campus. The site is supposed to facilitate cross fertilization of ideas from external companies as well as SFI Business Units. Other initiatives include creating a regional venture-capital fund, partnerships with external companies, universities and organizations. To coordinate these innovation efforts, an innovation center (BG Corundum) has been set up, encompassing the CTO’s office, a business incubator, an “innovation shared service centre”, project teams for emerging business areas, the chief innovation officer and representatives from each important business group.

An innovative idea from anywhere in the company can be submitted to BG Corundum, which decides whether or not the idea is attractive to develop. If so, the project will be prepared thoroughly and elaborated on for the new venture process to further develop it. If another external party has a similar product at a similar stage, the innovation might be acquired or licensed instead if it is more cost-effective.

1.3 RELEVANCE RESEARCH TO THE COMPANY

Purchasing, suppliers and Innovation

In the past, corporate management has asked Purchasing to reduce the total cost of ownership and to personalize Purchasing activities by leveraging spend and competence. Purchasing uses standard processes and systems to execute these tasks. Risk management, cash management and reduction of costs have been key topics for the department. As a result of the latest financial crisis, suppliers were recently asked to cooperate in cost reduction efforts. In 2009, Purchasing was a main contributor in lowering the operational costs.

However, recently corporate attention has also been drawn to the further development of supplier relations with ‘a keen eye on suppliers’ contribution to sustainability and innovation’. Other areas of corporate attention include transcending departmental silos, partnerships & acquisitions and focus on high growth economies.

Purchasing has also noticed global economic shifts such as increased scarcity of resources, globalization and increased regulations. In addition, trends in the supply market were identified, including increased value chain complexity in global connected markets, consolidation in the supply base, volatility, agility and reduced life cycles in the value chain and a shifting demand balance from a buyers to a sellers market. This all contributes to a changing importance of suppliers to SFI. According
to the CPO, SFI must now see its suppliers as ‘an extended capability that contributes significantly to its value chain.’ For example, it is believed that SFI has to become the customer of choice for its suppliers and use suppliers more for value adding activities such as innovation.

SFI has a large supplier network in place with a lot of potential; many innovations are available in the supplier market, suppliers have resources available that can be used for innovation and suppliers are interested in innovative partnerships. Also, by involving suppliers for cooperation partnerships for example for innovation, SFI may become much more interesting as a customer. Currently, SFI has but limited supplier involvement in innovation and does not capture the full potential value from suppliers with regard to innovation. Purchasing top management as well as other Purchasing employees from all levels feel that Purchasing can contribute much more to innovation at SFI. Purchasing is believed to be in an ideal position to act as a supplier relationship manager, facilitating open innovation and involving the necessary players at SFI.

As such, Purchasing top management has taken action. In 2009, a survey investigation among internal customers and sources has been undertaken in order to define how Purchasing is perceived within SFI. The results of this survey show that Purchasing has created a strong basis for being a value-adding, professional and transparent function, but has to work on using and developing this basis through closer integration and cooperation with SFI, the Business Groups and suppliers. In January 2010, Purchasing Indirect Goods and Services has added a new category; R&D and Innovation. This means that the different indirect Purchasing managers that were formerly responsible for all kinds of different aspects that have to do with R&D and Innovation have been accumulated to 1 dedicated category for R&D and Innovation. Next to this, a university trainee - me - has been hired as from May 2010 to investigate the link between the purchasing function and innovation at SFI.

**Purchasing Strategic Dialogue**

In March 2010 the CPO kicked off a Purchasing Strategic Dialogue (PSD) project in March 2010 in order to create one strategic vision for SFI Purchasing. A significant number of Purchasing employees – including myself – and some representatives from other departments took part in the PSD as a team member. Amongst other topics, the PSD has addressed innovation as well. The result of this undertaking is that Purchasing is now eager to establish a structure and culture enabling supplier involvement in innovation, to have focused supplier involvement in selected areas, to have Purchasing formally involved in the innovation process and to use innovation contracting. However, in order to underpin this strategic vision for innovation, a best practices or case study research is required by the Shared Services Board. This master thesis project provides exactly this.

**1.4 LITERATURE**

To sketch a context from literature, research from the innovation management literature, purchasing management literature, supply chain management literature and marketing management literature has been used. Many researchers from these disciplines indeed find that involving suppliers has beneficial effects for the buying company with regard to product innovation, which is also called New Product Development (NPD) (Burt, 1989; Clark, 1989; Clark & Fujimoto, 1991; Handfield, 1993; Ragatz et al., 1997; Monczka et al., 1998; Handfield et al., 1999; Sobrero & Roberts, 2001; Wynstra et al., 2001; Van Echtelt, 2004; Monczka et al., 2005; Wagner & Hoegl, 2006; Van Echtelt et al., 2008; Kibbeling & Van Weele, 2010). Purchasing is argued to have an important role and a perfect position when it comes to involving suppliers and improving NPD (Axelsson & Håkansson, 1984; Burt &

In order to get a full understanding of the theoretical context, this paragraph will offer an introduction to relevant literature. First, it will be explained why Purchasing should be involved in NPD by making the case for changing innovation and involving suppliers in innovation. Then it is discussed what role Purchasers play in this. It will become clear how Purchasing fits in formal NPD processes such as the Stage-Gate process. The paragraph closes with a discussion on the organization of Purchasing involvement in NPD.

**Suppliers’ new role in innovation**

For a long time, companies have innovated by getting the best resources in-house and investing heavily in R&D in order to get to the market first (Chesbrough, 2003a). However, scholars demonstrate that in order to keep up with the world's changes, innovation should become more open and include global access to resources, transcending the firm and its boundaries to a more open approach and collaborative innovation with external parties (Chesbrough 2003a; 2003b; Prahalad & Krishnan, 2008). Chesbrough (2003a; 2003b) explains that in open innovation, external resources and paths to market have become as important as internal resources and paths to market. Empirical research indeed shows that an increasing amount of companies are opening up their innovation process (Chesbrough, 2006; OECD, 2008).

Suppliers have been identified as being a key external resource when it comes to NPD (Von Hippel, 1988; O’Neal, 1993; Schiele, 2006; Kibbeling and Van Weele, 2010). OECD (2008) indeed reports that suppliers are one of the most popular parties to collaborate with for companies in the OECD countries. It has long been recognized that by managing suppliers the return on investment can be increased by using cost reduction and decreasing working capital. However, there are numerous other areas that suppliers influence; flexibility, responsiveness, time-to-market, product quality and innovation (Kibbeling & Van Weele, 2010).

Supplier involvement in innovation has both short-term and long-term effects. Numerous studies provide empirical evidence that supplier involvement in innovation leads to improved product quality, decreased development speed, lower product costs and lower development costs (Burt, 1989; Clark, 1989; Clark & Fujimoto, 1991; Handfield, 1993; Ragatz et al., 1997; Handfield et al., 1999; Sobrero & Roberts, 2001; Van Echtelt, 2004; Monczka et al., 2005). Long-term effects include tapping into the suppliers’ knowledge and aligning technology roadmaps, while sharing profits and risks (Handfield et al., 1999; Monczka et al., 2005; Van Echtelt, 2004). Permanent access to the suppliers’ technologies may also be of strategic importance (Wynstra et al., 2001; Monczka et al., 1998; Van Echtelt, 2004). Specific solutions and experiences resulting from collaboration with a supplier can be transferred to other projects, resulting in increased experience in relationships (Van Echtelt, 2004; Ragatz et al., 1997; Sobrero and Roberts, 2001). Von Hippel (1988) and Monczka et al. (2005) also show that suppliers are a source of innovative ideas.

Risks of including suppliers in innovation may be diffusion of knowledge and loss of skills, creating an unwanted lock-in situation with project delays as result and changing expectations or needs resulting in a conflict between a company and its supplier (Monczka et al., 1998; Handfield et al., 1999; Van
Echtelt, 2004). Next to this, it is logical that the benefits of supplier involvement should exceed the costs (Bahemia & Squire, 2010). In order to ensure a good information exchange, more time and effort and thus money needs to put into coordination of supplier involvement (Bensaou, 1999).

These risks imply that it is crucial to organize and manage supplier innovation in the right way. The right suppliers, the kind of relationship and the kind of project management should be chosen with care (Wynstra, 1998; Wynstra & ten Pierick, 2000; Wagner & Hoegl, 2006). In order to obtain the long term benefits from involving suppliers in NPD, a company must recognize and organize for Purchasing involvement in new product development (Zsidisin & Ellram, 2001; Wynstra et al., 2001; Van Echtelt et al., 2008). Wynstra et al. (2001) explain that the main issues for the buying company with regard to supplier involvement in NPD are identifying tasks and processes that need to be carried out by Purchasing (see also: Van Echtelt et al., 2008), forming an organization that supports these tasks and having a Purchasing staff with the right skills. In other literature, Purchasing is also seen as the most logical and fittest liaison, information processor and connector of internal and external resources (Williams & Smith, 1990; O’Neal, 1993). This description of Purchasing fits a new modern approach to purchasing in which its strategic importance to the firm and its key role and position to are recognized (McIvor et al., 1997; Axelsson et al., 2005; Monczka et al., 2005; Wynstra, 2006).

**Purchasing involvement in NPD**

Although McGinnis and Vallopra (1999) found a role for Purchasing in process innovation, all other literature finds most potential for Purchasing in NPD. Various studies empirically confirm the optimal position of Purchasing with regard to supplier involvement in NPD as argued by scholars (Williams & Smith, 1990; O’Neal, 1993; Zsidisin & Ellram, 2001; Wynstra et al., 2001; Van Echtelt et al., 2008). For example, Burt and Soukup (1985) explain that involving Purchasing can reduce project risk, reduce costs and enhance NPD performance, while Mendez & Pearson (1994) prove that Purchasing involvement in NPD decreases the product development time.

Managing NPD is not a simple and straightforward task; many variables are of influence in the NPD process and the success of the new product. There are many approaches in managing NPD (Amabile et al., 1996; Amabile, 1998; Kamoche, Pina e Cunha, 2001; Clark & Fujimoto, 1991; Cooper et al., 2002a; 2002b; 2004; Griffin, 1997; Keller, 2001; Cooper & Edgett, 2008), but the majority of companies structure their NPD process and use Stage-Gate processes to do this (Cooper et al., 2002a; 2004). A Stage-Gate process divides the NPD process in a number of stages which comprise a predetermined set of activities belonging to that stage. Such a stage is typically followed by a gate in which the preceding stage is reviewed, resulting in a go or no-go decision for the next stage. In section 2.3.1, the Stage-Gate process will be discussed in more detail.

Stage-Gate like processes are often used in combination with a cross functional team, resulting in a decreased time-to-market (Griffin, 1997; Keller, 2001; Cooper & Edgett, 2008). Scholars explain that using cross-functional teams are key to innovation success (Clark & Fujimoto, 1991; Griffin, 1997; Keller, 2001; Cooper & Edgett, 2008) and explain that Purchasing should be included in such teams (Burt & Soukup, 1985; Guy & Dale, 1993; Botter & Wijnstra, 1996; Wynstra, 1998; Wynstra et al., 2000, Nijssen et al., 2002).

In the different stages of Cooper’s (2002a) Stage-Gate process – Discovery, Scoping, Build Business Case, Development, Testing & Validation and Launch – Purchasing can add value in different ways. In
In the Discovery stage, Purchasing can add value by scouting for new technologies, components and ideas in the supply base. During the Scoping phase, Purchasing may assess the product design (for example in terms of in terms of costs, quality, risks, lead time etc.) and suggest alternative suppliers, product or technologies. Product design and description may significantly be improved and supplier lock-in avoided. Purchasing has also been found to promote standardization and simplification of the new product. Next to assessing the product and its components, Purchasing can also assess resources for security of supply and compatibility with the firm’s equipment and make project specific develop or buy decisions. Concerning suppliers, Purchasing is able to add value by selecting suppliers for involvement, determining the extent of involvement, deciding on the time of involvement and coordinating development activities of the supplier and firm. Encouraging suppliers to make beneficial suggestions for a certain product is also a potential Purchasing task. In literature, no Purchasing tasks have been found for the Build Business Case stage. With regard to the Development stage, Purchasing may include integrating activities between first tier suppliers and between first and second tier suppliers. Purchasing can also be involved in the packaging of the product. As a liaison, Purchasers have a good position to check for promotion cooperation with the supplier. Furthermore, coordinating development and engineering activities between supplier and firm is also found in this phase. Buying tooling and equipment is also done to this phase. In the Testing and Validation stage, ordering and casing prototypes, coordinating prototyping between supplier and firm and configuration management are all Purchasing activities that can contribute to the NPD process. In the Launch phase Purchasing can coordinate production start-up activities between supplier and firm and formalize and implement their contingency and purchasing plans.

Literature stresses the importance of involving Purchasing in the early stages of the NPD process already (Farmer, 1981; Burt & Soukup, 1985; Botter & Wijnstra, 1996; Wynstra et al., 2001 Van Weele, 2010) and not to leave out Purchasing. In section 2.3.2, this is explained in more detail.

Authors identify that involving Purchasing early can be an issue; it is often found that there is bias and resistance of management and other departments resulting in Purchasing being left out or blind spots for the added value that Purchasing has to offer (Burt & Soukup, 1985; Athuahene-Gima, 1995; Van Weele, 2010). With regard to supplier related Purchasing tasks, Handfield et al. (1999) explain that early supplier involvement in NPD is not necessary for simple or non-critical goods or services or wanted with non-allied suppliers. Other literature also implies that for some simple and non-critical goods or services clerical and classical Purchasing tasks may suffice (Kraljic, 1983; Bensaou, 1999; Wynstra, 1998).

Additional long term tasks are found at more strategic management levels; development management and supplier interface management level (Wynstra, 1998; Wynstra et al., 1999; Wynstra, 2000; Wynstra et al., 2000). Purchasing activities regarding development management include determining which technologies to keep in-house and which ones to outsource, formulating policies for supplier involvement, formulating policies for purchasing related activities of internal departments and communicating policies and procedures internally and externally. In the realm of supplier interface management, Purchasing can influence innovation by monitoring supplier markets for
technological developments, pre-selecting suppliers for product development collaboration, motivating suppliers to build up and maintain specific knowledge or develop certain products, exploiting the technical capabilities of suppliers, evaluating suppliers’ development performance and including development performance in overall vendor rating.

The Purchasing tasks, both on a project level and on a strategic level will be discussed further in section 2.3.2.

Organizing for Purchasing involvement in NPD

Organizing for Purchasing involvement starts with top management’s recognition and promotion of the strategic importance of Purchasing to the firm’s value creation processes in NPD (Nijssen et al., 2002; Athuahene-Gima, 1995). It is also top management’s responsibility to ensure that NPD is an organizational rather than a functional endeavor and thus include Purchasing in formal protocols for NPD processes (Burt & Soukup, 1985; Athuahene-Gima, 1995, Nijssen et al., 2002).

Wynstra et al. (2001) and Van Echtelt et al. (2008) explain that next to identifying tasks and processes with regard to Purchasing integration in NPD, an organization supporting these tasks needs to be formed. In order to create an organization that supports Purchasing involvement, some key enabling factors are of influence. These enabling factors ‘make it possible or easier to carry out purchasing related activities in NPD’ (Wynstra, 1998, pp. 133). These factors include having the right departmental and NPD team organization (Burt & Soukup, 1985; Guy & Dale, 1993; Botter & Wynstra, 1996; Wynstra, 1998; Wynstra et al., 2000; Wynstra et al., 2000; Nijssen et al., 2002), exchange and recording of information (Botter & Wijnstra, 1996; Wynstra, 1998; Wynstra et al., 2000, Zsidisin & Ellram, 2001) and quality of human resources (Guy & Dale, 1993; Athuahene-Gima, 1995; Botter & Wijnstra, 1996; Wynstra, 1998; Wynstra et al., 2000; Nijssen et al., 2002). Other enabling factors include top management support, Purchasing goals for NPD, cultural factors – especially in terms of openness and trust – and good long term supplier relations (Burt & Soukup, 1985; Athuahene-Gima, 1995; Guy & Dale, 1993; Botter & Wijnstra, 1996; Wynstra, 1998; Wynstra et al., 2000; Wynstra et al., 2000; Zsidisin & Ellram, 2001; Nijssen et al., 2002). A lack of enabling factors is a barrier to Purchasing from being involved in the new product development process (Guy & Dale, 1993; Athuahene-Gima, 1995; Botter & Wijnstra, 1996; Wynstra, 1998; Wynstra et al., 2000; Nijssen et al., 2002). Therefore, it is crucial to make sure that this lack does not exist.

Lakemond et al. (2001) argue that different NPD projects require different configurations of Purchasing involvement. It depends on the projects size and complexity how Purchasing professionals are best involved. For large, complex projects dedicated full-time Purchasing specialists are fit, while small, simple projects can do with indirect, ad hoc Purchasing involvement.

Section 2.3.2 and 2.3.3 will provide more details with regard to the enabling factors and Purchasing involvement structures.

1.5 RELEVANCE RESEARCH TO EXISTING LITERATURE

Most research with regard to supplier and Purchasing involvement in NPD has been conducted in the electronics industry (Axelsson & Hakansson, 1984; Mendez & Pearson, 1994) or automotive industry (Axelsson & Hakansson, 1984; Burt & Soukup, 1985; Clark, 1989; Clark & Fujimoto, 1991). Wynstra (1998) has addressed the lack of research in other industries by conducting an exploratory cross-
sectional case study across 5 industries and a series of mini-case studies of 9 Dutch manufacturers. In his cross-sectional case study, he addresses 9 relationships between suppliers and manufacturers. Only one of these cases concerns companies in the Chemicals industry. Newer research is, based on these cross-sectional case studies (Wynstra et al., 1999; Wynstra et al., 2000; Wynstra et al., 2001; Wynstra et al., 2003) or based on further research conducted in the electronics industry (Wynstra & ten Pierick, 2000; Van Echtelt, 2004; Van Echtelt et al., 2008). An exception is the work of Kibbeling and Van Weele (2010); they do conduct a cross-sectional survey, but do not include Chemicals as a sector. It must be noted that NPD projects across industries are hard to compare due to their unique nature (Meyer and Peter, cited in Wynstra et al., 1999, pp. 140). Thus, there is but few data on how research results with regard to supplier and Purchasing involvement in NPD are applicable to the Chemicals industry. Van Echtelt (2004) also explains that additional studies that focus on different industries are needed in order to see to what extent the previous mentioned findings can be generalized.

Studying Purchasing involvement in NPD projects in the Chemicals industry itself may provide a better understanding on how literature findings are applicable to this industry. Next to this, this project might provide additional insights about the nature of Purchasing involvement in NPD in this particular sector.

Numerous studies have made a case for Purchasing involvement in NPD (Farmer, 1981; Axelsson & Hakansson, 1984; Burt & Soukup, 1985; Williams & Smith, 1990; Handfield, 1993; O’Neal, 1993; Athuahene-Gima, 1995; Zsidisin & Ellram, 2001; Wynstra et al., 2001; Nijssen et al., 2002; Van Echtelt, 2004; Van Echtelt et al., 2008), also with regard to supplier involvement in NPD. It is empirically shown in literature that Purchasing involvement in NPD positively influences NPD performance. For example, Mendez & Pearson (1994) find that involving Purchasing in NPD helps to reduce product development time while Burt & Soukup (1985) and Burt (1989) find that NPD risks are reduced by involving Purchasing in NPD. However, it is still not empirically proven that Purchasing involvement indeed causes more supplier involvement in NPD. Also, Purchasing involvement in NPD might have an influence on aspects of NPD performance other than those previously investigated. This study sheds more light on these issues.

Lakemond et al. (2001) state that their findings with regard to Purchasing involvement structures need verification and that more research is needed with regard to the contextual factors. Also, little is known about the timing of Purchasing involvement in relation to the different Purchasing involvement structures that Lakemond et al. (2001) present. This project contributes to the fulfillment of these needs.
2 RESEARCH PLAN

This chapter gives a detailed research plan and methodology for the master thesis project. To begin with, a framework is presented for a problem-solving project. Second, the problem definition becomes clear and is elaborated on. Then, research models are derived from relevant company information and literature. To conclude with, a detailed methodology for the empirical part of this project is presented.

2.1 PROBLEM-SOLVING FRAMEWORK

In this paragraph, a framework for the project is set up. First, a research design framework is presented. Second, a more detailed framework is introduced concerning the solution design.

Regulative cycle

This master thesis project is a design-focused and theory-based problem solving project, as described by Van Aken et al. (2007). For such projects, Van Aken et al. (2007) stress that it is critical not to design a smart solution but to organize for a performance improvement.

As problem-solving processes rarely follow a clear sequence of phases, Van Aken et al. (2007) propose using process steps, based on the regulative cycle as introduced by Van Strien (1997). The regulative cycle is used as a methodological framework in this thesis. The steps of this regulative cycle are shown in figure 2.1.

Van Aken et al. (2007) explain that a problem solving project typically starts with a problem ‘mess’ consisting of issues, opinions, judgments, interests, and power resulting from the choices of influential stakeholders. The problem mess must first be structured and categorized in order to define the underlying problem in the problem definition phase (chapter 2). The problem definition needs further scoping and validation in order to design a research plan and determine the project deliverables. In order to do this, various stakeholders within SFI are interviewed and participative observation regarding the PSD is used as well. Analysis and Diagnosis (chapter 3) is the next, analytical, step in the regulative cycle. Here, methods of business research are applied in order to gather relevant data. Analysis of this data is supposed to produce specific knowledge on the context and nature of the problem, resulting in a diagnosis. Quality and reliability criteria are typically applied.

The diagnosis is followed by the design of a solution in the form of a Plan of Action (chapter 4). This solution is based on both theory and the practical situation. Mostly, the plan of action also encompasses an implementation plan. In a typical master thesis project however, there is no time for the actual implementation of solution design. It is important though to make sure that the plan of action is indeed carried out by involving influential stakeholders throughout the project. It is normal that the stakeholders themselves fill in the details of the formal redesign to enable the solution design to work properly. Next comes the Intervention step in which the company processes are actually changed. Last, Evaluation serves as a learning moment in order to see what actions remain to...
be taken in order to optimize the new situation. The Intervention and Evaluation step are out of scope for this master thesis project.

**Solution design**

Van Aken et al. (2007) define a solution design as *a model of an entity to be realized, as an instruction for the next step in the creation process*. A model can take different forms but is always an abstraction of a possible future reality. It should also give all the information necessary to realize the model as intended by the designer.

The process of designing begins with determining the required function of the object to be designed and ends with making the actual model (Van Aken et al., 2007). The process involves three steps (see figure 2.2).

The first step is making a project design, consisting of a process of analysis and design that will produce the object and realization design. Second, an object design is made – which consists of a model of the future system or process – as well as a realization design in which the material process is described in order to realize the object design. Often, a master thesis project does not include the making of a realization design.

**2.2 Problem Definition**

In this section, the problem with regard to Purchasing involvement in NPD at SFI is defined. In order to do this, it is first explained what the problem statement is and how the problem statement is derived. Then, the research questions needed to solve the problem are presented and the deliverables of the project become clear.

**2.2.1 Problem Statement**

In the initial research project assignment it is described that ‘*SFI wants to strengthen the link between innovation and Purchasing resulting in a stronger positioning of innovation in the Purchasing function*’. As Van Aken et al. (2007) and Verschuren & Doorewaard (2007) predict, a number of research approaches and directions of problem solving are mentioned without actually explaining what the existing problem is. In line with the suggestions of Van Aken et al. (2007) and Doorewaard & Verschuren (2007), the project therefore started with a general exploration, which consisted of a preliminary investigation of the organization and the problem context, leading to a problem definition. In order to do this, six intake meetings and 7 orientation interviews took place with supervisors, principals and other stakeholders. At least 18 meetings with the PSD workgroup Innovation or the total team were attended by means of participative observation. A full overview of the meetings and interviews that have taken place can be viewed in appendix 6. Next to this, other relevant information was gathered about primary business processes and organizational support. The series of interviews and meetings, together with other relevant information, have been used to add new perspectives to the initial assignment, to get a good idea of the problem mess and to assess the
Performance not measured or appraised for innovation and growth

No innovation targets

No targets for supplier involvement

No good innovation measurements available for purchasing

Focus on cost savings only

Purchasing has no innovation goals

No structure for purchasing involvement in innovation process

Purchasing not involved in corporate strategy/no strategic role

Purchasing not involved in purchasing involvement in innovation process by other departments or in late stage

Purchasing processes not transparent SFI wide

Engineers used to old innovating process without purchasing

Bureaucratic

Purchasing perceived as delaying

Purchasing processes not transparent SFI wide

Does not radiate passion, joy

Recognition added value purchasing by corporate top management not concrete

Added value supplier involvement not fully recognized

‘IP’-thinking/no knowledge sharing environment

Do-it-ourselves mentality

Suppliers rarely involved in open innovation

Added value purchasing in supplier involvement not fully recognized by all stakeholders

Need for more people with right skill set

No structured approach in supplier involvement/long term supplier relations

Lack of experience with long-term relations

Opportunism instead of give-and-take

Difficulties attracting right people

No specific training/learning for innovation involvement

Low integration with other business functions/stand-alone function

Purchasing bad image

Missed opportunities for cost savings

Missed opportunities for adding value to NPD

FIGURE 2.3: Cause and effect diagram regarding Purchasing involvement in NPD at SFI
scope and depth of the business problem. The problem mess has been structured in a cause and effect diagram, shown in figure 2.3. As can be seen, many factors have been found to be of influence on involvement of Purchasing in NPD, resulting in a complex cause and effect tree.

Some causes have to do with image problems (bureaucracy, delaying, lack of transparency, no passion, difficulties attracting employees) and people (need for more people with right skills, training/learning), while others have to do with goal setting (no strategic role/no strategy, lack of vision beyond cost savings, short term focus, no innovation targets), supplier relations (‘IP’-thinking, ‘do-it-ourselves’ mentality, added value not recognized, opportunism, lack of experience, no structured approach for involvement/long term relations) and organization (no integration with other business functions, innovation process structure, engineers used to old process). As a result of Purchasing not being involved in NPD, opportunities are missed with regard to cost savings and potential added value of suppliers.

The causes for Purchasing not being involved in innovation all directly or indirectly point to the lack of structure as a main cause for not involving Purchasing in NPD (blue delineation in the cause and effect tree in figure 2.3). Therefore, the practical problem definition is defined as follows:

At SFI, there is a lack of structure enabling Purchasing involvement in NPD projects.

2.2.2 RESEARCH QUESTIONS AND ASSIGNMENT

Research Questions

Resulting from problem definition, the main research question is formulated together with the matching sub questions. As figure 2.3 shows, many factors are at play when it comes to the lack of structure with regard to Purchasing involvement in NPD. Some of these causes were already entirely or partly addressed by Purchasing management. For example, the Communication Manager is helping in improving the bad image of Purchasing (grey delineation in figure 2.3). Also, next to innovation, the PSD included the topics communication, data gathering, internationalization, recognized business partner, value proposition, sustainability and supplier development. As such, some of the causes in the causes and effect diagram were covered by workgroups from the PSD (black delineation in figure 2.3). Together with a project principal, it is decided to place most focus on Purchasing occurrence in official innovation processes and supplier involvement in NPD (delineated in orange in figure 2.3). Business integration with other Business Functions and recognition of the added value of Purchasing (both delineated in orange in figure 2.3) are addressed as well, but in less extent.

The main research question is:

What organizational and procedural changes are necessary to create a structure that enables Purchasing to be involved in NPD at SFI?
Following from this main research question, the areas of focus and a previous conducted literature study (Van Erum, 2010), the following sub questions are deemed relevant:

- **What protocols and procedures concerning NPD are used in NPD projects and how do these relate to Purchasing involvement in NPD?**
- **How is Purchasing currently involved in NPD and how is this working out?**
- **Does the way in which the purchasing department and NPD project team are organized enable Purchasing involvement in NPD?**
- **What are the project team members’ perceptions of (the potential added value of) Purchasing and how does this relate to Purchasing involvement in NPD?**

**Assignment**

Next to the previously mentioned research questions, the assignment deliverables have been determined in advance as well. The subsequent deliverable for the project has been set:

*Analyze the current organization and procedures of the Purchasing department and NPD teams at SFI, in order to design a structure or framework of structures which enables the company to tap into the potential added value of Purchasing involvement in NPD.*

In a large organization such as SFI, such a structure or framework of structures depending on the type of NPD project or other contextual factors can provide understanding of the dependencies and implications of having a certain structure for Purchasing involvement. A sound structure or framework of structures should result in better, more conscious, decisions with regard to Purchasing involvement, most likely resulting in a better use of the potential added value of Purchasing involvement in NPD.

Also, this assignment shows to what extent the company matches the theories found in literature and what may be added or removed in the case of SFI. Possible directions for further research may be the result of this assignment.

**2.3 Research Model**

In this section, literature and the preliminary investigation at SFI are used to derive a research model to assess the organization and procedures with regard to Purchasing involvement in NPD. Before the model is defined, the NPD procedures at SFI are assessed first. Second, relevant literature is discussed in more detail. This information is combined, in order to derive the research model.

**2.3.1 NPD at SFI**

**PMP process**

As explained in chapter 1, SFI takes innovation very seriously. In their innovation BG, BG Corundum, radical innovation takes place and innovation supporting activities are done. However, the other BG’s also have their own innovation projects.

The innovation process begins with a discovery or idea, which can be submitted to a so called idea box at BG Corundum. If the idea is attractive enough, a new project will be initiated. To make sure that the output and effectiveness of an innovation project is optimized, SFI has adopted a formal business process, the Project Management Process (PMP). Different BG’s have their own official
processes, checklists and other structures, based on the general PMP. SFI makes it very clear that typical project risks may lead to value destruction or commercial damage and should therefore be managed with care. Such risks include vague project goals or deliverables, not delivering the required results, delays, exceeding the project budget and changing boundary conditions.

This PMP is based on Cooper’s (2002a; 2004) famous stage-gate based approach, which a lot of companies find useful. The PMP consists of five phases, as can be seen in figure 2.5. Every PMP stage ends with a gate in which a formal go or no-go decision is made based on predetermined criteria. Although named slightly different, the stages exactly resemble Cooper’s original stages (2002a); Scoping, Build Business Case, Development, Testing & Validation and Launch. In this work, Cooper’s (2002a) naming is used in order to maintain clarity for every reader. In the scoping stage a preliminary analysis of the idea potential is made based on strategic fit, gains, technical alignment, fit with current knowledge and potential problems or barriers. A second screening will take place in order to eliminate ideas with the least potential. It is considered crucial to develop a good business model around the new product in order to innovate successfully. This happens in the second stage after which the business case is assessed. If the business plan is approved, the further development of the new product takes place. After yet another assessment, stage four may be entered to validate prototypes and to scale up. After a final review, the product can be launched and transferred to running business. Management is responsible for ensuring project administration and a sound evaluation.

The PMP is strongly advised for all projects, among which NPD, process innovation, plant construction and many other kinds of projects. Small projects may choose to combine roles and tasks in order to reduce administration. However, if a project exceeds the size of €50 thousand, the PMP is mandatory. Projects that have a budget of more than €30 million or projects that are very complex and have a budget of more than €15 million, have to get an extra Value Assurance Review by a cross-functional team before submitting their project for review at the next gate.

Project managers can use a web-based application called ‘Project Plaza’ as a PMP tool. Project Plaza shows what steps should be taken in which stage and offers some checklists for every phase, except for the idea generation phase. The checklists function as a reminder to the project manager that certain aspects or information on 14 different topics should be taken into account. Per phase, the checklist is different and the list is supposed to be checked before submitting the project for review in one of the gates.

![Figure 2.5: The PMP of SFI](image)

![Figure 2.4: The NPD project team organization](image)
NPD project team organization

With regard to the NPD project team, there are corporate requirements as well. Figure 2.4 illustrates the general project team organization. When an idea has been formed by a particular responsible person at SFI, this person is called the senior user. The senior user defines the deliverables of the NPD project. When it is decided to start an NPD project, a project owner is contacted – this person has an available budget and can thus finance the NPD project with part of that budget. The project owner is accountable for the project and makes the go or no-go decision using the advice of a review team consisting of the project team members’ line managers. The project owner may ask people to be part of the review team, in addition to this group of managers.

The project owner has to contact a project manager who determines what experts are needed or wanted for his project and can thus determine who is in the project team and who is not. Also the timing and extent of involvement is determined by the project manager. In order to involve a certain employee, the project manager has to approach the managers of the department of a potential project team member first. It is common not to have a fixed project team. The rest of the organization and content of the project is up to the project manager as well. The PMP does not prescribe how to go about in organizing the project, but functions as a guideline.

The project owner and the project manager must not have a hierarchical relationship, to ensure a non-bias. The project manager must also have an independent manager, because this manager will be part of the review team as well.

Purchasing in the PMP

With regard to the supply part of a project, the PMP only specifies that the project manager is accountable for monitoring the purchase process and external commitments. Also, the project manager should integrate all disciplines involved. It is not further specified how the project manager can or should do this. In fact, the corporate PMP does not go into further details concerning which functions/ departments can or should be approached for which topics. Purchasing is not mentioned as a function that can take part in the project team at all.

In the PMP it is explained that certain functions should be represented in the review team (see figure 2.4). Concerning supply, Demand and Supply Chain Management is mentioned as a part of the review team. Although the PMP does not go into detail about this, Purchasing should be indirectly involved in Demand and Supply Chain Management (together with other functions such as logistics and demand chain planning).

It can be concluded that Purchasing as a function is not really mentioned in the PMP. The PMP does not describe any specific expectations for Purchasing with regard to innovation projects. As explained earlier in this paragraph, BG’s adapt the PMP and make customized tools to suit their own needs. It needs further investigation to see how BG’s mention Purchasing in their specific PMP adaptations and tools.

2.3.2 RELEVANT LITERATURE ON PURCHASING INVOLVEMENT IN NPD

In order to make a sound research model, information about the PMP is combined with literature on Purchasing involvement in NPD as a basis for this model. The starting point is Wynstra et al. (2001), who explain that the first two issues for the buying company with regard to supplier involvement in
NPD are identifying tasks and processes that need to be carried out by Purchasing (see also: Van Echtelt et al., 2008) and forming an organization that supports these tasks. A third issue mentioned by Wynstra et al. (2001), having the right quality of human resources, is out of scope for this research project.

In this section, relevant literature with regard to NPD processes and Purchasing tasks for NPD is discussed first. Purchasing tasks with regard to supplier involvement are of interest in particular. Second, enabling factors with regard to the organization of the Purchasing department and NPD teams are discussed in detail. Last, different structures with regard to Purchasing involvement in the NPD project are discussed.

**Purchasing tasks and processes**

In section 1.4, it is explained that in literature Purchasing is found to be able to add value by executing different tasks on a project level as well as on a long term, strategic level. Strikingly, the number of value adding activities of Purchasing concerning NPD mentioned in literature is rather large. Literature (see also: Van Erum, 2010) as well as the master thesis project principals point out the importance of Purchasing involvement with regard to supplier involvement in particular. As such, Purchasing tasks with regard to supplier involvement in NPD is focused on during this investigation.

With regard to Purchasing tasks on a project level, it is convenient that authors often use or add a timeline representing development phases based on the conversion rate from idea to launch (Farmer, 1981; Wynstra, 1998; Wynstra et al., 2001). This is similar to Stage-Gate approach and thus also the PMP of SFI. Table 2.1 shows the relevant Purchasing tasks found in literature with regard to supplier involvement in NPD per development stage.

In the **Discovery** stage, Purchasing may add value by scouting for new technologies and components in the supply base. Purchasing has also been found to scout for ideas for NPD in the supply base in particular. Purchasing tasks for the **Scoping** stage may concern suggesting alternative suppliers, products or technologies – leading to a better product design and description, cost savings and avoidance of a lock-in position – plus encouragement of suppliers to make suggestions. Other tasks in this stage, supplier selection as well as determining the extent and timing of supplier involvement, are directly related to supplier involvement in the NPD project. Literature has not identified any Purchasing task with regard to supplier involvement in NPD for the **Build Business Case** stage. In the **Development** phase, Purchasing tasks of interest are integrating activities between first tier suppliers and first and second tier suppliers. Another Purchasing task in this stage is coordination of development activities between the supplier and the firm. Coordination of prototyping activities between the supplier and firm is a Purchasing task for the **Testing and Validation** stage. Configuration management or version management is a related task which is also found in literature. According to literature, purchasing plans and contingency plans are formalized and implemented in the **Launch** stage. Coordination of production start-up activities is also a potential Purchasing task.

Literature also identifies long term Purchasing activities of a more strategic nature that are relevant with regard to supplier involvement (see table 2.2). These tasks include structurally monitoring the supplier markets for technical developments and obtaining information on new products and technologies. The suppliers’ development performance must be evaluated and shared for learning.
TABLE 2.1: Project level Purchasing activities with regard to supplier involvement in NPD categorized per development stage

<table>
<thead>
<tr>
<th>Development stage</th>
<th>Purchasing Activity</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
<td>Farmer (1981)</td>
</tr>
<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
<td>Burt &amp; Soukup (1985)</td>
</tr>
<tr>
<td>Build Business Case</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
<td>Wynstra (1998), Wynstra et al. (2001)</td>
</tr>
<tr>
<td>Launch</td>
<td>Coordinating production start-up activities</td>
<td>Wynstra (1998), Wynstra et al. (2001)</td>
</tr>
<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
<td>Burt &amp; Soukup (1985)</td>
</tr>
</tbody>
</table>

purposes as well. In order to get most out of a co-development with suppliers, suppliers’ technical capabilities must be exploited as well.

These tasks correspond with a large part of the critical tasks found by Van Echtelt (2004) and Van Echtelt et al. (2008) with regard to management of supplier involvement in NPD. Other tasks found by those authors may be done by other stakeholders. This is not surprising as literature underlines the necessity for a cross-functional approach to NPD (Burt & Soukup, 1985; Clark & Fujimoto, 1991; Guy & Dale, 1993; Botter & Wijnstra, 1996; Griffin, 1997; Keller, 2001; Wynstra, 1998; Wynstra et al., 2000, Nijssen et al., 2002; Cooper & Edgett, 2008). Van Echtelt (2004) divides management activities with
Table 2.2: Long term, strategic Purchasing activities with regard to supplier involvement in NPD

<table>
<thead>
<tr>
<th>Purchasing Activity</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-selecting suppliers for product development</td>
<td>Wynstra, 1998; Wynstra et al., 1999; Wynstra et al., 2000; Wynstra et al., 2001</td>
</tr>
<tr>
<td>collaboration</td>
<td></td>
</tr>
<tr>
<td>Exploiting the technical capabilities of the supplier</td>
<td>Wynstra, 1998; Wynstra et al., 1999; Wynstra et al., 2000; Wynstra et al., 2001</td>
</tr>
<tr>
<td>Evaluating the suppliers’ development performance</td>
<td>Wynstra, 1998; Wynstra et al., 1999; Wynstra et al., 2000; Wynstra et al., 2001</td>
</tr>
<tr>
<td>Monitoring supplier markets for technical developments</td>
<td>Wynstra, 1998; Wynstra et al., 1999; Wynstra et al., 2000; Wynstra et al., 2001</td>
</tr>
<tr>
<td>Providing information on new products and technologies</td>
<td>Wynstra, 1998; Wynstra et al., 1999; Wynstra et al., 2000; Wynstra et al., 2001</td>
</tr>
</tbody>
</table>

regard to supplier involvement in NPD into three different types; strategic activities, operational activities and collaboration activities. However, as the collaboration related activities for Purchasing can also be assigned to different NPD process stages or classified as long term and thus strategic, the collaboration type is not separately represented in the research model.

Optimizing Purchasing involvement effect

With regard to Purchasing activities in NPD, several factors are at play enabling the integration of Purchasing tasks with NPD and optimizing the added value of Purchasing contributions to NPD. These factors concern the timing of involvement, the level of pro-activeness of Purchasing in NPD, formal protocols and the balance between strategic and project level tasks. Below, these factors are explained in more detail.

Van Weele (2010) explains that as the NPD process advances, product specifications become more rigid and are thus harder to change. As a result, the degrees of freedom for Purchasing decreases while the costs of introducing changes rise as the project advances (see figure 2.6). Various scholars therefore stress the importance of involving Purchasing in the early stages of the NPD process already (Farmer, 1981; Burt & Soukup, 1985; Botter & Wijnstra, 1996; Wynstra et al., 2001 Van Weele, 2010). This does not necessarily mean that Purchasing should be involved in the idea generation stage already. In literature, it is found that when Purchasing is involved in the investigative scoping stage, this is early involvement as well (Burt & Soukup, 1985).

Organizing for Purchasing involvement starts with top management’s recognition and promotion of the strategic importance of Purchasing for the firm’s value creating processes in NPD (Burt & Soukup, 1985; Athuahene- Gima, 1995; Wynstra , 1998; Nijssen et al., 2002). Top management should ensure that new product development is an organizational rather than a functional endeavor. In order to do this, it is vital to include purchasing in the formal protocols for NPD processes (Burt & Soukup, 1985;
Athuahene-Gima, 1995; Nijssen et al., 2002). The Purchasing activities mentioned above can be used for making a formal protocol which also ensures timely involvement of Purchasing in the NPD process.

Next, it is indicated that in order for the abovementioned Purchasing tasks to have full effect, there needs to be a balance between strategic tasks and those tasks executed at project level (Wynstra, 1998; Wynstra et al., 1999; Wynstra et al., 2000; Wynstra et al., 2001). Some of the long term strategic tasks also enable related tasks at project level. For example, structurally evaluating suppliers’ development performance and pre-selecting suppliers for NPD directly help the operational task of selecting a supplier for a particular NPD project.

Finally, in order to be involved in NPD, Purchasing needs to adopt a pro-active attitude (Guy & Dale, 1993; Athuahene-Gima, 1995; Botter & Wynstra, 1996, Wynstra et al., 2000; Zsidisin & Ellram, 2001).

Organizational enabling factors

According to Wynstra et al. (2001), the second issue with regard to supplier involvement in NPD is forming an organization that supports the integration of Purchasing tasks with NPD. In Purchasing literature, many authors elaborate on enabling factors. In section 1.4 it is described that these factors are ‘those elements that make it possible or easier to carry out purchasing related activities in product development’ (Wynstra, 1998, pp. 133). Many enabling factors have been found in literature and are summarized in a general overview in appendix 7.

For this research, those enabling factors that are related to the company’s organization are of interest (see figure 2.8). In literature, two aspects of the internal organization come forward to be key to Purchasing involvement in new product development; the organization of the Purchasing department and the organization of the product development team (Burt & Soukup, 1985; Guy & Dale, 1993; Botter & Wijnstra, 1996; Wijnstra, 1998; Wynstra et al., 2000, Lakemond et al., 2001; Nijssen et al., 2002).

Organization of the department

With regard to the organization of the purchasing department the degree and principle of specialization, the horizontal complexity (centralization) and reporting relationship may be of influence (Botter & Wijnstra, 1996; Wijnstra, 1998; Wynstra et al., 2000; Lakemond et al., 2001).

First, the degree of specialization determines to some extent how much knowledge a Purchaser has about suppliers and products. Detailed knowledge is useful for Purchasing activities around product development. The size of the purchasing department with respect to the number of products and services and the number of suppliers may determine the level of specialization (Wynstra, 1998).

The principle of specialization also determines the alignment with other departments such as R&D (Wyntra, 1998; Lakemond et al., 2001). For example, if the purchasing department is specialized in terms of suppliers (suppliers A-D, suppliers E-H, etc.) and the R&D department based on technologies (for example plastics), there is a misalignment and communication thus becomes complex. Lakemond et al. (2001) report of cases in which purchasers involved in a new product development team had to cover a product function while they were specialized towards a technology. The misalignment was problematic indeed. It seems that having a product orientation and a congruent orientation with R&D improves the contribution of Purchasing to new product development activities, facilitate
involvement and diminish the need for coordination (Lakemond et al., 2001). However, as suppliers might be oriented more in terms of technologies this can make the interface with the supplier more challenging. Changing the degree and level of specialization may require changing the purchasing process as well as the required skills and competences of human resources (Lakemond et al., 2001).

The horizontal complexity – the number of different units or groups with specific tasks in a department – may be another factor influencing Purchasing involvement (Botter & Wijnstra, 1996; Wynstra, 1998; Lakemond et al., 2001). The more complex the organization of the purchasing department is, the more likely it is that there is a separate unit that is responsible for operational activities and another unit that is responsible for tasks such as product development related tasks. Botter and Wynstra (1996) state that in large firms departments should be decentralized so that communication lines are more direct and it enables the employees involved to have enough responsibilities and power to cooperate productively (see also Wynstra, 1998). However, if the complexity is too high, the coordination of the Purchasing activities may be hindered or need special care (Wynstra, 1998; Wynstra et al., 2000). The challenge is to organize the purchasing department in such manner that there is time and opportunity enough for Purchasing personnel to endeavor activities beyond the regular Purchasing tasks (Wynstra, 1998). Lakemond et al. (2001) suggest that appointing a Purchasing coordinator for development projects may be a good alternative for creating a separate Purchasing unit focused on product development activities.

The reporting relationship may be of influence as well (Wynstra, 1998). If the purchasing department and the R&D department report to the same manager, there are better chances that their goals are more aligned and thus coordinate their actions. This can be done on a project basis, but also on a permanent basis. There are cases in literature in which such a joint reporting relationship was found. For example, Cuijpers and Wynstra (1996) studied the Dutch company Hollandse Signaalapparaten that used duo’s consisting of 1 engineer and 1 purchaser to advise development related activities such as make-or-buy decisions, supplier and part selection and specification.

Organization of the NPD team

Cross-functional product development teams, including Purchasing, are mentioned to be key by many authors (Burt & Soukup, 1985; Guy & Dale, 1993; Botter & Wijnstra, 1996; Wijnstra, 1998; Wynstra et al., 2000, Nijssen et al., 2002). It is striking that in innovation literature, cross-functional teams in general are mentioned as a key factor in managing innovation as well (Clark & Fujimoto, 1991; Griffin, 1997; Keller, 2001; Cooper & Edgett, 2008). Aspects such as structure, composition and location of the development team are of influence.

A team structure can enable Purchasing involvement (Wynstra 1998; Wynstra et al., 2000). The team can on the one end exist of people that are closely connected with their functional organization and have no strong project manager. On the other end there are autonomous teams, which are fully dedicated to the project and have a project manager with a strong position. The choice for a structure seems to be dependent on the nature, priority and resources of the project and the companies’ habits towards cross-functional teams (Wynstra, 1998).

The composition of the project team determines which departments are most involved in the development project and affected by it (Wynstra, 1998). If a department has representatives in the development project, it enables the department to be better informed about the development
process, communicate and coordinate with other functions, influence the development process and take part in decisions. Participation of one or multiple representatives from Purchasing is likely to enhance new product development project outcomes, as specific important Purchasing or vendor related interests can be defended (Burt & Soukup, 1985; Guy & Dale, 1993; Botter & Wijnstra, 1996; Wijnstra, 1998; Wynstra et al., 2000). Although in some companies Purchasing is a part of the new product development team (Atuahene-Gima, 1995), such a functional collaboration is often not present.

The physical location of the new product development team members is argued to be important, as it enables the fast and effective communication that is required in new product development (Burt & Soukup, 1985; Botter & Wijnstra, 1996; Wynstra et al., 2000). This co-location can be a full-time location of Purchasers at a development team, Purchasing personnel being stationed near design engineers or maintaining two offices (one in the purchasing department, another in the engineering or development team area). Another option is to use procurement engineers who work with design engineers on a daily basis (Burt & Soukup, 1985; Van Weele, 2010).

**Purchasing involvement structures**

Case-study findings, such as those of Wynstra et al. (2000), show that not every firm needs the same form of organization, as each firm faces a different context. The same principle goes for the kinds of Purchasing involvement in new product development. Lakemond et al. (2001) discuss six possible configurations to involve Purchasing (see figure 2.7):

**A)** Engineers contacted Purchasing specialists external to the project team on an ad hoc basis.

**B)** Purchasing specialists are integrated into the project team on a part-time basis and work closely with engineers on specific materials, parts or technologies.

**C)** Purchasing specialists are full-time dedicated and fully integrated into the projects. They work closely with engineers on specific materials, parts or technologies as well.

**D)** A Purchasing coordinator is a part of the project team and coordinates Purchasing specialists external to the team.

**E)** A Purchasing coordinator is a part of the project team and other Purchasing specialists are added to the team on a part-time basis.

**F)** Both a Purchasing coordinator and Purchasing specialists are integrated in the project team on a full-time basis.

The first three configurations provide opportunities for in-depth and dedicated project involvement of Purchasing specialists. Configurations D, E and F allow for a higher degree of coordination. The enabling factors concerning the purchasing department’s organization and human resources mentioned above also enable the configurations discussed. How Purchasing professionals are best involved seems to depend on the size and complexity of new product development projects (Lakemond et al., 2001).
2.3.3 Research Model

In this section, the findings from sections 2.3.1 and 2.3.2 are used to construct a research model for assessing the organization and procedures with regard to Purchasing involvement in NPD. The research model consists of three parts: a conceptual model of the enabling factors, the Purchasing tasks and processes and a framework for Purchasing involvement structures. These research models facilitate a structured approach to answering the research questions.

The three steps mentioned by Wynstra et al. (2001) with regard to supplier involvement serve as a starting point for the research models. Wynstra et al. (2001) mention that the main issues for buying companies with regard to supplier involvement have to do with the quality of human resources, forming an organization enabling Purchasing involvement in NPD and identifying tasks and processes for Purchasing in NPD. Figure 2.8 depicts these three issues. As explained in section 2.2, this thesis focuses on organization and procedural aspects, and therefore the quality of human resources are not a part of this initial research model. However, important issues with regard to the quality of human resources might arise during the investigation.

The enabling factors, discussed in section 2.3.2, are also depicted in figure 2.8. As explained above, the following factors are expected to influence the extent in which an organization supports Purchasing involvement in NPD with regard to supplier involvement; the degree of Purchasing

Figure 2.7: Structures for Purchasing involvement in NPD projects (Lakemond et al., 2001)
specialization, the principle of Purchasing organization, the horizontal complexity of Purchasing, the reporting relationship of Purchasing, the NPD team structure, the composition of the NPD project team and the physical location of Purchasing. In order to get a deeper understanding of the extent of organizational support, all factors need to be assessed for at SFI. When it becomes clear to what extent SFI complies with the enabling factors found in literature and how these organizational enabling factors relate to Purchasing involvement in practice, directions for change will come forward.

Factors that are expected to influence Purchasing tasks and processes for NPD in the company are early Purchasing involvement, Purchasing occurrence in formal procedures, Purchasing pro-activeness and the balance between Purchasing tasks at project level and Purchasing tasks at strategic level (see section 2.3.2). As explained in the previous section, the BG’s have different formal procedures, therefore it is required to assess the BG’s procedures for Purchasing tasks and processes. By investigating the relations found in literature in practice, good judgment can be made about what approach is best associated with value adding Purchasing input in NPD at SFI.

Wynstra et al. (2001) explain that the Purchasing tasks and processes need to be indentified as well, in order to achieve Purchasing enabled supplier involvement (see figure 2.8). In section 2.2 the Purchasing tasks with regard to supplier involvement found in literature are presented (see table 2.1). Although Purchasing tasks have been mentioned by many scholars, Wynstra (1998) was the first to structure these tasks in a model, according to both management level and development progress. As mentioned above, it is expected that when Purchasing tasks at a project level and at strategic level are in balance, the full benefits resulting from Purchasing involvement in NPD can be reaped. In figure 2.9, the distinction between tasks at these management levels and their relation is depicted. The tasks found in literature (table 2.1 and 2.2) will be assessed for in order to draw conclusions with regard to the balance between tasks.

![Diagram](image-url)
However, assessing the mere occurrence of Purchasing tasks is not enough. As explained before, the timing of Purchasing involvement, and thus the execution of Purchasing tasks for a particular NPD project, is important as well. Purchasing occurrence in the official NPD procedures is mentioned by literature as enabling Purchasing involvement in NPD as well.

In the Stage-Gate approach, NPD tasks are structured based on development progress. Most companies, including SFI, have adopted this process in their official NPD procedures (Cooper et al., 2002a; 2002b; 2004). Farmer (1981), Wynstra (1998) and Wynstra et al. (2001) use different phases to structure Purchasing tasks at project level than Cooper et al. (2002a; 2002b) do in their Stage-Gate model, but they show many similarities. The similarities are such that the Purchasing tasks can be categorized per Stage-Gate phase, as presented in table 2.1. As a result, the timing of Purchasing tasks are represented by one uniformly phased model (see figure 2.9), that represents the NPD approach of most companies. By using Cooper’s (2002a; 2002b; 2004) Stage-Gate phases, the formal and actual procedures of SFI can be better compared to the tasks found in literature. Next to this, by using a research model that enables assessment of the timing of execution of Purchasing tasks for NPD, more will become clear with regard to necessary adaptations to the formal NPD procedures in order to get Purchasing optimally involved in NPD. Identifying Purchasing tasks may also serve as an extra measure with regard to measuring the overall timing of Purchasing involvement of NPD.

**Figure 2.9:** Research Model 1 – Purchasing tasks for NPD with regard to supplier involvement
All together, the model presented in figure 2.9 combines Purchasing literature and Innovation literature in order to make a model of Purchasing tasks for NPD with regard to supplier involvement that is generalizable and comparable throughout both disciplines by using the innovation funnel and Stage-Gate approach. The list of Purchasing tasks may be extended with relevant tasks found in practice. In literature, no Purchasing tasks for NPD have been found with regard to building the business case. It is possible that relevant Purchasing tasks are found in this stage instead of another stage or in addition to the existing set of tasks.

In section 2.3.2 the contingencies of Purchasing involvement structures for NPD teams are briefly discussed (see figure 2.7). Lakemond et al. (2001) argue that project complexity and project size determine the appropriate structure for Purchasing involvement. When it comes to managing large, complex projects, dedicated full-time Purchasing specialists provide for the strongest degree of involvement. Indirect, ad hoc Purchasing involvement however is sufficient for managing small and simple projects. Lakemond et al. (2001) stress the fact that the purchasing department does not necessarily need to coordinate all supplier contacts, as other functions may have considerable knowledge about the supplier market as well and can therefore play a coordinating role as well. Also, the appropriateness of certain configuration may change over time within a particular NPD project.

Figure 2.10 depicts the structure contingencies for the different configurations. In order to determine how Purchasing currently is involved en to draw conclusions with regard to Purchasing involvement structures at SFI, it needs to be investigated what involvement structures are currently used and how these structures can be placed in the framework below. In order to do this, project complexity and size must be measured as well. Lakemond et al. (2001) define project complexity as a function of the newness of technology, the degree of innovation and the duration of the project. The project size can be measured by taking both budget size and number of team members. In order to decide whether a budget is big or not and the amount of people involved is large or small, project managers can be asked to indicate a critical value and label their own project for the project characteristics.

In their case studies, Lakemond et al. (2001) found the presence of a number of configurations, configuration A, D and E at these companies. The scope of the coordinator’s role at the relevant companies varied, just as the tasks of Purchasing specialists. Also new Purchasing involvement structures were found. Also in the case of SFI, the structures may deviate from the contingencies in figure 2.7 and 2.10.

The research models will serve as a framework for the empirical research in this master thesis project. By using the models presented in figure 2.8, 2.9 and 2.10 while keeping the research questions in mind, it is possible to get a good understanding of the current situation en compare this with existing literature in a consistent manner. In section 2.4, the empirical methodology will be described in more detail. The research models are used as a building block in both in section 2.4 and in chapter 3. In section 3.9 and 3.10, the research models are adapted in order to represent the empirical findings.
### Methodology

The design-oriented business problem-solving approach of Van Aken et al. (2007) suggests that once the problem is defined and the project approach is clear, a more detailed methodology is needed with regard to the empirical part of the investigation. In this section, such a methodology is elaborated on. In order to do this, first the research type is discussed. Next, the chosen method – case study analysis – is explained in detail.

#### Research Type

The investigation concerns a practical contemporary situation at the company SFI and is orientated at revealing the ‘how’ and ‘why’ of the innovation processes at SFI. The investigation can therefore be labeled as explanatory (Yin, 2003). The empirical part of the project serves to get an in-depth understanding of the innovation processes and structures, which is needed for making recommendations concerning Purchasing involvement in NPD. Especially in situations where change of a current situation is the objective, it is important to get a complete understanding of the situation and its complexity. A case study enables an investigator to get this necessary in-depth knowledge (Verschuren & Doorewaard, 2007). Moreover, Yin (2003) states that when ‘how’ or ‘why’ questions are being asked about a contemporary set of events over which the investigator has little or no control, a case study is the preferred strategy for empirical analysis. An additional advantage is that results from a case study tend to be accepted better in comparison with other research methods due to the everyday nature and recognizability of the cases (Verschuren & Doorewaard, 2007). A disadvantage of using a case study method is the challenge of maintaining external validity (Verschuren en Doorewaard, 2007). However, Yin (2003) argues that external validity of case studies can be significantly improved by using theory in single-case studies or replication logic when multiple cases are selected. Therefore the case study is deemed to be a good research strategy for the empirical part of the project.
Case study methodology

In order to answer the research questions, two kinds of information are required. First, information about processes and motives in actual NPD projects need to be gathered. This information is to be compared with the research model. This may be more complex than it seems, as many BG’s conduct NPD projects of many kinds plus BG’s can have their own separate formal procedures as well. In order to be able to compare real-life processes and the official structure, multiple NPD projects are assessed for patterns and similarities.

In line with Van Aken et al. (2007), a cross-case analysis is conducted in order to do the comparison. The unit of analysis is the NPD project at SFI, but the research design has a link to organization wide official structures and processes such as the PMP.

Yin (2003) underlines that if there is a choice, multiple-case designs are preferred over single-case designs due to three substantial analytic benefits. First, due to the possibility of direct replication, analytic conclusions are more powerful than those resulting from a single-case research. Second, if common conclusions can be made in varied contexts the external generalizability of the findings has immensely expanded compared to findings from a single case. Evidence from multiple cases is considered more compelling and makes the overall study more robust. Other reasons to choose a multiple case-study design are more of a practical nature. At SFI, there is no one ‘innovation department’ where all innovations start and end but there are many innovation projects guided and led by innovation experts and managers. As explained in section 1.2 and 2.3.1, BG Corundum is specialized in radical innovation and special open innovation projects, but many NPD projects and initiatives take place at other BG’s as well. In order to be able to generalize research findings and to avoid a bias, multiple BG’s should be assessed in this research. In addition, different BG’s have different formal protocols and checklists (see also section 2.3.1). There might be large differences between Purchasing tasks and enabling factors between BG’s. Comparing research results between different BG’s may provide valuable insights about the impact of certain factors.

Figure 2.11 shows an adapted version of Yin’s (2003) multiple-embedded case study design. The sections below explain this case study design in more detail.

![Figure 2.11: Multiple case study design (adapted from Yin, 2003)](image-url)
2.4.2 Quality of Research

Several logical tests are offered to assess the quality of an empirical social research. The most commonly used tests are validity and reliability. As suggested above, designing a case-study requires extra care for the validity and reliability of the study. In general, there are four widely used tests dealing with validity and reliability. These tests have been summarized by various authors. Kidder & Judd (cited in Yin, 2003) give an overview of these tests:

- **Construct validity**: establishing correct operational measures for the concept being studied
- **Internal validity**: establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships
- **External validity**: establishing the domain to which a study’s findings can be generalized
- **Reliability**: demonstrating that the operations of a study – such as the data collection procedures – can be repeated, with the same results.

**Construct validity**

To meet the test of construct validity, Yin (2003) suggests three tactics.

To begin with, *multiple sources of evidence* should be used in order to get a complete picture of the situation (see also: Verschuren & Doorewaard, 2007). For the problem-solving project at SFI, the sources of evidence are existing documentation, archives and interviews.

In order to fully understand the NPD projects, relevant documents such as official informational documents (for example from Project Plaza), administrative documents, evaluations and minutes of meetings can be of use. Strengths of documentation as a source of evidence include stability (it can be reviewed repeatedly), unobtrusiveness (the information is not created by a case study), exactness and broad coverage (documentation can include information about many events in many settings, over a long span of time). Weaknesses of this source are possible difficulties with retrievability, access of the documentation and bias due to incomplete documentation or the author of the documentation (Yin, 2003). Archival records in this project may include survey data, lists of names, lists of innovation projects, organizational records (for example organization charts and budgets) and such. The strengths and weaknesses of this source include all of the strengths and weaknesses of documentation as a source of evidence. In addition to this, archival records are precise and can be quantitative but may also have accessibility constraints due to privacy or confidentiality reasons (Yin, 2003).

Verschuren & Doorewaard (2007) explain that when people are a source of evidence, surveys, interviews or observations should be used to gather data. Interviews are one of the most important sources of information in a case study (Yin, 2003; Van Aken et al, 2007). Interviews enable a researcher to target on the case study topic directly and provide good insights on causal inferences for example. Weaknesses of using interviews are biases and inaccuracies due to poor questions, response bias and poor recall. Next to this, the interviewee might give the answers that he or she thinks the interviewer wants to hear (Yin, 2003). Other data collection methods such as observations and surveys do not offer much room for opinions and interaction with participants and do not allow a similar direct targeted approach without getting too time-consuming. Considering the facts that a
multiple case study may take a lot of time (Yin, 2003) and the serious time-constraints of this project, interviews are deemed a suitable and valuable source of data in this research.

Bryman and Bell (2007) suggest using some structure in the interviews when using a multiple-case-study approach to ensure cross-case comparability. This is in line with Yin (2003) who also suggests making a steady line of inquiry. Both Bryman and Bell (2007) and Yin (2003) explain that case studies require a structure but also stress that a slightly unstructured, open-ended approach facilitates gathering information about opinions as well as facts (see also: Van Aken et al., 2007). Yin (2003) even states that due to a open-ended approach interviewees might even give additional personal insights and suggest other persons to interview. A semi-structured interview seems fit to get a complete picture of a certain situation and suggestions for additional sources of information or evidence. Another type of interview is the focused interview, in which in the interview structure is more thoroughly followed, but still has some open-endedness (Yin, 2003). The interviewee is interviewed for a fixed short amount of time (an hour for example) with the main purpose to corroborate certain facts found earlier. This kind of interview can be a fast and useful way of validating certain findings from other sources such as semi-structured interviews or documents.

Interviews can be individual interviews or group interviews such as focus groups (Verschuren & Doorewaard, 2007). Group interviews are a good data collection technique for complex situations that are hard to assess or when discussion is beneficial for respondents in order to give information. Also, group interviews enable the researcher to find out what opinions are shared (Van Aken et al., 2007). Disadvantages are possible group pressures or dominancy by certain group members during the interview. Because of this, the investigator sometimes should also function as a moderator. Verschuren and Doorewaard (2007) therefore advise to use two investigators; one to pose the questions and be the moderator and one to observe and collect data. These disadvantages and the fact that there is just one investigator available can be reasons not to conduct group interviews. Although it can be of value in the case study to know whether certain opinions are shared and bias due to poor recall may be decreased by using groups, there are also practical reasons not to conduct group interviews. Potential interviewees have full schedules, making it more complex and time-consuming to plan a group interview with the right people. In addition, a preliminary interview is needed in order to make a list of the right persons to include in the interview. All together, an individual semi-structured or focused interview seems best during this particular case study setup.

The second tactic mentioned by Yin (2003), is documenting a chain of evidence. This comes down to enabling the reader of the thesis to follow the derivation of the evidence and the steps taken in the research to come to conclusions.

Third, the draft case study report should be reviewed by key informants. This serves the purpose of evaluating the correctness of the facts in the case-study and may produce additional evidence and information. With this reviewing process, the likelihood of reporting false information is reduced and subjective perspectives can be identified (Yin, 2003).

Internal validity

Internal validity can be ensured by several possible tactics as well (Yin, 2003). One tactic could be pattern matching – matching a predicted pattern with an empirical found pattern. Another possible tactic is using logic models, where theoretically predicted models are matched to empirical found
models. A third tactic is building an explanation around the case to analyze the data. One more option is addressing rival explanations and show how these explanations cannot be built. It must be noted that Yin (2003) warns researchers that there are many dangers in explanation building. For instance, this tactic demands extreme analytic skills as it is very easy to drift away from the original topic while building explanations. The tactic used in this research resembles both pattern matching and logical models. In the previous sections of this chapter a logical model and pattern is predicted, which is to be validated and investigated during the empirical stage of this research.

**External validity**

External validation is a challenge for case study research, and should therefore be taken into account thoroughly before proceeding with the case-study (Verschuren & Doorewaard, 2007). As described earlier, Yin (2003) mentions that replication logic ensures the quality for multiple-case studies. This means that a theory is tested by replicating the findings in a second or even third neighborhood, in order to see if the same results occur. The replication logic underlying the multiple-case study can also be based on different case results, found for predictable reasons. This has already been accounted for in the multiple-case study in this project, by using theory and preliminary information to predict a pattern beforehand which is validated later.

**Reliability**

Reliability can be ensured by making sure that another investigator can follow the same procedures as described by the first investigator (Yin, 2003). Ensuring reliability can be done by using a case study protocol and developing a case study database. Such a protocol is intended to guide the investigator through the data collection from a single-case study (also if this particular case is part of a multiple-case study). A case study protocol encompasses an overview, field procedures, case study questions and a guide for the case study report. A case study database contains not only the investigators report but also raw data such as notes, documents, tables, narratives and such. Including raw data enables other investigators to review the evidence directly.

2.4.3 **Case selection**

As the multiple-case study may require a lot of time and resources and every case should have a specific and representational purpose in the whole, cases should be carefully chosen (Yin, 2003; Verschuren & Doorewaard, 2007). Yin (2003) says that if more cases are available, more cases should be taken into account if the time constraints allow it. In this project, there are serious time constraints. Van Aken et al. (2007) say that if more cases are available, they should be selected on theoretical grounds. At SFI, there are plenty of NPD projects, and therefore cases have been pre-selected on theoretical grounds. Strategies for selecting cases can be either selecting cases that have minimum differences, or selecting cases that are not that much alike (Verschuren & Doorewaard, 2007). Case-selection on theoretical grounds can be driven by considerations about the independent and dependent variables (Van Aken et al., 2007). As Purchasing involvement in the end is the independent variable, cases have been selected based on the presence and absence of this variable (Van Aken et al., 2007). Thus, 4 cases in which Purchasing was involved and 2 cases in which Purchasing was not involved were selected.

In order to do this, a list of the top-55 innovation projects at SFI was used. First, the NPD projects were extracted from that list. Second, Purchasers from the BG’s of those NPD projects were asked to
indicate whether or not Purchasing was involved in this project. Based on this information, 23 NPD project were approached to ask for their cooperation in this research project. In line with Yin’s (2003) advice, an official letter of introduction by one of the principals (i.e. someone with power) was sent to the project managers in which they were asked for their cooperation in this project (see appendix 8). The initial response rate was very poor, especially with regard to projects in which Purchasing was not involved. In order to improve the response rate, the NPD projects that had not responded yet were approached for a second time by telephone or in person in order to ask for their cooperation. This resulted in a much higher response rate and many positive reactions; 14 project managers indicated they would be willing to cooperate in the investigation.

The 14 potential cases were subsequently assessed for suitability and accessibility. The most relevant criterion with regard to suitability was the stage of the NPD process; including an NPD project in its scoping stage would be of less added value to the investigation in comparison with a project already in launch stage. As a result, 6 cases were selected, of which one was a pilot case.

The pilot case study was selected as a final preparation for data collection. By conducting a pilot case-study, all relevant data collection issues are encountered before the actual case studies begin and thus helps to refine data collection methods, assess interview questions, and evaluate the content of the data collected (Yin, 2003). The case was chosen based on convenience, access and geographic proximity (Yin, 2003). As the pilot case results did not lead to many changes in the data collection methods the case study is included as a regular case in the multiple case study.

The NPD projects under investigation have been renamed as Emerald, Red Beryl, Opal, Ruby, Sapphire and Diamond and are described in more detail in chapter 3.

2.4.4 DATA COLLECTION

As discussed in section 2.4.3, a case study protocol is used in order to maintain the reliability of this research. In this section, the data collection plan is elaborated on. Next to this, the individual case study report is presented.

Data collection plan

Taking all research design choices and quality measures discussed in this chapter into account, three sources of data are used in order to get a full understanding of the project and the Purchasing role in the project. Table 2.3 shows the sources of evidence setup. However, in order to get a full understanding of the NPD project the table can be deviated from.

As discussed in the section 2.4.2, when using documents and archives as a data source one is often confronted with accessibility issues. As such, table 2.3 serves mostly as a guideline. However, in order to find answers to the research questions, it is absolutely required that the BG procedures and checklists are included in the case studies. Also, it is absolutely required to interview a project manager, a team member and a Purchaser of a particular project, in order to get a complete picture of the NPD process and Purchasing involvement. As a part of the interviews, table 2.1 and 2.2 have been used as a survey for Purchasing tasks in the NPD projects as well.
In different case studies, the same set of topics needs to be addressed in order to maintain consistency throughout the multiple case study (Yin, 2003). Therefore, the case study outline is determined in advance of the data collection and analysis. The research models discussed in section 2.3 serve as a basis for data collection, thus data is gathered such that the following relevant topics are sufficiently addressed in each case study report. (See appendix 10 for a more detailed description of the case study outline.)

1. Introduction
2. Process
3. Purchasing and supplier involvement
4. Analysis of activities at project level
5. Analysis of activities at strategic level
6. Analysis of enabling factors
7. Organizational structure Purchasing involvement
8. Conclusions

The results of the individual case study will be summarized following the format shown in table 2.4. By doing this, it is ensured that during the cross case analysis a sound comparison is made, taking along all relevant variables mentioned in the research models. All enabling factors and factors of influence mentioned in the research models are represented; Purchasing involvement, supplier involvement, Purchasing tasks at project level, strategic Purchasing tasks, use of formal procedures, Purchasing mentioned in formal procedures, pro-activeness, timing of involvement, degree of specialization, principle of specialization, team structure, team composition and co-location. Next to this, attitude of team members has been added to the table in order to structurally assess the potential influence of team members’ perceptions on Purchasing involvement in NPD. To measure the effects of Purchasing involvement, the variables performance/ goals, project costs and time-to-market has been added as well. These variables in particular have been chosen as the preliminary investigation in section 2.2.1 and literature (Burt and Soukup, 1985; Guy and Dale, 1993; Mendez and Pearson, 1994) indicate that Purchasing involvement in NPD may influence these factors. Table 2.1 and table 2.2 will be used as formats in order to compare the presence of the different Purchasing tasks at the projects and thus also the balance between strategic tasks and tasks at project level.
### Table 2.4: Format for summary project findings

<table>
<thead>
<tr>
<th>Project name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing involvement</td>
<td></td>
</tr>
<tr>
<td>Supplier involvement</td>
<td></td>
</tr>
<tr>
<td>Purchasing tasks at project level</td>
<td></td>
</tr>
<tr>
<td>Strategic Purchasing tasks</td>
<td></td>
</tr>
<tr>
<td>Purchasing mentioned in formal procedures</td>
<td></td>
</tr>
<tr>
<td>Use of formal procedures</td>
<td></td>
</tr>
<tr>
<td>Pro-activeness</td>
<td></td>
</tr>
<tr>
<td>Timing of involvement</td>
<td></td>
</tr>
<tr>
<td>Degree of specialization</td>
<td></td>
</tr>
<tr>
<td>Principle of specialization</td>
<td></td>
</tr>
<tr>
<td>Team structure</td>
<td></td>
</tr>
<tr>
<td>Team composition</td>
<td></td>
</tr>
<tr>
<td>Co-location</td>
<td></td>
</tr>
<tr>
<td>Attitude of team members</td>
<td></td>
</tr>
<tr>
<td>Performance/ goals</td>
<td></td>
</tr>
<tr>
<td>Project costs</td>
<td></td>
</tr>
<tr>
<td>Time to market</td>
<td></td>
</tr>
</tbody>
</table>

### 2.5 Conclusion

In this chapter, the problem mess and context are structured such that the problem statement and research questions could be derived. Based on the research questions, literature and preliminary information 3 research models have been designed, which are used as a framework for the data collection and the empirical analysis. In order to collect sufficient data for an in-depth understanding, a multiple case study is conducted of NPD projects at SFI. Yin’s (2003) multiple case study methodology has been adapted for use in this specific research and in order to maintain a high level of reliability and validity. Six NPD projects were selected for the multiple case study – at these projects, data was gathered by using interviews, documents and archives. In chapter 3, the results of this multiple case study are described in detail.
3 ANALYSIS

3.1 INTRODUCTION

In this chapter, the case studies of six new product development projects are presented and used to analyze the situation at SFI. In order to gather the data, in total 30 interviews were held with project managers, project team members, purchasers, PMO managers and other relevant persons. Next to this, 30 other kinds of evidence were gathered in order to get an in-depth understanding of the projects and to ensure construct validity. Appendix 10 offers an overview of all the data gathered and the interviews held per case.

Every case study is structured according to the predetermined case study outline as presented in the previous section. Next to six individual case studies, also a cross-case analysis is made in which the individual case studies are compared. Based on this comparison and some general observations, several general conclusions are drawn with regard to relations, causes and effects.

3.2 CASE STUDY PROJECT EMERALD – BUSINESS GROUP BERYL

3.2.1 INTRODUCTION TO THE CASE STUDY

In line with the trend of reducing industry’s carbon footprint, SFI is developing a new building block for plastics. In project Emerald, SFI is developing a process in which this building block, polyamide, is made by using mostly natural castor oil instead of just fossil oil. Not only does this have a positive effect on the carbon footprint, but it also has positive effects on the material characteristics. Emerald is more stiff, able to keep its properties under very high temperatures and resistant against various chemical substances. However, Emerald will cost more than the products that are currently available.

By mixing Emerald with various other ingredients, it can be made suitable for all sorts of applications such as car parts, electronics, etc. Four types of Emerald will be developed; Emerald compounds for injection molding, Emerald for extrusion, Emerald as an additive to existing SFI products, and some other uses for Emerald. Per type of use, different variations will be developed depending on the application in which it is used. Project Emerald serves as an umbrella project for all these types and type variations. Five grades of Emerald compounds for injection molding have been launched in November 2010.

Purchasing employees have indicated that Purchasing was involved in the new product development process. In this within case study, it is investigated to what extent Purchasing has been involved and what Purchasing actually did. The supplier role will be looked at as well. It is also investigated to what extent organizational enabling factors are in favor of Purchasing involvement in the new product development project.

3.2.2 PROCESS

In Business Group Beryl, the general SFI stage-gate procedures (Project Management Process) are used; but the BG has its own adapted version. The project manager has mostly used a stage gate toolkit designed for product launch. Although a new Project Management Office is working on new checklists, these were not available at the beginning of project Emerald but will be used if deemed
appropriate. At the moment, Purchasing is not yet directly mentioned in the checklists and procedures, which are not mandatory. Indirectly however, amongst other functions Purchasing should be involved for Supply Chain and Contract topics. For the toolkit and other project management tasks MS Excel and MS Projects are used instead of Project Plaza. In this project, the formal strategic sourcing (SSM) process of the purchasing department is also used.

To save time, they use a ‘light’ version of the available systems. For example, instead of using many documents, the project manager uses a ‘perm’ meeting in which the Research and Technology part of the project is evaluated and reviewed per stage. The Emerald compounds subproject is already in the launch stage whereas the other three subprojects are still in the build business case and development stage. Each year, project Emerald defines a year plan and there is also a multi-year plan from 2009 to 2020.

During the product development, there has been cooperation with customers, in order to develop the exact right material for a certain application. This is the regular approach to product development at BG Beryl. Especially concerning Emerald for extrusion, SFI needs some extra know-how about what happens to the product further in the value chain. It is likely that for this variation of Emerald, a joint development agreement will be set up with customers. Tolling manufacturers are used in this project as well. See figure 3.1 for a more detailed description of the process.

In November 2011 Emerald compounds for injection molding have been launched and in 2011 development of Emerald for extrusion began. Currently, Project Emerald is in the Development stage. Until now, the project is going according to plan. There are no deviations from budget. The project activities made good progress and have resulted in project Emerald being ahead of schedule. According to the project manager this is mainly due to the high quality of human resources and the enthusiastic attitude of these employees. Still, there were small negative setbacks related to misjudged material costs and market demand. According to the project manager: ‘Results from the involvement of Corporate Purchasing could have been bigger.’

3.2.3 PURCHASING AND SUPPLIER INVOLVEMENT

The critical raw material in project Emerald is sebacic acid. In the build business case stage, Purchasing was involved. It was part of the responsibility of Purchasing to have it strategically sourced. According to a corporate strategic sourcing specialist, they have been contacted too late by BG Beryl; after the product was already developed. At that point, there was no choice for an alternative material possible. Before Purchasing was involved, the project manager has collected information about raw materials himself. This meant that in some cases external reports were bought. Also suppliers have been met and talked with before Purchasing was involved.

As a part of the SSM strategic sourcing method, the internal customer needs have been analyzed as well as the suppliers available to come to an advice for the two best suppliers. In order to do this, a core team was formed by the corporate Purchaser and the Purchaser for project Emerald. Next to this there were some cross-functional sub teams, including Purchasers (also from China), the Emerald project manager, people from other BG’s, a technical expert etc. As a result of the late involvement, there was a lot of missing information from the BG’s in the beginning of the strategic sourcing project, and it was hard to get all required information. Later, the cooperation went much better.
Not much is known about the discovery stage.

The idea for project Emerald has been worked on from 2008 till 2009. It took several months to check whether all assumptions were correct.

In May 2009 the project has entered the business feasibility review and case building stage. Here, it was tested whether the project assumptions were correct. In November 2010, a plan was ready and the Purchaser joined the project team followed by a corporate Purchaser a few months later.

In the first months of 2011, the project entered the development phase, and is currently still in this stage.

The project manager’s expectations differed from what the strategic sourcing team offered. He explains: ‘I expected more speed... it took a long time before the strategic sourcing report was finished... this disappointed me.’ Also: ‘I already knew a lot. It took quite some time for them to come up with real new information.’ Other project team members have the opposite opinion. A team member: ‘The Purchaser had very good input because of specific expertise... Purchasing should play a bigger and more strategic role.’ The interviewees agree that the involved functions, Purchasing included, should have more time to dedicate to the project. According to the project manager: “The availability is a bottleneck. ... Purchasing could only spend little time on the project.”

The availability and price of sebacic acid are key success factors for project Emerald. This is also why Purchasing was involved. Currently, suppliers of sebacic acid are being approached. It is very likely that at some kind of cooperation with the supplier is necessary as SFI’s current use of sebacic acid is too small to create buying power. Buying sebacic acid is relevant for multiple BG’s, which means that the strategic purchasing plan might rise to BG top level management. It is expected that Purchasing will still have input in this, although the team does not know what Purchasing can offer on a strategic level. Next to this, as part of the core business project team, Purchasing was also involved in the process of deciding on and arranging the tolling manufacturer. Project team members are equals.
3.2.4 **Analysis of tasks at project level**

In this section, Purchasing tasks with regard to early supplier involvement are assessed. In appendix 11, the survey results are summarized.

**Discovery**

*New technology scouting* and *organized idea scouting in the supply base* have not been performed by Purchasing for this project in particular. It is mentioned that technology functions are more involved in these kind of actions, however, ideas may result from information found by Purchasing.

**Scoping**

Purchasing has been asked to *suggest alternative suppliers*. This was not so much with regard to improving the product design and description but more about cost savings, secured supply and avoiding lock-in. Once Purchasing was involved, raw material had already been decided on. *Alternative products or technologies have not been suggested*. It must be noted that choosing another material was not possible as sebacic acid is the key building block for Emerald.

There is no supplier involvement in project Emerald. However, options have been discussed ad a team. Purchasing did have input in *supplier selection for involvement in the development project* as a part of the team. This also holds for *determining the timing and extent of the supplier involvement*. Purchasing has very much *encouraged suppliers to make suggestions*, for example concerning cost savings.

The BG checklist suggests that in this stage, SFI must be sure it can obtain the raw material from the supplier and that the supplier supports the new business.

**Build Business Case**

A detailed business case has been made by the complete project team, managed by the project manager. Purchasing is a team member and has thus been *involved in making the case*. The BG toolkit prescribes that in this stage, *potential suppliers and co-development partners are identified, have been contacted and negotiations have started*. Also, contracts with key players (such as partners and suppliers) should be considered.

**Development**

According to the survey, no Purchasing tasks concerning *integration of activities between first tier suppliers or first tier suppliers and second tier suppliers* have been executed. However, it is explained that in the build business case stage, first and second tier suppliers have been visited and talked to. Purchasing was not yet involved at that time. *Coordination of development activities between the supplier and firm* is not applicable to this project. Also, it is indicated that Purchasing is mostly involved in such a task when a toll manufacturer is involved.

BG Beryl’s checklists mention that in the development stage, contracts with key players such as suppliers must be signed or agreed. It is advised to have the *purchasing policy plan with regard to raw materials and equipment* ready in this stage. Commercial conditions should be already agreed on and a supplier relation management plan should be ready. If relevant, a toller must be selected and pilot runs at the toller’s plant should be done. It is unclear whether all these topics are indeed covered for
project Emerald. For the Emerald compounds for injection molding, material is produced in the SFI compounding plant. Next to this, tollers are used.

**Testing and Validation**

Project Emerald has not yet entered this stage. It has become clear that it is normally not the case that Purchasing is involved in *configuration management between the supplier and the firm*. This also applies to project Emerald. *Coordination of prototyping of supplier and firm* is also not applicable to project Emerald yet. Purchasing is rarely involved in this. According to the checklists, all supplier, partner and toller contracts must be signed and set now.

**Launch**

Project Emerald is still in an earlier stage. Survey results imply that Purchasing will not be involved much in *coordinating production start-up activities*. However, as Purchasing is part of the core team, it is likely that Purchasing will also be directly involved in this. Furthermore, there is a Purchasing role reserved for *formalizing and implementing contingency plans*. However, as described above, these plans are supposed to already be made in the development stage.

### 3.2.5 ANALYSIS OF TASKS AT STRATEGIC LEVEL

Appendix 12 summarizes the survey results for the strategic tasks. Strikingly, there is a strong indication that Purchasing is structurally performing all tasks under investigation; *exploiting suppliers’ technical capabilities*, monitoring supplier markets for technical developments, *pre-selecting suppliers for joint development*, evaluation of suppliers’ development performance and providing information on new products and technologies. It is explained that Purchasing monitors supplier markets together with Technology. Also, using suppliers’ technical capabilities is essential at BG Beryl.

### 3.2.6 ANALYSIS OF ENABLING FACTORS

Project Emerald is a big project, consisting of 3 full time employees and a large number of employees involved on a part time basis from BG Beryl sites in the Netherlands, India and China. Also, employees are approached for involvement on an ad hoc basis, if deemed necessary. There are regular team and sub-team meetings, as well as information and communication days arranged for the entire Emerald team. How the team is organized exactly, is showed in figure 3.2.

The project team is multi-functional and is very autonomous. Next to the employees who are in the project team depicted in figure 3.2, there are others involved. For example, globally SFI is present in Europe, USA and Asia/ Pacific. These areas have regional organizations that Beryl also uses for

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**FIGURE 3.2: Organization diagram NPD team Project Emerald**

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52
application opportunity scouting, application development and sales in order to realize a growth worldwide. However, employees in these regional organizations are not considered part of the team.

Purchasing and most other disciplines involved are located in the same building or at a site close by. However, there is a geographical issue with regard to colleagues from India for example. Despite the geographical distance, it seems that the global Beryl Purchasing team functions well. It is deemed critical that local Purchasers are present.

With regard to the Purchaser’s specialization, opinions differ among team members. It is indicated that there is a gap between the degree of specialization and what is necessary. However, it is also indicated that Purchasing is very specialized and knowledgeable in the relevant fields. It is clear that the project Emerald Purchaser has many years of experience in technical and chemical fields. Both technical specialization and having a macro view on the project are believed to be of added value by the interviewees. Purchaser 1: ‘By having a macro view, it is possible to break trough functional silos.’ The other Purchaser involved was more specialized in strategic sourcing. Although the principle of specialization of Purchasing differs from that of other (technical) functions, no misalignment issues have been experienced. A team member explains: ‘Research and Technology employees are specialized in terms of technical knowledge fields whereas Purchasing more on economical grounds. However, there is a big overlap.’ It is noted that the team would like Purchasing to have more time available for the project.

3.2.7 Organizational structure purchasing involvement

At project Emerald Purchasing has been involved on a part-time basis. Purchasing has been a full team member from the moment of involvement. It was also Purchaser 1 that worked together with other members of the Purchasing community who were not part of the team. These Purchasers contributed to the strategic sourcing process and report for sebacic acid. Figure 3.3 depicts how Purchasing has been involved in the NPD team; Purchasing is integrated on a part-time basis with a coordinator role.

Project Emerald concerns radical innovation but uses existing technology and the project duration is short (3 years). Therefore project Emerald is not considered a complex project. The project budget is 2.5 million per year, which is relatively small. However, there are a lot of people working on the project – at least 25 employees are involved at the moment of which 3 on a full time basis. The project size is labeled as large.

Figure 3.3: Project Emerald: Integrated purchasing involvement on a part-time basis combined with a coordinator role (adapted from Lakemond et al., 2001)
3.2.8 Conclusions

Project Emerald concerns several subprojects which are in different development stages. The raw material, sebacic acid, is critical for the project. The project is not yet near its end and thus it is not clear whether the project is successful or not. It had become clear that the project is ahead of schedule and has stayed within budget. The strategic sourcing report project was started late, and it took a long time until it was finished. The content of the strategic sourcing report was of limited importance; because of the late publication of the report, most of its contents were already known to the team. It is recognized that having this a good strategic sourcing report which can be used to securing supply and getting a better price on the raw material is of strategic importance to the success of the project. Opinions about the added value of Purchasing are divided. Purchaser 1 has been a full team member. Tasks with regard to customer partners and tolling manufacturers have been executed by the whole team, and thus purchasing has been involved.

BG Beryl has procedures and checklists available which suggests that certain tasks should be done in certain stage without mentioning who should do this. A ‘light’ version of these procedures is used, with the aim to use as few documents as possible. Purchasing did play a role in supplier selection for involvement in the development project and determining the timing and involvement of supplier involvement. The following other Purchasing tasks related to supplier involvement have been found: encouraging suppliers to make suggestions, building the business case and formalizing and implementing contingency plans.

With regard to strategic tasks, a strikingly good result has been found. It has been indicated that all tasks are performed by Purchasing or together with Purchasing; pre-selecting suppliers for product development collaboration, evaluating suppliers’ development performance, monitoring supplier markets for technical developments, pre-selecting suppliers for joint development and providing information on new products and technologies. These results show that Purchasing is putting more effort in strategic tasks related to supplier involvement with respect to the tasks in a project level. This is an unbalanced situation.

The NPD team is multifunctional, large and autonomous. There are frequent meetings between the core team and the subteams. Project Emerald is a large project but not complex. The Purchasing involvement structure can be described as integrated Purchaser involvement on a part-time basis combined with a coordinator role. Lakemond et al. (2001) would say that a project with project Emerald’s characteristics should indeed use Purchaser involvement on a part-time or full-time basis.

Project Emerald has attained a good score for the enabling factors team structure, team composition and co-location. With regard to the other factors, degree and principle of specialization, project Emerald did not score good or bad in particular. Table 3.1 summarizes all findings.
### Table 3.1: Summary findings Project Emerald

<table>
<thead>
<tr>
<th>Project</th>
<th>Emerald</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing involvement</td>
<td>Yes</td>
</tr>
<tr>
<td>Supplier involvement</td>
<td>No, but likely future collaboration. Toller involved.</td>
</tr>
<tr>
<td>Project tasks</td>
<td>Relatively good amount of tasks.</td>
</tr>
<tr>
<td>Strategic tasks</td>
<td>Relatively good amount of tasks.</td>
</tr>
<tr>
<td>Purchasing mentioned in formal procedures</td>
<td>No.</td>
</tr>
<tr>
<td>Use of formal procedures</td>
<td>Yes.</td>
</tr>
<tr>
<td>Pro-activeness</td>
<td>No.</td>
</tr>
<tr>
<td>Timing of involvement</td>
<td>Build business case stage. Early involvement.</td>
</tr>
<tr>
<td>Degree of specialization</td>
<td>Differs. Technology specialization/ experience. Strategic sourcing specialization.</td>
</tr>
<tr>
<td>Principle of specialization</td>
<td>Non-congruent, no misalignment issues.</td>
</tr>
<tr>
<td>Team structure</td>
<td>Autonomous, complex. Use of subprojects.</td>
</tr>
<tr>
<td>Team composition</td>
<td>Multifunctional.</td>
</tr>
<tr>
<td>Co-location</td>
<td>Yes.</td>
</tr>
<tr>
<td>Attitude of team members</td>
<td>Positive.</td>
</tr>
<tr>
<td>Performance/ goals</td>
<td>?</td>
</tr>
<tr>
<td>Project costs</td>
<td>No deviations.</td>
</tr>
<tr>
<td>Time to market</td>
<td>Faster than planned.</td>
</tr>
</tbody>
</table>

### 3.3 Case Study Project Red Beryl – Business Group Beryl

#### 3.3.1 Introduction to the Case Study

Necklace, a very large international electronics company and a big customer of SFI, was bothered by the fact that the company scored low on sustainability rankings. One of their products had quite some PVC in it, which contains halogens and is not recyclable, resulting in a large contribution to the company’s carbon footprint. As part of a plan to become more sustainable, Necklace contacted some of their suppliers, among which SFI, to see which supplier was most capable of developing a new kind of material replacing PVC.

As a result of this assignment, SFI started project Red Beryl. To replace PVC, SFI needed a sustainable product compliant with very high standards for example concerning flame retardant properties and esthetics. This product, Red Beryl, consists of a complex mix of compounds, resulting in a material that does not have any halogens in it and has a low carbon footprint. Red Beryl is a thermoplastic polymer, which means that the material can be recycled. Due to the availability and price of the raw materials, Red Beryl is expensive. Currently, Necklace is the only customer willing to pay the steep price.

Project Red Beryl has started in 2007 and was launched in 2009. Red Beryl will continue to be improved and developed.

It is indicated that Purchasing was involved in the NPD project Red Beryl. In this chapter a case study is conducted to see to what extent Purchasing has been involved and what Purchasing actually did. The supplier role will be elaborated on as well. Finally, organizational enabling factors with regard to Purchasing involvement are assessed.
3.3.2 Process

Business Group Beryl has its own adapted version of the general SFI stage-gate procedures (Project Management Process). In the Beryl procedures and checklists, Purchasing is not mentioned as a function. However, in some tasks, Purchasing is the proper caretaker, for example 'Purchasing policy for raw materials and equipment is defined, commercial conditions have been agreed upon'. With regard to supply chain and contract topics, Purchasing should be indirectly involved as well.

Necklace is a very demanding customer and SFI was required to work extremely fast in comparison to other innovation projects. In order not to lose this opportunity, the project was prioritized. A team member: ‘Necklace wants its product in six months and wants your draft material now, in order to test it themselves. Necklace wants this; if we cannot comply, we lose the job.’ The project owner also explained that: ‘Necklace thinks in hours and days! ... In order to keep up, SFI needed to change their way of working; have more speed and be more externally oriented.’ Specifications of the product were not clear in advance, there was no previous experience in this field and Necklace reviewed and changed the product specifications frequently. This required SFI to become very flexible as well.

For these reasons, use of formal processes and checklists were kept at a minimum. Long term planning was of no use and there was no time to compose detailed documents. In order to keep some structure a ‘light’ version of PMP was used by the Research and Technology Manager and for building the business case. Also, the project team met very frequently to report and discuss progress; a conference call was made every single day and every other week the steering committee (including Purchasing) met. Research and Technology employees from Europe and Asia communicated on a daily basis and there was frequent contact with Necklace as well.

It is not entirely clear if the project has been a success or not. There were no set goals with regard to budget and planning. The goal of the project was to develop an alternative for PVC that meets all technical and esthetical demands. Project owner: ‘The project process has been a rollercoaster. Necklace has never given a commitment to SFI that they would get the business. It was SFI’s choice whether or not to continue with this project.’ SFI did continue the project and was able to develop a product that meets all specifications. In the end SFI got the business with Necklace and makes money with Red Beryl, thus the project was successful according to some. No delays or extra costs were caused by involving Purchasing.

However, the price of the product is so high that only Necklace is willing to pay for it and raw material costs continue to rise. The project manager explains that the project has not been successful as the supply side of the project was not properly managed, resulting in having the wrong raw material and exorbitant raw material prices. It is still critical that raw material costs go down in the future. Other hard data on the project’s success have not been made available.

More details on the process of project Beryl can be found in figure 3.4. Although the product already went commercial in 2009, Red Beryl continues to be improved and developed in project Red Beryl 2. In this project more raw material alternatives are tested and potential other suppliers are looked for.
In 2007 Necklace has approached its suppliers. Project Red Beryl was initiated.

At first, all development of Red Beryl and contact with Necklace was done by Research and Development. Although there was no commitment from Necklace, there was co-development. First samples were developed and sent to Necklace. After approval, other trial runs were made. At this point Purchasing was involved too. When Necklace approved the product, the development process went very fast.

There was a continuous cycle of testing, reviewing, adjusting specifications, developing, testing and so on, driven by Necklace.

When production of the product was about to commence, issues arose. These issues had to do with product stability, raw material availability and complex logistics.

The product was launched in 2009.

3.3.3 PURCHASING AND SUPPLIER INVOLVEMENT

All components for Red Beryl are purchased from suppliers. The influence of the raw material, and thus the suppliers, on the product is very big. Suppliers have not been involved in the project team but there has been intensive contact and partial co-development between SFI and suppliers.

The first contact with suppliers was made by Research and Technology employees. Purchasing was informed with regard to this first contact. However, Purchasing was not truly involved until later in the process. It was understood that the raw material costs were fixed and a cost reduction for larger volumes was agreed on. Based on this information, some important decisions were made. It turned out that these facts were not set and based on anticipations by Marketing; there had been no real negotiations and there was nothing on paper.

Team members feel that in projects like Red Beryl, Purchasing should be involved on a full-time basis since it is such an intense project. Research and Technology has contact with the supplier on a daily basis but Purchasing does not have manpower enough to be present at all these supplier meetings. ‘The Purchasing role in product development would be bigger if a dedicated Purchaser was available’,
said the Project Owner. Other interviewees agree with this remark; more Purchasers and a Beryl sourcing analyst would make it easier to be involved in innovation projects.

As a result of Research and Technology employees having frequent contact with the supplier without Purchasing, the supplier had obtained information regarding SFI’s locked in position. According to the Purchaser: ‘The suppliers knew that their product was unique and critical for us. ... Some suppliers even knew that our customer was Necklace!’ The availability of the material is limited as well; some components are sold out already. These factors have resulted in the high price that the suppliers ask of SFI.

As explained above, the high raw material price results in an extreme high price for Red Beryl. As a consequence, Red Beryl is in a sole customer position and it is critical that prices go down in order to keep the current customer and improve the market position. This is even more important as demand turns out to be much higher than expected.

BG Beryl has learned from this project; having Purchasing involved in the project created more awareness that is useful to seriously involve Purchasing during the development of a new product. It is now also realized that Research and Technology employees must not share too much information with the supplier and avoid a lock in position. In order to get Purchasing more involved, interviewees suggest to have more clear responsibilities for Purchasing and to emphasize the role of Purchasing.

By the end of project Red Beryl, Necklace has been put into contact with the bottleneck supplier as well. This has caused Necklace to have more insights in the SFI situation and pricing and thus be actively involved in looking for solutions. As explained in the previous section, also a cost reduction program has been set up for project Red Beryl 2.

3.3.4 ANALYSIS OF TASKS AT PROJECT LEVEL

A number of Purchasing tasks which are deemed relevant with regard to supplier involvement in NPD projects are assessed in this section. A summary of the survey results is given in appendix 11. The separate tasks are elaborated on below.

Discovery

According to the survey results, there were no Purchasing tasks carried out with regard to both technology or component scouting and organized idea scouting in the supply base. Interviewees have remarked that it would be best if Purchasing was involved in this stage already, but in this project they were not.

Scoping

It was not in the scoping stage, but in the development stage that Purchasing suggested alternative products or technologies. Survey and interview results imply that Purchasing did not contribute much with regard to this particular task. As explained above, suppliers were already selected by Research and Technology before Purchasing was truly involved involved in the project. Although the suppliers were never officially in the team, there has been frequent contact with the supplier for the development of Red Beryl. The moment and extent of supplier involvement have not been decided on beforehand. As the development process went along, stakeholders were involved where deemed necessary. Therefore, deciding on the extent and moment of supplier involvement was no actual task
in this project. Not in this stage, but towards the end of the project, Purchasing did play an active role in *encouraging suppliers to make suggestions*. The suggestions asked were mainly about availability and price.

**Build Business Case**

But few survey respondents have recognized some interaction with Purchasing regarding cost calculations. However, it is also indicated that Purchasing involvement has been minimal until later in the process. An actual business case has not been made available. It is unclear how detailed the business case was, especially when taking into account the fact that this project was relatively unstructured.

The BG Beryl procedures advise that *potential suppliers and co-development partners are identified and contacted* in this stage and *negotiations* should start in this stage as well. Other contracts with key players (such as partners and suppliers) should be considered already.

**Development**

None of the survey respondents found a Purchasing task executed in development stage of with regard to the product development (*integration of first and second tier suppliers, integration of first tier suppliers and coordination of development activities of supplier and firm.*) This is completely in line with results from the interviews and other data. It is noted that at BG Beryl, they do not look back into the value chain as far as second tier suppliers. However, the team member does explain that: “We do fully cooperate with our customer Necklace, their first tier suppliers and their second tier suppliers as well.”

According to Beryl’s procedures key player’s contracts should be set and signed. The team member agrees: “Actually, raw material prices should be fixed before we start the development. We will make sure this will happen in the future.” BG Beryl suggests that *purchasing plans for raw material and equipment* must be ready by now, as well as a supplier relation management plan. If applicable, a toller is best selected in this stage, combined with pilot runs already.

**Testing and Validation**

Beryl Purchasers do not execute tasks related to *configuration management between the supplier and SFI*; this has been a task for Research and Technology. However, it is explained that such a task is sometimes executed by technical Purchasers, employed in the corporate Purchasing category ‘technical goods and services’. *Coordination of prototyping* is also not a Purchasing task at project Red Beryl.

BG checklists suggest that all supplier, partner and toller contract should already be signed in this stage.

**Launch**

*Coordination of production start-up activities* as a Purchasing task has hardly been indicated by survey respondents. Other proof of Purchasing activities resembling this task has not been found either. A team manager does add: “Actually, according to the demand chain planning, Purchasing should have something to do with coordination of start-up activities”. However, it is found that Purchasing did add
value by formalizing and implementing contingency plans and purchasing plans. In line with the BG checklist, the project owner feels that they need to have this task performed in the development stage already.

3.3.5 ANALYSIS OF TASKS AT STRATEGIC LEVEL

Survey results with regard to more strategic level tasks for Purchasing are summarized in 12. Based on the survey results and the interviews, the following can be concluded. On a strategic level, Purchasing is involved in pre-selection of suppliers fit for development collaboration. Other strategic tasks in which Purchasing is involved include exploiting the suppliers’ technical capabilities and evaluating suppliers’ development performance. No involvement has been found for monitoring supplier markets for technical developments and providing information on new products and technologies.

3.3.6 ANALYSIS OF ENABLING FACTORS

The project team is different than those found at the other projects under investigation. At project Red Beryl, the project manager is a Marketing Manager leading employees working on the project. Figure 3.5 shows how the project team was organized. The team worked on the project in a very autonomous way, although there was daily contact with the project manager, who very much pulled the project. The project team involved multiple disciplines, but left some disciplines out. Next to the project team, people from other departments were involved in an ad hoc manner, for example IP and Regulatory Affairs. No customer or supplier was part of the project team, although co-development activities have been performed.

Geographically, project Red Beryl was very complex, especially with regard to the supply chain. In the Netherlands, Purchasing is located close to the Research and Technology department of project Red Beryl, who handled first supplier contact. Also, Purchasing is located relatively close to Dutch establishments of the suppliers. However, for the project Red Beryl, testing sites and scaled-up production sites were located in Asia. Therefore, raw material had to be ordered at local Asian establishments. Having a good relationship with European suppliers and supplier contacts had no influence on ordering in Asia and contact with local Asian establishments of those same suppliers. Making arrangements with the Asian establishments of the same suppliers did not go as well as they hoped for; it was hard to get everything arranged. For example, at the moment that 100 ton of extra raw material was needed for production in Asia, it was hard to order this. The team member describes the situation: “Normally, we would have contacted our European Purchasing colleagues, who would arrange this with the supplier fairly fast due to their contacts here. But in this case, it was difficult to get it done.” Interviewees agree that if the whole team would have been located together, the whole NPD process would have gone even faster. Although departments such as Purchasing and Research and Technology were located in the Netherlands, the project manager was located in Asia – this person tried to call in nearly every day.
The project’s Purchaser had no particular technical expertise. The Purchaser explained that: “Having too much expertise is not of added value at BG Beryl, as almost everyone at BG Beryl is technically specialized. The most value added by Purchasing is because of the fact that Purchasing does not think in a specialist way. Purchasing looks at factors that technical specialists overlook.” Other interviewees explain that Purchasing came along very well in team discussions, mostly with regard to the chemistry part, not so much with regard to the technical part. However, the project manager adds that Purchasing at Beryl lacks specialization how to source raw material that we do not have experience in and how to commoditize that material.

Whereas most people at BG Beryl are specialized in terms of technology, the Beryl Purchaser feels that Purchasing is specialized more based on Purchasing topics. For the other team members, it is not entirely clear how Purchasing is specialized and what their responsibilities are. Team members explain that the grounds on which Purchasing and their respective departments are organized are aligned. However, in order to be involved in the technical development of a product, more technical knowledge would be required. No mismatch issues have been experienced.

3.3.7 Organizational Structure Purchasing Involvement

Purchasing has been involved on a part-time integrated basis, meaning that Red Beryl was one of multiple projects that the Purchaser took care of. Regardless of the moment of involvement, a Purchaser has been a member of the team once involved. Figure 3.6 shows the structure of Purchasing involvement at BG Beryl.

Project Red Beryl was about developing a radical kind of innovation, using techniques which were novel to Beryl and novel to SFI. The project was compressed to a total duration of three years, which is very fast. The project budget of one million euro per year has been labeled ‘large’. This also goes for the number of people involved. Around 20 people in total were involved in the project. As a conclusion, the project complexity and the project size have both been considered high.
3.3.8 CONCLUSIONS

Project Red Beryl has been finished in 2009. No quantitative data about the project’s success has been made available. From a technical viewpoint the product was successful, as they succeeded to develop a product with very high standard using a new technique in an incredibly short time. However, from a commercial perspective Red Beryl was not successful; raw material prices and thus Red Beryl’s price are exorbitant resulting in a bad market position. It is critical that in the future raw material costs go down. The excessive price of Red Beryl is a direct consequence of not involving Purchasing early in the new product development process. There has been supplier involvement in the development process from the start of the project, regardless of Purchasing involvement. However, the fact that Research and Technology had frequent contact with the supplier and shared too much information with suppliers before Purchasing was involved also lead to a lock-in position for BG Beryl and a bad negotiation position with regard to raw material.

In project Red Beryl a product was developed for Necklace, a very demanding customer. Because of these customer demands, project Red Beryl needed to be flexible and running on top speed. Therefore, use of formal processes and checklists was kept at a minimum.

At project level, Purchasing has played a role in encouraging suppliers to make suggestions and formalizing and implementing contingency plans and purchasing plans. Next to this, the task suggesting alternative products or technologies was also found in the development stage, instead of the scoping stage. For building the business case, Purchasing was asked for cost calculations. Strategic tasks mentioned by the interviewees and respondents include pre-selection of suppliers fit for development collaboration, exploiting the suppliers’ technical capabilities and evaluating suppliers’ development performance. In terms of percentages, more strategic tasks have been found than tasks at project level.

The project manager has an important leading role in the project team, but still the project functions in an autonomous way. The project team is cross-functional. However, not all relevant functions are officially integrated in the project team, some were contacted in a more ad-hoc manner. Project Red Beryl is a large project and has a high degree of complexity. Lakemond et al. (2001) would advise using an integrated Purchaser in combination with a coordinator. It is striking that project members agree that an integrated Purchaser should be used for this kind of projects.

To conclude with, enabling factors concerning degree of specialization and team composition were negative. Factors concerning principle of specialization and co-location had no positive or negative score. Only with regard to team structure, project Red Beryl scored high. Table 3.2 shows a summary of the case study.
### TABLE 3.2: Summary findings Project Red Beryl

<table>
<thead>
<tr>
<th>Project</th>
<th>Red Beryl</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purchasing involvement</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Supplier involvement</strong></td>
<td>No, but close communication &amp; partial collaboration.</td>
</tr>
<tr>
<td><strong>Project tasks</strong></td>
<td>Relatively small amount of tasks.</td>
</tr>
<tr>
<td><strong>Strategic tasks</strong></td>
<td>Mediocre amount of tasks.</td>
</tr>
<tr>
<td><strong>Purchasing mentioned in formal procedures</strong></td>
<td>No. But Purchasing tasks are mentioned though.</td>
</tr>
<tr>
<td><strong>Use of formal procedures</strong></td>
<td>Limited.</td>
</tr>
<tr>
<td><strong>Pro-activeness</strong></td>
<td>Reactive.</td>
</tr>
<tr>
<td><strong>Timing of involvement</strong></td>
<td>Late.</td>
</tr>
<tr>
<td><strong>Degree of specialization</strong></td>
<td>Generalist but technical understanding. Missing: sourcing new materials/ commoditizing them.</td>
</tr>
<tr>
<td><strong>Principle of specialization</strong></td>
<td>Not congruent, but no misalignment.</td>
</tr>
<tr>
<td><strong>Team structure</strong></td>
<td>Autonomous and pulled by project manager.</td>
</tr>
<tr>
<td><strong>Team composition</strong></td>
<td>Partly multifunctional, including Purchasing.</td>
</tr>
<tr>
<td><strong>Co-location</strong></td>
<td>Partly co-located, party very distant. Geographical related issues present.</td>
</tr>
<tr>
<td><strong>Attitude of team members</strong></td>
<td>‘Do-it-ourselve’ attitude</td>
</tr>
<tr>
<td><strong>Project costs</strong></td>
<td>No deviations.</td>
</tr>
<tr>
<td><strong>Time to market</strong></td>
<td>No deviations.</td>
</tr>
</tbody>
</table>

### 3.4 Case Study Project Opal – Business Group Mineraloids

#### 3.4.1 Introduction to the Case Study

Hydroxytyrosol is an antioxidant found in olives which has microbial, anti-inflammatory and DNA-protective properties. Recent research has found that hydroxytyrosol also boosts the cellular capacity for energy production. In project Opal, SFI develops a natural sustained energy product by using an olive byproduct called olive water. Opal will be free of caffeine, low in calories and have a competitive price. As the negative effects of caffeine have been under the spotlight, consumers increasingly seek offers providing natural sustained energy but with limited caffeine content. SFI has patents for the production process of extracting hydroxytyrosol from olive water. It is planned to use a toller for the initial production.

SFI is not the only company that will be active in this market. However, since available products have poor technical performance plus suppliers are small and do not have much market reach, SFI is expected to lead the market.

Purchasing has indicated that their function was involved in this project. In this case study, the extent of Purchasing involvement and the supplier role are investigated. Then, Purchasing tasks are described in more detail. Project Opal will also be assessed with regard to organizational enabling factors in favor of Purchasing involvement in NPD projects.
3.4.2 Process

Business group Mineraloids uses the general SFI procedures and also uses Project Plaza. Next to this, BG Mineraloids has defined the tasks and roles for different functions more in detail in a separate toolkit. Purchasing is also represented as a function and has its specific tasks. It is known in advance who to turn to for which contributions to the project. The toolkit starts at the business feasibility stage and includes Purchasing in all stages. Next to this, Purchasing has to be consulted before each phase transfer. Project management has a high level of responsibilities in this set up.

In a previous project, SFI had a cooperation agreement with a company that sold an Opal-like end product. However, this product was not successful in the market, due to its high price and poor quality. Since there is a market opportunity for the bioactive if the weaknesses of the mentioned product are overcome, SFI decided to develop a better product; Opal. The agreement with the company concerning cooperation and exclusivity was terminated in 2008. Figure 3.7 summarizes how the NPD process went for the new project, project Opal.

![Figure 3.7: Process project Opal](image)

In 2004 the project idea was formed as a result of a previous cooperation with another company in the same market. Due to a bad quality product, SFI wanted to develop its own improved version.

Not much is known about the scoping stage, it may have been combined with the discovery stage.

In September 2005, the build business case stage was entered in which business feasibility has been assessed. A major milestone in this was deciding on the supply scenario for Opal.

Already in November 2005, project Opal went into Development. During this phase, the production process is being developed until ready for scale up, trial production for customer samples, human and safety study.

In July 2009, it was decided for strategic reasons that the project work on the remaining technical hurdles is done in a staggered, rather than in a parallel.
For strategic reasons, Project Opal is currently managed on financial exposure rather than on time to market. Due to this, the project will be launched later than initially planned. Project Opal’s duration has extended with 1,5 years now. Three technical challenges remain to be overcome before product launch. Purchasing involvement was already planned from the start, so no deviation from the plan has been observed with regard to time and budget because of Purchasing involvement. It is indicated by the project manager that: ‘Purchasing was absolutely required in the project.’

3.4.3 Purchasing and Supplier Involvement

Purchasing has been involved since an idea was formed about which raw material was required for Opal. This moment occurred early in the process in the scoping stage. Olive water is a byproduct of olive-oil producers that would normally be disposed of or incinerated. The olive water is ideally sourced as a 10x concentrate. Alternatively, a toller would need to be found close by the olive water supplier for water evaporation. Unexpectedly, most oil mills were not readily interested in supplying olive water, even though the olive water is an environmental concern in olive oil-producing countries. Purchasing played an important role with regard to strategic sourcing and surrounding tasks such as analysis the product and its requirements, making a purchasing strategy, secure supply of raw materials, identifying customer requirements, supplier analysis and suggestion, negotiations and making the contract. As the olive oil and olive extract market was entirely new to SFI, the strategic sourcing process was complex. There were language issues as well. Purchasing also played a significant role in deciding whether to produce internally or externally and analyzing and suggesting tollers, together with the technical product manager. Opal will be produced by a tolling manufacturer, at least for the first several years after launch.

For project management and Purchasing, it was natural that Purchasing was approached and knew in advance what input to expect. The team member however, was more surprised: ‘Having Purchasing in our team was a very important step in our innovation process. I did not expect this in the beginning.’ It does come forward that the Purchaser’s pro-activeness influences the role Purchasing plays in a project and the level of involvement they have. Purchasing has to be involved reactively at BG Mineraloids. However, whenever Purchasing has an idea, they can use a general SFI idea box to have it followed up.

In this project, having the right suppliers was of extra strategic importance. The supplier base has been used for raw material supply and toll manufacturing. Development activities in project Opal have been done by SFI without any co-development.

3.4.4 Analysis of Tasks at Project Level

In this section, a selection of relevant Purchasing tasks with regard to supplier involvement is assessed. The tasks are discussed below per NPD stage. In appendix 11, there is a summary available for the survey results with regard to these tasks.

Discovery

The discovery stage mainly consisted of the decision to develop Opal as a better 2nd generation of a previously licensed-in product. Technology or component scouting was no Purchasing task here, but
rather an R&D task. It is indicated that Purchasing did contribute by organized idea scouting in the supply base. The idea scouting mainly applies to searching for ideas to lower production costs or finding products or technologies that would fit SFI’s portfolio.

**Scoping**

With regard to suggesting alternative products or technologies, Purchasing did play an important role in the multifunctional team. As said before, strategic sourcing was one of the main Purchasing contributions to this project resulting in secured supply, cost savings, quality, etc. In project Opal, there was no co-development with a supplier, in contrast with the predecessor project where the final product was licensed in. However, it is indicated that Purchasing had input by supplier selection for involvement in NPD, possibly for future cooperation. Tolling partners may play a part. It appears that Purchasing and R&D together are responsible for contact with the supplier concerning involvement. Also, execution of this task is an official prerequisite in order to move to the testing and validation phase later in the process. By using risk management and assessing profitability and IP aspects, the extent of supplier involvement has been decided on by Purchasing and R&D jointly. The moment of supplier involvement was in the build business case stage. Who decides on the moment of supplier involvement is unclear, but it seems to be in an early stage every time at BG Mineraloids. Potential tolling partners were asked by Purchasing to make suggestions in order to improve the process or product and to reduce costs.

**Build Business Case**

In project Opal, Purchasing has a clear role in the build business case stage. In the official toolkit, Purchasing is assigned with several tasks;

- purchase candidate ingredients for screening and proof-of-concept studies,
- develop a strategic sourcing strategy
- define a list of potential suppliers for raw materials and active ingredients,
- make a contingency plan,
- contribute to the make or buy decision (together with process research),
- if the decision is to buy, the active ingredient has to be purchased for development work.

Next to this, the project manager must request a production cost estimate from Purchasing and technical product management. It has been indicated the supplier is supposed to be involved in this stage when it comes to supplier involvement in NPD. The actual business case has not been made available. In project Opal, these Purchasing tasks have also been performed. The project manager has received information on raw material costs and availability as well, in order to make the business case.

**Development**

In this phase, Purchasing has many tasks to perform. The toolkit prescribes 24 tasks for Purchasing. These tasks include, amongst others, updating the sourcing strategy, buying ingredients and formulating active ingredients for all kinds of development activities, identify preferred suppliers, carrying out contingency plans, request supplier information and proposals and providing input in raw material specifications.
None of the tasks mentioned point to integration activities between first tier suppliers and first and second tier supplier. The interview and survey respondents indicate that these activities are not needed. Coordination of development activities between the supplier and firm will be done by project management and R&D. However, it is not decided yet on what to do in terms of process optimization at the tolling company.

**Testing and Validation**

BG Mineraloids has slightly adapted the general SFI stage-gate process – the testing and validation stage is divided in a first and a second phase. Altogether, 9 tasks have been predefined. The tasks that the toolkit prescribes for Purchasing includes, amongst others, making strategic deals, making a contingency plan and including external tolling activities as needed.

Purchasing is not involved in configuration management between the supplier and firm or coordinating prototyping of supplier and firm. These two tasks are not yet applicable to the project. Also, Manufacturing will most likely be doing configuration management.

**Launch**

Also the launch stage is not yet applicable to this project. Nevertheless, it is clear that formalization of the contingency plan is supposed to be done the build business case stage already. No separate task has been mentioned concerning implementation of the contingency plan. With regard to coordination of start-up activities, it is mentioned there should be cooperation with Quality and Technical Product Management in order to do this. However, the team member feels that: ‘Purchasing has no capabilities for this.’

The toolkit prescribes, amongst others, that Purchasing has to ensure availability of raw materials needed to produce the product (or the product itself in case of a resale product), and get a signed delivery contract.

### 3.4.5 Analysis of tasks at strategic level

The following is concluded based on the interviews and the survey data. Purchasing is involved in pre-selecting suppliers for product development collaboration, exploiting the suppliers’ technical capabilities and monitoring supplier markets for technical developments. Next to this, the Purchaser explained that there is a database with information about the big, important or strategic suppliers of BG Mineraloids. Every year, these suppliers are evaluated, also with regard to development performance. This evaluation is put in the supplier file and shared with the supplier. Also with regard to the NPD process evaluation, Purchasing is always involved in the evaluation process in this BG, together with the technical manager and the product manager. Nothing is undertaken to provide information on new products and technologies. The survey results with regard to strategic level tasks for Purchasing are summarized in appendix 12.

### 3.4.6 Analysis of enabling factors

The project team did not consist of a core project team as such, more of separate people who are involved in the project. The project manager makes sure that everyone involved stays informed. It is also the project manager that has the responsibility to involve everyone that is supposed to be involved according to BG procedures. The team work is not all autonomous, but mostly coordinated.
by the project manager. Nevertheless, it does seem that team members feel a part of a fully integrated team. The organizational structure is very simple, as can be seen in figure 3.8. The project team is multi-functional.

Purchasing is located in the main building of BG Mineraloids, just as Regulatory Affairs, Project Management, Marketing and IP. Next to this, they have their office at the same site as Research although they are in another building. The manufacturing site containing the pilot plant lies 20 Kilometers away from the main building. Therefore, Purchasing is co-located with part of the team.

The Purchasing skills level is judged as being high, especially with regard to negotiation related issues and using years of technical or chemical experience in their Purchasing perspective. Purchasers that are active in new product development teams seem highly specialized in the chemicals/technologies used by Mineraloids. The Purchaser: ‘In a new product development team you need much more chemical knowledge in comparison with a normal Purchasing job.’ The Purchasing department is organized differently than for example Research or Engineering. Despite the fact that there is no congruence with regard to the principle of specialization, there is no misalignment of any sort according to the interviewees.

3.4.7 **Organizational structure Purchasing involvement**

Is explained above, Purchasing is involved in the project team on a part-time basis. Purchasing is fully involved from the start of the project already and on a frequent basis. Therefore, the Purchasing involvement structure is integrated Purchasing involvement on a part-time basis. This is depicted in figure 3.9.

Project Opal had access to existing technologies, and thus the technology cannot be labeled novel. Although SFI is not a first mover, the kind of innovation is radical as the production process, product composition and product positioning are new to the world. In comparison with other innovation projects, the project duration is long and the budget is high. The project team comprises approximately ten disciplines, in total 40 people are or have been contributing to the project.
Concluding, both the project complexity and the project size are labeled high.

### 3.4.8 Conclusions

Project Opal is currently in the development phase, and is - for strategic reasons - currently managed on financial exposure rather than on time to market. After the next upcoming milestone, a Go/No Go decision will be made. It is not yet possible to conclude anything about the success of the project. Purchasing has been involved from the very start of the project, this is considered as being very normal. The project plan included Purchasing already, so no (short term) deviations were noticed because of Purchasing involvement. Purchasing participation in the NPD was most required as the raw material supply could make or break the business case.

In BG Mineraloids there is a toolkit available that describes the tasks that a specific function, including Purchasing, must do per stage of the NPD process. The project manager has to make sure all tasks are completed. The toolkit starts in the build business case stage. At project level, Purchasing has indeed played a significant role in a number of tasks. In the discovery and scoping stage, Purchasing played a role in organized idea scouting in the supply base, suggesting alternative products or technologies, supplier selection for involvement in NPD, determining the extent of supplier management and stimulating suppliers to make suggestions. Also with regard to the business case, Purchasing has fixed tasks. Among others, Purchasing is responsible for making a strategic sourcing strategy, making a contingency plan and contributing to a make or buy decision. It is striking that the contingency plan is formalized in this stage already. The project manager also consulted Purchasing for information on raw material pricing and availability, as was required by the toolkit. In the development stage, none of the tasks under investigation were found. As the project is in the development stage at the moment, further tasks have not been found yet.

Four out of five tasks under investigation on a strategic level are structurally being done at BG Mineraloids; pre-selecting suppliers for product development collaboration, exploiting supplier’s technical capabilities, evaluating suppliers’ development performance and monitoring supplier markets for technical developments. This is a remarkably good score. It can therefore also be concluded that there is a good balance between Purchasing tasks with regard to early supplier involvement if compared with the tasks that have been done in the first couple of stages of the NPD process.

The project manager has a big role in the NPD team and holds it all together. Although part-time, there is a semi-autonomous team with frequent meetings between subgroups of the team. All relevant functions must be and are included in the team for project Opal. The project has a high degree of complexity and the project size is large. For these characteristics, Lakemond et al. (2001) would advise the same Purchasing involvement structure as project Opal currently has with a coordinator in addition.

Next to this, project Opal scores high with regard to the enabling factors co-location and degree of specialization. The project does not score high or low in particular on the remaining enabling factors, principle of specialization and team composition. Project Opal has an overall good set of enabling factors and procedures. Table 3.3 gives a summary of the findings of this case study.
### TABLE 3.3: Summary findings Project Opal

<table>
<thead>
<tr>
<th>Project</th>
<th>Opal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing involvement</td>
<td>Yes</td>
</tr>
<tr>
<td>Supplier involvement</td>
<td>No. It was a strategic choice.</td>
</tr>
<tr>
<td>Project tasks</td>
<td>Relatively good amount of tasks.</td>
</tr>
<tr>
<td>Strategic tasks</td>
<td>Relatively good amount of tasks.</td>
</tr>
<tr>
<td>Purchasing mentioned in formal procedures</td>
<td>Yes</td>
</tr>
<tr>
<td>Use of formal procedures</td>
<td>Yes</td>
</tr>
<tr>
<td>Pro-activeness</td>
<td>Reactive. Pro-activeness not needed to be involved.</td>
</tr>
<tr>
<td>Timing of involvement</td>
<td>Early</td>
</tr>
<tr>
<td>Degree of specialization</td>
<td>Specialized in chemistry and technology plus adept in purchasing.</td>
</tr>
<tr>
<td>Principle of specialization</td>
<td>Not congruent, but no misalignment.</td>
</tr>
<tr>
<td>Team structure</td>
<td>People involved on a part time basis in team, non autonomous.</td>
</tr>
<tr>
<td>Team composition</td>
<td>Multifunctional, including Purchasing.</td>
</tr>
<tr>
<td>Co-location</td>
<td>Co-located with most of the team.</td>
</tr>
<tr>
<td>Attitude of team members</td>
<td>Yes</td>
</tr>
<tr>
<td>Performance/ goals</td>
<td>?</td>
</tr>
<tr>
<td>Project costs</td>
<td>No deviations.</td>
</tr>
<tr>
<td>Time to market</td>
<td>No deviations.</td>
</tr>
</tbody>
</table>

### 3.5 CASE STUDY PROJECT RUBY – BUSINESS GROUP CORUNDUM

#### 3.5.1 INTRODUCTION TO THE CASE STUDY

Project Ruby combines existing know-how and technologies from different Business Groups into a ready-to-use preservation product. Ruby is a substitute for existing preservation methods and products, with a lot of distinct advantages for the customers of Science Faceting Inc.; less costs, less waste loss, more control over the production process and higher product quality. Customers can even use Ruby to develop new product variations. The IP rights are in possession of Science Faceting Inc.

The product’s market is entirely new and has therefore been labeled as an Emerging Business Area. Although the market is new, project Ruby can use the existing sales channels of another Business Group that has experience in comparable markets.

Not only the product and the market are new to the company; the business model is unconventional for SFI as well. For this product, SFI will sell a final product directly to the end customer, where normally SFI customers are doing so. Also, Project Ruby uses a toll producer who takes care of the actual production and delivery to the end customer, while Science Faceting Inc. invoices the customer. The toll manufacturer sends an invoice to SFI for their services. Orchestrated by Corundum another Science Faceting Inc. BG provides the crucial raw material for Ruby exclusively to the toll producer; the additional materials can be purchased at other suppliers. The toll manufacturer was an existing customer of this other Science Faceting Inc. BG before they were approached for a tolling partnership by Corundum. So now this toll producer is a customer as well as a supplier of SFI.

According to Purchasing, there has been Purchasing involvement in this project. In this case study it is investigated to what extent Purchasing was involved and what the supplier role exactly was. The
Purchasing tasks related to supplier involvement are assessed. Finally, the enabling factors with regard to Purchasing involvement in new product development are investigated as well.

3.5.2 **Process**

At Corundum, innovation projects and project needs are different from those at any other Business Group at SFI. Corundum has been set up especially for more radical kinds of innovation and is very young in comparison with the other Business Groups. Suppliers and their products are often entirely new or critical and the Corundum environment is very dynamic. As a result, also Purchasers need to be extremely inventive in their solutions.

The formal procedures at Corundum match those of SFI and do not mention Purchasing in any specific way. The project manager ran his project in an organic way, not using the exact stages as defined in the stage-gate process, but using the available project management tools where and when he deemed them useful. The project manager: “The type of project and the different people you need in this kind of project does not allow you to work in a very structured way. … it is more on an ad hoc basis that we involve people, we need to be very flexible.” Although the project approach was ad hoc, official checklists were used to structure the project information. In these checklists the supply chain is mentioned as a category but it is not clear for which activities Purchasing can be of help.

Because of the unstructured nature of the project’s organization, project tasks can not be clearly structured per stage using the innovation funnel. Figure 3.10 summarizes this process.

As can be read in figure 3.10, project Ruby is now being launched. No hard information on the project’s outcome is available yet. However, the project manager indicated there were no budget issues or any other trouble. The time to market was 4 years, but could have been 3 years altogether. The project manager explained that: “Earlier Purchasing involvement could have reduced the time-to-market with several months.” The project manager mentioned the positive influence of Purchasing on the margin as a result of a good purchasing deal.

3.5.3 **Purchasing and Supplier Involvement**

When the product development was far enough and the IP rights for Ruby were filed, the project owner and project manager started their search for a tolling manufacturer. The exact timing of Purchasing involvement is unclear as the stages of the stage-gate process have not really been applied. With some help of the Business Group’s sales force, project management made a list of potential tolling partners and collected some relevant information about these companies such as production yield and prices. They had been contacting companies and looking for a potential partner for six months. Forwards integrating and tolling are new areas for SFI and especially for Corundum. The needs for project Ruby were rather complex as well, as the tolling construction involved more than just production and the supplier needs to be flexible – produce small quantities at first but large volumes later. The project manager wanted to speed things up and decided to involve Purchasing. Purchasing helped the project manager to review the list of potential tolling manufacturers they already had and provided them with more additional information that could be relevant. Together they made a ranking of the potential tolling manufacturers and got into contact with them. Within two weeks, a suitable partner was found.
The idea was generated by an employee who was transferred from one BG to another, combining both areas. Brainstorms followed, including different BG’s and a customer.

Project Ruby was initiated in 2006. Development by Research began right away, to get a proof of concept. Next to a testing facility at the SFI site in Delft, also the customer was involved to do trial runs.

Since 2009, the other European customers were involved instead, in order to learn and develop the product far enough to write a patent.

After the patent was filed, the search for a tolling manufacturer started with help of sales. Purchasing was approached for help in finding one. The toller’s expertise and process experience was used to set up a production line in their production facility. The long term partnership contract with the tolling manufacturer is settled and signed.

Project Ruby now has an agreement with a big customer, and is ready for its first launch. The marketing department has been approached for help on the sales side. On July 1st 2011, the project will be transferred to running business at BG Amethyst.

By coincidence, the project manager found there were also Purchasers specialized in the area of preservation products. They were invited to participate in a discussion about the contract. The project manager learned that there are many years of market and product experience present at SFI Purchasing as well, both from a commercial and from an engineering perspective. If these Purchasers would have been involved from the start, they could have used this untapped knowledge. However, they were not aware of each others’ activities and knowledge.

There were some issues with regard to human resources as well. There were three Purchasers involved in project Ruby due to staff turnover and sickness leave, which was not beneficial for the quality and extent of Purchasing involvement. Purchasers at BG Corundum indicated there they were very short on people and that there were quite some vacancies.

Although there has been no actual co-development, the tolling partner was very much involved in the process developments to facilitate the product’s production. They were not officially part of the team or a co-developer but have played an important part in the development of the product due to their expertise and extended tolling role. This is supported by a quote from the project manager: “They are
treated as being part of the team, it is partnership... they have their logistics organized, know what is relevant and understand the technical needs. They are actually very valuable to the project.”

In this project, the customer base has been used to find a supplier partner. As a result of using the customer base to find a tolling partner, the project team of project Ruby realized that the supplier base can also be used in order to find customers or partners for other projects. Ideas about using Purchasing to do this have been discussed as well. In addition, the preservation supplier market is in this case also the new product’s market. Therefore, all existing knowledge about these suppliers and the preservation market could be used as in-depth market and competition knowledge as well.

3.5.4 Analysis of tasks at project level

The presence of the most important Purchasing tasks as indicated in the survey has been summarized in appendix 11 and elaborated on below.

Discovery

In project Ruby, knowledge or information gathered through technology or component scouting has not played a significant role. In this stage, existing knowledge from the participating business groups has been used mainly. An interesting observation is that in a very late stage, per coincidence, Purchasing knowledge resulting from technology scouting and experience in the preservation area has been used to check the project choices in hindsight. The timing for this task has indeed been experienced as too late and thus having little added value. From the Purchasing side, it has been indicated that this Purchasing task can add most value to NPD when performed early. A team member explains: “Often business itself takes over activities as they do not feel so much supported in the early phases of new developments. It is only in a later stage that Sourcing/Purchasing plays a more significant supporting role.” It is described that there are too few resources available to do these tasks early in the process and that project management often does not know who to go to for which tasks in the separate innovation stages.

Scoping

Purchasing did not play any role in suggesting alternative products or technologies in order to avoid a lock-in position, cost saving or improve product design. The interviewees agree that later on, Purchasing did play an important role in a better product description. The project manager explains: “Purchasing forces innovation projects to think in a more concrete and detailed manner, and put the needs and goals on paper very precisely.” Purchasing has not been involved in suggesting alternative suppliers as candidates for a tolling partnership as the list was already made with help of the sales department. Purchasing did help in selecting the tolling partner. As a result of the business model, but few other suppliers are involved. The partner was involved after the patent was filed, meaning that there was no actual co-development with the supplier concerning the product itself. There has been cooperation concerning production issues and the business model alignment. Involvement of Purchasing in coordinating these activities has been mentioned but not explained. Purchasing did not have much influence with regard to determining the moment or extent of supplier involvement.
Build Business Case

As a part of the project, a business case has been built. The exact content of this business case has not been made available. Although in literature no relevant Purchasing tasks have been found for this stage, at project Ruby there is consensus about the valuable input of Purchasing. This input has been described as informal and comprises financial information, supply chain plans, advice on the business model and assessing the business case from multiple angles.

Development

Although integration activities between first tier suppliers and first and second tier suppliers have been mentioned in the survey, no distinct role for Purchasing has become clear. It has been indicated that Purchasing has been involved in coordinating development activities between the supplier and firm. As mentioned above, in this project the only co-development tasks concerned the production process. This was managed mostly by the project manager and owner.

Testing and Validation

Purchasing has not played a significant role in configuration management between the supplier and firm or coordinating prototyping of supplier and firm. As the matter a fact, is has been recognized that in this business group and Purchasing is never involved when it comes to testing and validation.

Launch

Coordination of production start-up activities are the responsibility of the project manager, assisted by the marketing department. However, due to the complex nature of the business model the marketing department has indicated that Purchasing is consulted very often for critical information. It is unclear to what extent formalization and implementation of contingency and purchasing plans are applicable to this project. SFI produces the critical raw material itself and the toller is responsible for buying other raw materials.

3.5.5 Analysis of tasks at strategic level

Appendix 12 gives a summary of the results from the survey about Purchasing tasks found at a strategic level. In the search for a tolling partner, Sales was involved in order to make a list of potential partners. Purchasing was involved later. There were no pre-selected suppliers one could pick from with regard to development collaboration activities. Strikingly, in the survey it is unanimously indicated that Purchasing is active with regard to pre-selection of suppliers. No particular examples for efforts from Purchasing to continuously exploit suppliers’ technical capabilities have been found but survey results show that Purchasing does splay a part in this. Anyhow, the technical capabilities and knowledge of the supplier have been used in the advantage of SFI. At BG Corundum suppliers’ development performance is evaluated and supplier markets are structurally monitored for relevant developments or new product and technologies.
Apart from a couple of researchers that got together on an occasional basis from the start already, the team was “virtual and occasional” (project manager). Employees from different departments were involved on an ad hoc basis and in an unstructured way, depending on the knowledge that was necessary at the moment. Figure 3.11 represents the team structure. Note that the supplier (tolling partner) is not part of the NPD team. There is a continuous cooperation with people from the BG’s Amethyst and Beryl as well as with Research. The composition of the project team has been changing continuously, using the word ‘team’ is ambiguous even. Also, Purchasing was involved when deemed necessary but was never a member of any ‘team’. When they were involved, there was close collaboration between Purchasing and the project manager. Although there was no actual ‘team’, project Ruby did involve multiple disciplines. The interviewees mention a long list of other departments involved from different BG’s, such as IP, Legal, Purchasing, Marketing, Sales, the Management Team, Regulatory Affairs, Research and Production.

Purchasing, the project manager and the team member are often in the same building, although Purchasing officially is not located there. Purchasing has multiple unofficial offices, as Corundum Purchasers are officially located at the same site as Research but travel to Corundum’s site and another site very often. There is consensus that co-location and face-to-face contact is a big help in involvement of Purchasing. Purchaser 1 explains: “A Purchaser should be physically present on a full-time basis in order to be involved pro-actively.”

As explained earlier, BG Corundum is quite different from other Business Groups; innovation regards new areas of expertise and is radical. The projects at this BG differ a lot, resulting in no single area of expertise. Purchaser 1 very clearly summarizes that at other BG’s, “we have specialized category managers with a specialization in a certain category of products. However, what Corundum is working on is much more than what is covered by category management. So partly, the buyers can ask for input from the category managers in case there is a match. But for other part, the buyer has to do it by himself.” A Purchaser at Corundum needs to be more inventive and creative than others. Purchasers indicate a need to discuss solutions and alternatives with colleagues instead of only with a project manager, but this is currently not supported much. The Purchasers at Corundum are thus responsible of getting familiar with certain areas of expertise they have not dealt with before. It is explained that although technical affinity is easy, it is not necessary. It is much more important to be able to duck into the matter. Too much technical background can even cause the pitfall of not being able to keep a required amount of distance. A shortage of Purchasers has been reported.
3.5.7 **ORGANIZATIONAL STRUCTURE PURCHASING INVOLVEMENT**

Figure 3.12 shows the type of Purchasing involvement that has been present at project Ruby; indirect Purchaser involvement on an ad hoc basis. The project manager claims that the optimal kind of Purchasing involvement depends on the size of the NPD project: “...Dependent of the project size I can imagine sourcing is a project member in certain phases. For smaller projects sourcing should be involved on an ad hoc basis...”. This is partly in line with Lakemond et al. (2001), who concluded that the configuration of Purchasing involvement depends on the size and complexity of the NPD project. The technology used in project Ruby is entirely new, the degree of innovation is radical and the duration of the project has been indicated to be long and thus the project complexity will be labeled as being high. The project budget is low and the number of people involved is low as well in comparison to other projects; the project size is therefore small.

3.5.8 **CONCLUSIONS**

Project Ruby has resulted in a successful collaboration with a supplier. Despite the limited number of value adding activities of Purchasing, it has been found that there has been a positive influence of Purchasing involvement on the profit margin. Scoping the project and developing Ruby has been done without Purchasing and Purchasing has been involved late. If Purchasing was involved sooner, the time-to-market might have been reduced.

At project Ruby, the most important Purchasing tasks at project level were related to concrete and precise (product) descriptions and selecting tolling suppliers. Purchasing plays an informal role in building the business case because of their generalist, multiple angle view and their knowledge with regard to the supply chain and financial aspects. Another limited role has been found in coordination between supplier and SFI.

Most other tasks have been done only to a very limited extent. It has been recognized that Purchasing has been involved too late to actually unleash the full potential of added value of Purchasing for the project. This seems a structural phenomenon at this business group. Another interesting finding is that it is remarked that Purchasing is never involved at the validation and testing stage at all at BG Corundum. It is perceived that there is a lack of resources to do all tasks early and it seems unclear to whom one can turn to for certain tasks or information. All strategic level tasks were indentified at BG Corundum. This means that there is a bad balance between Purchasing tasks at a project level and those at a strategic level.
In project Ruby, the project manager has taken the lead in practically everything. Although multiple disciplines were involved in the project, there was no actual ‘team’ and no formal stage-gate procedures have been used. Purchasing involvement has been unstructured and ad hoc. Project Ruby has a high project complexity but a low project size. For a project with these characteristics, Lakemond et al. (2001) would recommend using a Purchasing coordinator.

Enabling factors are low with regard to the degree and principle of specialization. With regard to collocation, project Ruby scores high. The team-composition is not negative or positive in particular. In general, conditions for Purchasing involvement are suboptimal. Table 3.4 summarizes the findings of this case study.

**Table 3.4: Summary findings Project Ruby**

<table>
<thead>
<tr>
<th>Project</th>
<th>Ruby</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing involvement</td>
<td>Not much.</td>
</tr>
<tr>
<td>Supplier involvement</td>
<td>No co-development. Good cooperation with toller though.</td>
</tr>
<tr>
<td>Project tasks</td>
<td>Small number of tasks.</td>
</tr>
<tr>
<td>Strategic tasks</td>
<td>Mediocre amount of tasks.</td>
</tr>
<tr>
<td>Purchasing mentioned in formal procedures</td>
<td>Hardly.</td>
</tr>
<tr>
<td>Use of formal procedures</td>
<td>No.</td>
</tr>
<tr>
<td>Pro-activeness</td>
<td>Both pro-active and reactive.</td>
</tr>
<tr>
<td>Timing of involvement</td>
<td>Late.</td>
</tr>
<tr>
<td>Degree of specialization</td>
<td>Generalism, innovative solutions. Short of people.</td>
</tr>
<tr>
<td>Principle of specialization</td>
<td>Corporate technology category support available, but often not applicable. No specialization, flexibility instead.</td>
</tr>
<tr>
<td>Team structure</td>
<td>Ad hoc involvement, no actual team.</td>
</tr>
<tr>
<td>Team composition</td>
<td>No actual team. Multiple functions consulted, including Purchasing.</td>
</tr>
<tr>
<td>Co-location</td>
<td>Unofficially co-located, sites located nearby.</td>
</tr>
<tr>
<td>Attitude of team members</td>
<td>Negative first, positive later.</td>
</tr>
<tr>
<td>Performance/ goals</td>
<td>?</td>
</tr>
<tr>
<td>Project costs</td>
<td>No deviations.</td>
</tr>
<tr>
<td>Time to market</td>
<td>Could have been shorter.</td>
</tr>
</tbody>
</table>

3.6 **CASE STUDY PROJECT SAPPHIRE – BUSINESS GROUP CORUNDUM**

3.6.1 **INTRODUCTION TO THE CASE STUDY**

Project Sapphire concerns an entirely new way of producing a base chemical compound used for applications in various areas such as food, feed, pharmaceuticals and materials. The novelty of Sapphire is that it oil-independent whereas other products on the market are not and thus has a low environmental footprint. Furthermore it is expected that the cost price of Sapphire will be lower than the petrochemical based products that are currently on the market. To produce Sapphire, SFI uses a fermentation process with a low PH. This process has been patented by SFI.

As the product is very novel to the world, it has been labeled as an Emerging Business Area. Project Sapphire includes co-development with Gold Mines, an international company specializing in starch and starch derivatives. Gold Mines (GM) is familiar with fermentation technologies and is in possession of culture-media (feedstock) and micro-organisms. Gold Mines is also a major supplier of
SFI with regard to feedstock for fermentation processes and modified starches. It is planned to use a toll manufacturer in order to produce the base chemical, but this has not been arranged yet.

SFI and GM have established a joint venture, Bracelet, in which they both have a 50% stake. Sapphire will be marketed through this joint venture. SFI and GM have indicated to continue to work together and expand their joint capacity.

Purchasing employees have indicated that Purchasing has not been involved in the new product development process. In this within case study, it is investigated to what extent Purchasing has been involved, what role suppliers played and how the process went. It is also investigated to what extent organizational enabling factors are in favor of Purchasing involvement in the new product development project.

3.6.2 PROCESS

The procedures at project Sapphire more or less correspond with those of the official stage-gate approach of SFI. Project management tries to make sure that the required steps are followed and checklists are used. However, co-developing with GM makes these efforts more challenging, as colleagues at GM were used to other procedures and terminologies plus they experienced SFI procedures as being too bureaucratic. The geographic distance between SFI and GM is another factor to take into account; project participants from SFI are located in the Netherlands, whereas those from GM are sited in France. To maintain the SFI procedures and to make sure all important topics are covered, Project Plaza is used. As a means of communication and storing and exchanging information, a web based application called Teamroom is used as well. Figure 3.13 summarizes the new product development process so far.

Project Sapphire is still in its Development phase, thus no information about the project’s outcome is available yet. As from the start of the project, Bracelet was expected to become market leader and this has not changed so far. Sapphire is planned to be fully launched in 2012. Despite all the challenges they faced, they are still on track with regard to time to market and budget. The project manager: “Not involving Purchasing did not have negative influence on the project performance.”

3.6.3 PURCHASING AND SUPPLIER INVOLVEMENT

As the project required quite an investment, it was decided at once to get a development partner. Selecting a partner has been done by project management themselves. Various potential partners have been assessed and met, but GM came out as best. GM was considered a very suitable partner because they had the knowledge, technology and the feedstock needed. GM was already working on a product such as Sapphire and as such had already licensed some valuable technologies and received subsidies from their government. The Business Case was developed and deemed attractive by both partners. Therefore, a joint development agreement has been signed. By having a joint development, SFI also got rid of direct competitor.
Since 2005 there have been brainstorming sessions on how to better valorize SFI’s existing know-how in biotechnology. This resulted in Sapphire - made by fermentation and with a major expected market size. Considering the large required investment, a partnership was decided on right away.

No information on the activities in the scoping stage has been made available. It is known that the following gate was entered in January 2007.

In July 2007, business case building started. This included a proof of concept at laboratory scale using facilities at BG Amethyst, a feasibility study of cost price concepts, a shortlist of process options and a joint development agreement with GM.

After a successful review, project Sapphire has entered the Development stage in December 2008. It has been decided to revamp a demonstration plant in and to pursue a flexible growth manufacturing strategy. Strain and process have been developed and transferred to GM. The coli strain performance proved lower than in the lab, whereas the yeast strain performance was better. In 2010 the demonstration plant was started up - the first ton of Sapphire was produced successfully. Working on an alternative transporter protein caused some delay. The joint venture agreement with GM was also signed in 2010.

Many companies have sampled and tested the Sapphire from the demonstration plant and intend to take shipments from Bracelet in the future. Sapphire is expected to go into the next development stage soon.

During the development phase, the team consisted of both GM and SFI employees. All contact and coordination has been managed by project management or has been between direct colleagues of SFI and GM. In the joint development, both parties had their specific specialties but the complete picture has always remained visible. Because both parties have had positive experiences with the cooperation, and the prognosis concerning the technology and overall market position are good, they have decided to go through with a joint venture.

It is striking that there was no Purchaser responsible for project Sapphire at all. Nobody, including higher Purchasing management from both BG Corundum and BG Amethyst was able to indicate a Purchaser responsible for this project or a contact for project Amethyst might they need something. The project team opinions are diverse about how this is working out. For instance, team member 1...
explained that she knows who to contact for what issues due to her experience. On the other hand, team member 2 indicated that a regular contact is needed and he would like a more structural approach. It must also be noted that most of the required materials are currently arranged or purchased by GM.

Sourcing has been indirectly involved by engineering departments and manufacturing sites that were asked for cost information. Also, previous quotes from Purchasing were used for calculations with regard to the business case. There has been contact with the CPO and the VP of direct spend in order to explore how Purchasing could be of use in the project. Conclusions from this meeting were that Purchasing may not yet be competent enough to provide the necessary expertise.

The NPD team is not unanimous about the added value of Purchasing. Some literally indicate that Purchasing has a lack of competences in innovation and tolling. Team member 1 explains how she knows this: “I have worked with various Purchasers before and therefore I know what they can and cannot do.” Another reason not to involve Purchasing is, according to her: “we do not use the supplier market. Our partner is our supplier, we are backwards integrated.”

The general believe is that only after all technology, equipment and IP aspects have been set, one should think about raw material and suppliers. It is indicated that as soon as the location for the plant become clear, local Purchasing will be involved for activities concerning the plant. These activities are supposed to minimally include buying equipment, making equipment specifications, selecting local suppliers of raw material, checking availability, lead-time, and prices followed by negotiating a contract.

3.6.4 ANALYSIS OF TASKS AT PROJECT LEVEL

Purchasing was hardly involved in the project. The survey results for project Sapphire are shown in appendix 11 and elaborated on below. It must be noted that there were just 2 respondents for the survey.

Discovery

In the discovery phase, the main factors of influence were internal brainstorms. Both new technology scouting and organized idea scouting in the supply base were not of much influence. Also, Purchasing played no specific role in this stage.

Scoping

With regard to suggesting alternative products or technologies, Purchasing has not been involved. All activities concerning products and technologies have been done by research or employees. Interestingly, it is mentioned that Purchasing could be of added value when involved in this task. As explained above, it is intended to include Purchasing as soon as the plant location has been decided on with regard to supplier selection. However, if Purchasing would be included for these tasks in the testing and validation stage most product and process specification will be set already, and it may thus be too late to be of much added value.

One team member has indicated that Purchasing does not have the required capabilities to be involved in arranging for a development partner. Although it has been indicated that Purchasing was indeed not involved in any task related to partner selection, a supplier profile for GM, made in 2008
by Purchasing’s Business Intelligence for project Sapphire has been found. This, together with the survey results, may indicate minor involvement for information purposes after all. Nevertheless, Purchasing had no say with regard to coordination of development tasks and determining the extent or moment of supplier involvement. Until now, Purchasing has not done anything in particular with regard to encouragement of suppliers to make suggestions. It is unclear whether Purchasing will do so in the next stages of the project.

Build Business Case

Project Sapphire made sure to have a solid business case before it approached Gold Mines for a joint development. Despite the fact that the exact business case is unavailable, it has become clear that a very detailed and complete business case has been made. Interviewees have indicated that Purchasing has had no big part in this. However, survey results indicate that Purchasing did play a minor role. The project manager also explains that indirectly, Purchasing was involved through the production sites and engineering departments he contacted with regard to costs estimation for raw material, C-sources and equipment. One team member expresses the need for extra Purchasing involvement: “It would be nice to have a more structural approach, a steady contact or extensive databank... it would help us to get the information needed to make the business case faster.”

Development

Although there has been backwards integration by using a supplier as development partner, no integration of activities between first tier suppliers or first tier suppliers and second tier suppliers have become clear. However, there are plans to involve Purchasing as soon as the location of the new plant has been decided on. Again, what activities this involvement encompasses seems uncertain. It has been explained during the interviews that all coordination activities have been done by project management, manufacturing or research.

Testing and Validation

The project has not entered this stage yet, but will do so any time now. Purchasing has not been involved in configuration management between the supplier and firm and will not be involved for this in the future. Coordinating prototyping of supplier and firm is also not on the agenda for Purchasing. Activities of such nature are reserved for manufacturing and project management.

Launch

This stage is still far away, none of the activities have been discussed during the interviews. However, the survey results give away that there might be minor involvement in formalizing and implementing contingency plans and purchasing plans and coordinating production start-up activities.
3.6.5 **Analysis of Tasks at Strategic Level**

The survey results of the strategic Purchasing tasks under investigation are showed in appendix 12. As there has been no structural contact with Purchasing, activities on a strategic level have not been of much influence at project Sapphire. It has become clear that project management has gathered information themselves in order to make a new list of potential partners; there was no database or list of *pre-selected suppliers with regard to joint development*. The survey respondents are unanimous about the fact that Purchasing is involved when it comes to *exploiting suppliers’ technical capabilities*. This is mostly done in so-called capex-projects which are not related to project Sapphire.

No evaluations or recordings or *suppliers’ development performance* are available neither have arrangement been made to do this in the future, for example for GM. There has not been structural Purchasing effort to *monitor supplier markets for relevant developments or new product and technologies*.

3.6.6 **Analysis of Enabling Factors**

Project Sapphire is huge, encompassing around 40 employees of SFI and GM, of which many people are involved full-time. Figure 3.14 clearly depicts the project organization. The project is managed by a main project team, also called steering committee, evenly filled by SFI and GM employees. The main project consists of several subprojects that come and go. In the early development stages there were just two subprojects, R&D and Business Case, resulting in a small project team. As the project matured, more subprojects were added and therefore the main project team has grown as well. These subprojects are managed by people from the project team. Every subproject has employees from both SFI and GM. The main form of communication is frequent meetings between the subproject leaders (the main project team). The project team is multi-functional as it includes specialists from fields such as research, manufacturing, management, finance etc. However, not all functions are represented in the team. As explained in the previous sections, Purchasing is not included in the project team as well as other functions, for example marketing. Although not part of the main project team many departments have had input; Legal Affairs, IP, Subsidy Affairs etc. Also Purchasing has had minor input for informational purposes.

Project Sapphire has multiple sites, both in the Netherlands and France, where GM is located. In the Netherlands the SFI project’s office and laboratory are located at the site of BG Amethyst, which is around 200 kilometers away from BG Corundum. As a consequence, there is a reasonable geographic distance between the Purchasers of BG Corundum and project Sapphire. There are local Purchasers from BG Amethyst present at the site, but there is no relevant communication with them regarding Sapphire.
An interesting finding is that all team members and project management indicate that they do not know on what basis Purchasing is specialized nor to what degree they are specialized. Despite this, a strong opinion has been formed by some. For example, team member 1 said: “Purchasing needs more competences to be of added value in innovation” and “I have worked with various Purchasers before and therefore I know what they can and cannot do”.

In fact, just Purchasers at BG Corundum are not specialized in just one area as the projects at this BG differ a lot. BG Corundum differs from other BG’s; innovation regards new areas of expertise and is always radical. Purchasing is much more specialized in finding even more inventive solutions, is flexible above all and has a general technical understanding. Existing knowledge at the corporate Purchasing Categories does not cover all issues a Purchaser encounters BG Corundum. Purchasers at BG Amethyst do have experience in the field of biotechnology.

3.6.7 **Organizational Structure Purchasing Involvement**

The Sapphire project team has not used significant Purchasing support at all. However, there was minor Purchasing involvement for informational purposes. Figure 3.15 depicts the structure of Purchasing involvement in this project. The existing Purchaser involvement configurations of Lakemond et al. (2001) do not include this kind of insignificant involvement. Therefore, the model has been adapted to fit the structure at project Sapphire. The technology for Sapphire is very novel, the project duration is long (7 years) and the degree of innovation is radical. Also, project Sapphire has an enormous budget - they spend more than 5 million euro per year – and around 40 people are working on the project of which many full-time. Project Sapphire thus has a high project complexity and a large project size.

3.6.8 **Conclusions**

The joint development activities with supplier Gold Mines in Project Sapphire have resulted in a successful and continuing cooperation. As the project is still running, there is no hard data on the total performance of the project. Intermediate results show that project plans are well on track as scheduled, apart from a minor delay caused by a technical issue. Purchasing involvement has been minimal and insignificant with regard to supplier involvement. Until now, it seems that not involving Purchasing did not negatively influence on the project as planned with regard to time to market and spend. However, some interviewees feel that Purchasing might have had a positive impact on the time to market with regard to getting relevant information faster.

The rationale not to include Purchasing in the project seems to be based on previous experiences and a ‘do it ourselves’ mentality from the engineering viewpoint. After product features, plant details and other technical aspects are decided on and set, Purchasing will be involved for classic Purchasing
activities. This means that Purchasing involvement is starts very late. Therefore it is likely that any potential added value of Purchasing with regards to supplier involvement will not be fully experienced by the team members. Unproven or absent capabilities with regard to adding value to NPD projects is indeed another motive not to include Purchasing. Last, but certainly not least, it is indicated that it is not clear to everyone involved what Purchasing can do and who to contact for structural Purchasing help.

Also with regard to Purchasing tasks on a strategic level, but few involvement has been found. Only *exploitation of suppliers’ technical capabilities* has been identified as a strategic endeavour by Purchasers. No significant conclusions can be drawn with regard to a balance between Purchasing tasks on project level and those on a strategic level. Purchasing has not approached project Sapphire pro-actively.

Project Sapphire has an autonomous project team, with a clear structure. In the main project team, SFI and the supplier partner are equally represented. Although the team was part multifunctional, not all disciplines have been involved. Formal procedures were followed and detailed information has been recorded and shared using web based applications. The structure of Purchasing involvement has been insignificant, indirect and ad hoc. Considering the fact that project Sapphire has a high project complexity and a large project size, Lakemond et al. (2001) would recommend using part-time or full-time integrated Purchasers in combination with a Purchasing coordinator.

Enabling factors are low when it comes to the degree and principle of specialization. Project Sapphire also scores low on team-composition and co-location. The team structure seems fit for the kind of project and thus results in a high score on this factor. In general, conditions for Purchasing involvement are poor. Table 3.5 summarizes these findings.

**Table 3.5: Summary findings Project Sapphire**

<table>
<thead>
<tr>
<th>Project</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purchasing involvement</strong></td>
<td>No.</td>
</tr>
<tr>
<td><strong>Supplier involvement</strong></td>
<td>Yes, co-development with a following joint venture.</td>
</tr>
<tr>
<td><strong>Project tasks</strong></td>
<td>None.</td>
</tr>
<tr>
<td><strong>Strategic tasks</strong></td>
<td>Small amount of tasks.</td>
</tr>
<tr>
<td><strong>Purchasing mentioned in formal procedures</strong></td>
<td>Hardly.</td>
</tr>
<tr>
<td><strong>Use of formal procedures</strong></td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Pro-activeness</strong></td>
<td>No.</td>
</tr>
<tr>
<td><strong>Timing of involvement</strong></td>
<td>Not yet. Very late.</td>
</tr>
<tr>
<td><strong>Degree of specialization</strong></td>
<td>Generalist, innovative solutions. Short of people.</td>
</tr>
<tr>
<td><strong>Principle of specialization</strong></td>
<td>Corporate technology category support available, but often not applicable. No specialization, flexibility instead.</td>
</tr>
<tr>
<td><strong>Team structure</strong></td>
<td>Autonomous, very structured. Use of subprojects.</td>
</tr>
<tr>
<td><strong>Team composition</strong></td>
<td>Partly multifunctional, excluding Purchasing.</td>
</tr>
<tr>
<td><strong>Co-location</strong></td>
<td>No; considerable geographic distance.</td>
</tr>
<tr>
<td><strong>Attitude of team members</strong></td>
<td>Negative.</td>
</tr>
<tr>
<td><strong>Performance/ goals</strong></td>
<td>?</td>
</tr>
<tr>
<td><strong>Project costs</strong></td>
<td>No deviations.</td>
</tr>
<tr>
<td><strong>Time to market</strong></td>
<td>No deviations.</td>
</tr>
</tbody>
</table>
3.7 CASE STUDY PROJECT DIAMOND — BUSINESS GROUP CARBON ALLOTROPES

3.7.1 INTRODUCTION TO THE CASE STUDY

Project Diamond is all about using the Diamond® fiber in applications for the renewable energy market. In this project, the renewable energy market is systematically assessed for opportunities to apply Diamond®. When an opportunity is found, a new application has to be developed to exactly match its new use. Project Diamond is an umbrella project, consisting of several subprojects corresponding with the opportunities found. Main areas of interest are wind, wave, tidal and biomass energy, but also transport and storage of energy. The current subprojects are Diamond Kite and Tidal Diamond but this list may be extended soon.

Diamond Kite has been started in response to opportunities in wind energy. The objective is to develop a towing rope construction and kite lines (using Diamond®) for marine propulsion. The propulsion system consists of a big kite that flies in front of the bow, pulling the boat and therefore reducing its fuel consumption. SFI develops this in cooperation with a customer that is designing such an application and another company that produces ropes. Subproject Tidal Diamond is for power generation by using tidal and wave movement. The Tidal Diamond subproject also uses ropes based on Diamond® and involves three other customers for joint development. Both projects require that the ropes for these kinds of power generation and propulsion have high tensile strength, low weight, low stretch properties, high abrasion resistance, and high weather resistance. Having a reliable fiber supplier for future demand is also important for the participating companies. Diamond® and SFI perfectly fit this description and therefore the value proposition is perfect. It is forecasted that there will be a strong demand for new energy systems in the next decennia. Among the potential customers of the Diamond Kite or Tidal Diamond are also suppliers of SFI.

Purchasing employees have indicated that Purchasing has not been involved in the new product development process. In this within case study, it is investigated to what extent Purchasing has been involved and how the process was managed. The supplier role will be looked at as well. It is also investigated to what extent organizational enabling factors are in favor of Purchasing involvement in the new product development project.

3.7.2 PROCESS

BG Carbon Allotropes applies a ‘light’ version of the companies’ formal stage-gate procedure, the Project Management Process. Project Diamond has the same approach. This means that information such as general information, subprojects and project briefs is recorded in Project Plaza, the general web based application for SFI’s Project Management Process. Some parts of Project Plaza are not used, for example the project’s progress. Other documents and emails are used to communicate and record relevant information with respect to the project and transitions from one development stage to another. BG Carbon Allotropes has made its own checklist for each stage, consisting of general topics that require to be covered. Employees are approached for involvement on an ad hoc basis, if deemed necessary.

Figure 3.16 summarizes the new product development process so far.
Figure 3.16: Process project Diamond.

Project Diamond has started in 2008. The project was minuscule, consisting mostly of a project manager with a vision, who was trying to get other people interested.

In the following phase, a project planning for Diamond Kite was set up, also containing details about value chains, customer needs, product profile, customer value and product positioning.

In 2009, the business feasibility of the entire project was assessed and elaborated on. In this stage Diamond Kite and its partners started testing the materials to get a proof of concept and define further development requirements. Commercialization plans and development plans were agreed on.

In January 2010, the Development stage commenced. For Diamond Kite, the Diamond® fiber grade, the coating and electrical systems were aligned on for the systems and kite lines. Testing and development continued, end of lifetime criteria were defined and patent opportunities were dealt with as well. Tidal Diamond feasibility was commenced by discussing the design and material specifications with the partners. A project plan and joint development agreement was set up between Tidal Diamond and its partners. The right rope materials for the rope manufacturing were chosen. Prototypes have been manufactured and tested. More information in financial, legal, strategic, commercial and technological aspects was gathered.

Currently, Project Diamond is in the Development stage. This means that nothing is known about the project success. Until now, everything goes according to project plan. Not including Purchasing did not lead to short term delays or extra costs so far.

3.7.3 Purchasing and Supplier Involvement

As said before, Purchasing was not involved in this project and the supplier base has not been used in the NPD project so far. The Purchaser expresses concerns that due to not involving Purchasing, issues will arise in a later stage. Examples of such issues are; the partner cannot cope with lean volumes, the partner has no capacity expansion possibility, there is no alternative supplier available, etc.

However, what is notable in this project is that there have been meetings with the responsible BG Purchaser to see how Purchasing can help to use the supplier base for sales purposes. The SFI supplier base also contains potential customers of the products Diamond Kite and Tidal Kite. One of multiple examples is that SFI is a big customer of shipping companies. If SFI only uses shipping companies with a very small carbon footprint, this stimulates companies to reduce their footprint. As most ships are very expensive, it is less likely that shipping companies will buy new ships these days.
and more likely that they will use Diamond Kite. If SFI plays it smart and communicates openly, it can stimulate its suppliers to buy Diamond Kite and create momentum for this new product. In general, Purchasing at BG Carbon Allotropes is more and more pro-actively looking for opportunities with regard to sustainability instead of being reactive.

Surprisingly, the Purchaser explains that he does not know anything about project Diamond. The Purchaser: “It is a general weakness in BG Carbon Allotropes that people are informed about projects, projects’ content and project teams on a need to know basis. As a result, people have no insights at all in projects in which they are not involved themselves. This makes it hard to be pro-active.” The project manager and team member on their turn do not know what Purchasing does besides buying stuff and negotiating conditions.

The project manager and team member have no knowledge about how Purchasing could be involved in an NPD project and what their added value could be since nothing is being bought yet. Also contributing to their opinion is the fact that SFI produces Diamond® themselves and thus has no direct suppliers. Nevertheless, they have indicated that they are very willing to learn more about this.

There are no difficulties with regard to finding the right resources at BG Carbon Allotrope, but it is troublesome to get them to work on your project on the required moment. This is due to the fact that all resources are already planned in existing projects and programs. With regard to Purchasing, there is a shortage of people. The Purchaser explains that there are some vacancies that are very hard to fill, especially because they need Purchasers with a chemical or technical background.

3.7.4 **Analysis of Tasks at Project Level**

As explained in the introduction, it was indicated that Purchasing has not been involved in the project. The project manager, a project team member and the responsible Purchaser were asked about possible presence of Purchasing tasks in the Diamond NPD projects. Appendix 11 shows the survey results with regard to these activities. They are described and elaborated on below.

**Discovery**

The main point in this stage was that someone structurally put effort in finding opportunities for using Diamond®. Both *new technology scouting* and *organized idea scouting in the supply base* are important in this stage and also in the next stage. However, the project manager has mostly done this himself with help of marketing and business intelligence departments; Purchasing played no role in this.

**Scoping**

Purchasing has not been involved in any product or technology related issue; this is seen as being an engineering task. This also goes for *suggesting alternative products or technologies*. There are quite some partners involved. *Partner selection* was done by the project manager, Purchasing was not included in the decision process. This also goes for the following tasks; *coordination of development tasks, determining the extent of supplier involvement and determining the moment of supplier involvement*. As suppliers have not really been used in project Diamond, there has been no *encouragement of suppliers to make suggestions*.

**Build Business Case**
A detailed business case for project Diamond has been made but is has not been made available for this research. It is known that the business case consists of a deep financial analysis and forecast from the beginning of the project until 10 years after launch. This financial analysis makes use of costs and revenue information and forecasts and contextual information. The project manager has made the business case himself, using some help of experts, such as material experts and financial specialists. There has been no contact with Purchasing with regard to building the business case.

Development

No suppliers have been involved at this stage of the project. It must be observed that SFI supplies the raw material, Diamond®, itself. Therefore, there have been no efforts by anyone to integrate activities between first tier suppliers or first tier suppliers and second tier suppliers. No coordination activities between the supplier partner and SFI were needed.

Testing and Validation

The project has not entered this stage yet. The respondents indicated that configuration management between the supplier and firm is not a Purchasing task in this project. With regard to coordinating prototyping of supplier and firm, Purchasing might have a minor role from a planning point of view.

Launch

This stage is not yet applicable to project Diamond. Survey results give away that in this future stage Purchasing may be involved for formalizing and implementing contingency plans and purchasing plans and coordinating production start-up activities.

3.7.5 Analysis of Tasks at Strategic Level

Appendix 12 summarizes the survey results with regard to the strategic level Purchasing tasks. At a strategic level, there is a strong indication that structural efforts are put in exploiting suppliers’ technical capabilities and monitoring supplier markets for technical developments by Purchasing. It is not clear how results of these tasks are used in NPD projects. In project Diamond, they have not been used at all. With regard to pre-selection of suppliers for joint development, evaluation of suppliers’ development performance or providing information about new product and technologies, no Purchasing involvement has been found. It is also questionable if these tasks are executed at all.

3.7.6 Organizational Structure Purchasing Involvement

Project Diamond is rather small, consisting of around 6 people, depending on who is required at a particular moment. Next to this, there is a fixed team continuously working on the new product development. Team members are involved on a part-time basis. How the NPD team is organized, is the depicted in figure 3.17. Officially the team is steered by a budget owner, the Diamond® supplier (within SFI) and the product user (also a partner). The project manager and development team members manage the subprojects of project Diamond. These subprojects also have subproject team members contributing to the product development process on a part-time basis. The project does not function autonomous but is heavily steered by the project manager. Partners are an equal project team member in the subprojects. As can be seen in figure 3.17, the project team is multi functional. As people are involved based on the need of the moment, not all functions are represented in the team.
At BG Carbon Allotropes, Purchasing and project management and some team members are co-located. Some departments, such as Research, are located at sites close by. Partners are located elsewhere.

Both the project manager and the team members have indicated that they have little knowledge about Purchasing’s expertises or capabilities. The Purchaser explains that at BG Carbon Allotropes: “It is entirely dependent on the persons involved and their experiences.” At BG Carbon Allotropes there are just a few Purchasers available, mostly generalists without a technical background. Because of the lack of technical background, it is sometimes not understood what an engineer is looking for exactly. As a result, research is sometimes more capable of finding a supplier than Purchasing is. Understaffing and a recent reorganization of the purchasing department may play a part in this as well. Sourcing is supported by Category Management, based on technology categories. But it is very hard to get help suitable for innovation projects. The Purchaser: “We do not need more Business Intelligence employees at Direct Sourcing. We need a bigger workforce that is specialized in and available for innovation projects.”

3.7.7 ORGANIZATIONAL STRUCTURE PURCHASING INVOLVEMENT

At project Diamond, Purchasing was not involved in any significant way. However, there has been a meeting to see how Purchasing can be of use in sales. Figure 3.18 shows the structure of Purchasing involvement in project Diamond. The model has been adapted to fit the Purchasing involvement structure at project Diamond. Purchasing involvement is insignificant, indirect and on an ad hoc basis. Project Diamond uses existing materials with novel systems. The degree of innovation is incremental for SFI. Project Diamond is planned to take up a total of 7 years, which is labeled by the project manager as ‘long-term’. At this stage, the project’s budget is small; €200,000 per year. There are 6 employees working on the project now, which is still not much in comparison to other project that sometimes have more than 10 employees involved.
Considering these facts, project Diamond’s project complexity is labeled low, whereas the project size is small.

3.7.8 CONCLUSIONS

Project Diamond consists of several subprojects and involves multiple partners. The project has not finished yet and therefore the project performance is still unknown. Purchasing was not significantly involved in this project yet, but might be involved in a very late stage. As project plans are on track, not involving Purchasing does not show any negative effects yet. Project management and team members indicate to be curious about the possible added value of Purchasing; currently they do not know. Purchasing on their turn does not know which projects exist at the BG unless they are involved already. It is not surprising that Purchasing has not approached project Diamond for involvement in NPD pro-actively. Next to this, it is indicated by Purchasing that there is a need for more technical knowledge in their workforce.

On a strategic level, Purchasing puts effort in exploiting suppliers’ technical capabilities and monitoring supplier markets for technical developments. However, results of these tasks are not used in project Diamond, which points to a slight unbalanced distribution between Purchasing tasks on project level and on strategic level.

The NPD project team is pulled by one person, and is thus not autonomous. The project organization is somewhat complex as many stakeholders, internal and external, are involved. Most team members are involved on a part-time basis. The team is multi-functional but does not encompass all functions.

The formal PMP as prescribed by the business group is followed, which does not mention Purchasing in any way. Information is recorded and shared partly by using a web based application and for the other part by sending documents per email. The Purchasing involvement structure is insignificant indirect Purchasing involvement on an ad hoc basis. As the project complexity and the project size are both low, Lakemond et al. (2001) would recommend indirect Purchaser involvement on an ad hoc basis.

Project Diamond scores low on enabling factors with regard to the degree of specialization, the principle of specialization, the team structure and team composition. The enabling factor co-location was present. As a result, enabling conditions for Purchasing involvement are bad. Table 3.6 summarizes these findings.
### Table 3.6: Summary findings Project Diamond

<table>
<thead>
<tr>
<th>Project</th>
<th>Diamond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing involvement</td>
<td>No.</td>
</tr>
<tr>
<td>Supplier involvement</td>
<td>No.</td>
</tr>
<tr>
<td>Project tasks</td>
<td>Small number of tasks.</td>
</tr>
<tr>
<td>Strategic tasks</td>
<td>Mediocre amount of tasks.</td>
</tr>
<tr>
<td>Purchasing mentioned in formal procedures</td>
<td>No.</td>
</tr>
<tr>
<td>Use of formal procedures</td>
<td>Yes.</td>
</tr>
<tr>
<td>Pro-activeness</td>
<td>No.</td>
</tr>
<tr>
<td>Timing of involvement</td>
<td>Not yet. Very late, if at all.</td>
</tr>
<tr>
<td>Degree of specialization</td>
<td>Generalist. Short of people.</td>
</tr>
<tr>
<td>Principle of specialization</td>
<td>Corporate technology category support available, but often not of help.</td>
</tr>
<tr>
<td>Team structure</td>
<td>Not autonomous, complex. Use of subprojects.</td>
</tr>
<tr>
<td>Team composition</td>
<td>Partly multifunctional, excluding Purchasing.</td>
</tr>
<tr>
<td>Co-location</td>
<td>Yes.</td>
</tr>
<tr>
<td>Attitude of team members</td>
<td>‘Do-it-ourselves’ attitude</td>
</tr>
<tr>
<td>Performance/ goals</td>
<td>?</td>
</tr>
<tr>
<td>Project costs</td>
<td>No deviations.</td>
</tr>
<tr>
<td>Time to market</td>
<td>No deviations.</td>
</tr>
</tbody>
</table>

### 3.8 Cross-case analysis

In this sub section, the individual case studies of the NPD projects will be compared. In order to make a cross case comparison, the findings of the individual case studies have been summarized using the format as presented in Table 2.4 and put together in one overview (Table 3.7 or appendix 13). In this overview, the projects are given a color score per characteristic for the sake of a clear overview. The scores have been determined by comparing the individual case study findings with the literature described in chapter 2. Green is associated with a good score. If project scores are negative on a certain characteristic, this is indicated with red. The color yellow means that the project does not score good or bad in particular, and thus has a neutral score.

Next to this, also the presence of the Purchasing tasks mentioned in Table 2.1 and 2.2 and in Research Model 1 (figure 2.9 or appendix 15) is summarized in such an overview. Table 3.8 shows this overview. The colors green, red and yellow have been used as well to indicate the presence of a task. Green indicates that Purchasing was involved for a certain task in the NPD project. Red indicates that Purchasing was not involved. In some cases the color yellow has been used to indicate that Purchasing was involved, but only to a small extent or for a part of the task.

Both overviews are used to compare the cases in order to recognize similarities, differences and relations. Next to this, other interesting findings from the individual case studies have been assessed for patterns and interesting facts. The topics that were addressed in the case study outline (section 2.4.4) are addressed here as well. The analysis starts with some general findings concerning the effects of purchasing involvement. After this, the cases are compared in detail using the case study outline as a framework; Purchasing tasks in NPD are assessed, enabling factors are analyzed and Purchasing involvement structures are compared.
Table 3.7: Summary findings of all individual case studies.

<table>
<thead>
<tr>
<th>Project</th>
<th>Emerald</th>
<th>Red Beryl</th>
<th>Opal</th>
<th>Ruby</th>
<th>Sapphire</th>
<th>Diamond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplier involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchasing mentioned in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>formal procedures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of formal procedures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing of involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pro-activeness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of specialization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principle of specialization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team composition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude of team members</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Performance/ goals          |         |           |      |      |          |         |
Project costs                |         |           |      |      |          |         |
Time to market               |         |           |      |      |          |         |

Figure 3.19: Causal model

Both the effects of Purchasing involvement, the enabling factors and relations that have emerged are represented in figure 3.19. The most important finding is that at SFI, Purchasing involvement in NPD resulted in lower product costs and reduced project risk but proved to have no effect on project costs or development time. Three factors demonstrated a positive relation with Purchasing involvement; the right people, the right structure and the need for risk mitigation. The structure for Purchasing seems to be influenced by formal NPD procedures & processes, having long-term strategic tasks, the presence of the enabling factors and two-way information sharing. The remaining part of this section explains the findings leading to this model in further detail.
<table>
<thead>
<tr>
<th>Development Phase</th>
<th>Purchasing activity</th>
<th>Emerald</th>
<th>Red Beryl</th>
<th>Opal</th>
<th>Ruby</th>
<th>Sapphire</th>
<th>Diamond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovery</td>
<td>New technology/ component scouting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scoping</td>
<td>Suggest alternative suppliers, products or technologies resulting in a better product design and description (plus avoiding supplier lock-in and cost savings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier selection for involvement in development project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Determining extent of supplier involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Determining moment of supplier involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Build Business Case</td>
<td>Integrating activities between first tier suppliers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Integrating activities between first tier suppliers and second tier suppliers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testing &amp; Validation</td>
<td>Configuration management supplier &amp; manufacturer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coordinating prototyping supplier &amp; firm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Launch</td>
<td>Coordinating production start-up activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic Purchasing activities</td>
<td>Pre-selecting suppliers for product development collaboration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exploiting the technical capabilities of suppliers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluating suppliers’ development performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring supplier markets for technical developments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Providing information on new products and technologies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.8.1 Effects of Purchasing Involvement

Purchasing involvement

There was no data available with regard to the long term effects of involving or not involving Purchasing in new product development project at SF1. However, several conclusions can be drawn with regard to short term effects of Purchasing involvement. Involving Purchasing is mentioned to have a positive effect on the new product's margin in several projects. Involving Purchasing has not negatively nor positively affected the time-to-market of the products or the project costs. The same goes for not involving Purchasing. It must be noted that interviewees in project Ruby remarked that that if Purchasing would have been involved sooner the time-to-market could have been faster.

Early Purchasing involvement

As implied above, the timing of Purchasing involvement matters. Late Purchasing involvement can be associated with problems in the projects. In project Red Beryl, the late involvement of Purchasing lead to an exorbitant product price and a lock-in position with regard to supply. Late involvement of a corporate strategic sourcing expert in project Emerald resulted in information sharing issues and a delay of the strategic sourcing report for sebacic acid. It is explained that because of this delay, the added value of the strategically important report for the project was reduced. Also, project Emerald has had small setbacks related to misjudged material costs and market demand. Interviewees in project Ruby report that due to late involvement of Purchasing, opportunities have been missed with regard to using existing knowledge about the preservation market and tasks around partner selection.

It is striking that interviewees of projects in which Purchasing was involved late, indicated to have learned from this; in the next project they will make sure to involve Purchasing more early.

To understand what the positive effects are of early Purchasing involvement, it is best to compare project Opal and project Red Beryl more in detail. In both projects, there was one critical raw material accompanied by a complex supply situation. Purchasing was also involved in both projects, but in project Opal Purchasing was involved early, whereas in project Red Beryl there was late Purchasing involvement. In project Opal, there was a well arranged supply position without any issues with regard to supply. In project Red Beryl, some severe problems came to surface concerning raw material costs and a lock-in position, threatening the market position of the product.

It must be remarked that four of the six projects under investigation were still in the development stage at the time of writing. Possible issues may become clear later in the project.

Altogether, it can be concluded that by involving Purchasing early in the process, problems with regard to supply and raw material costs are avoided. Also, by early Purchasing involvement it is ensured that all information is complete and correct from the start of the project.

Next to this, interviewees in the projects with Purchasing involvement indicated that Purchasing has valuable input in the new product development team. Purchasing has a unique perspective on NPD projects. In some projects it is explained that Purchasing involvement is “critical”.

Supplier involvement

Based on the data, it cannot be proved or disproved that Purchasing involvement leads to supplier involvement or to better supplier involvement. The only project in which Purchasing has been involved early, did not choose to co-develop with the supplier. All projects in which Purchasing was involved
late, partly involved the supplier in development and testing activities. Of the projects that did not involve Purchasing, one had a full co-development agreement with an SFI supplier. The other project did not have any kind of supplier involvement. It must be noted that the decision whether or not to include a supplier as a co-development partner depends on many factors. Having Purchasing in the project team probably does not influence the assessment of the decision criteria with regard to involving an external partner. The case study results imply that other factors are of influence in the decision whether or not to include a supplier in the NPD project. Project Opal for instance was the result of a previous unsuccessful cooperation with an external partner continued internally at SFI. In project Sapphire it was already know in advance that a partnership was required in order to develop the product.

Project Sapphire was the only project that actually has signed a co-development agreement with a supplier. Purchasing has had no significant input in any tasks. Nevertheless, the cooperation with the supplier went very well. Both parties are very positive and continue their cooperation in a Joint Venture. Other persons or departments thus also have the capabilities to facilitate supplier involvement.

3.8.2 NPD processes

Formal procedures

Remarkably, the one project that involved Purchasing from the start of the project was also the only project which used formal procedures that directly included Purchasing as a function with its own set of specific tasks. At BG Mineraloids, Purchasing has to be consulted before each stage transfer. It is also mentioned that including Purchasing in the project team from the very start of the project is natural at BG Mineraloids as the procedures prescribe this. In the NPD projects from other BG’s this was not the case. Thus, having Purchasing explicitly mentioned in the formal procedures of the BG is of influence on having Purchasing involved from the beginning of the NPD project.

Balance between tasks on different management levels

This project, project Opal, is also the only project in which there was an excellent balance between Purchasing tasks concerning supplier involvement at project level and at strategic level. On both levels, Purchasing is involved for many tasks. It is likely that this is also linked to Purchasing being mentioned in the formal procedures and the positive general BG attitude concerning Purchasing involvement in NPD projects. It seems that at BG Mineraloids’ Purchasing tasks for NPD projects are much more structured and planned for.

There appears to be a link between having Purchasing involved in strategic tasks, and having Purchasing involved for tasks at NPD project level. Interviewees of projects that did not involve Purchasing in the new product development process for tasks related to supplier involvement indicated that Purchasing was also not involved for related strategic level tasks. However, if two projects of the same BG are compared with regard to strategic level Purchasing tasks, there are some differences. This is surprising, as it is logical that at one BG, the same strategic tasks are performed and applicable to all NPD projects in that BG. This implies that there might be an alternative reason why interviewees of the projects in question indicated less Purchasing tasks at strategic level.

First, project Ruby and project Sapphire at BG Corundum are compared. At project Ruby, all strategic Purchasing tasks have been noticed in greater or lesser extents. Interviewees at project Sapphire only observed one the five tasks under investigation. Purchasing was involved in project Ruby but not in
project Sapphire. Second, project Emerald and project Red Beryl are both from BG Beryl. Interviewees at project Emerald found all strategic Purchasing tasks to be executed. At project Red Beryl, only three out of five strategic Purchasing tasks have been noticed. At project Emerald, Purchasing was involved in the build business case stage, while in project Red Beryl Purchasing was involved late; after all development activities were done by Research and Technology.

During the case studies it has became clear that there was a learning process for the project manager and owner of project Ruby. As the project went along, they learned how Purchasing can be of added value and play a part in NPD projects. Their attitude towards Purchasing grew to be positive. In project Sapphire, opinions about Purchasing were different. It is mentioned that Purchasing has a lack of competences with regard of innovation and tolling. Also, it was unclear to the project members what the added value of Purchasing could be for NPD projects. When project Emerald and project Red Beryl are compared in the same way, a relation becomes clear. In project Emerald, team members had a positive opinion with regard to Purchasing. It is said that Purchasing has a good input in the NPD project and it is even mentioned that Purchasing should play a bigger and more strategic role. At project Red Beryl, Research and Technology played the most important role in the project, together with Marketing. A ‘do-it-ourselves’ attitude can be recognized in the way how the team members had contacts with suppliers without Purchasing. Next to this, they did not pay much attention to the supply side of the new product in general.

In projects of a certain BG where positive attitudes towards Purchasing involvement prevail, more strategic tasks with regard to Purchasing are recognized. In projects of the same BG where attitudes towards Purchasing involvement are not so positive, less strategic Purchasing tasks are recognized. This indicates that interviewees have a bias with regard to seeing Purchasing tasks based on attitudes and opinions.

**Team attitude**

Now this has become clear, it must also be remarked that attitudes and opinions about Purchasing play a larger role concerning Purchasing involvement. If all projects are taken into account again, it can be observed that in the projects where there was a positive attitude towards Purchasing already from the beginning of the project, Purchasing was involved from the very start of the project or in the build business case stage. Projects where team members did not have a positive opinion about Purchasing already from the beginning of the project or where a ‘do-it-ourselves’ mentality prevailed, involved Purchasing late or not at all. It can be concluded that positive opinions and attitudes with regard to Purchasing positively related to Purchasing involvement in the projects under investigation.

**Use of formal procedures**

The exact use of SFI’s formal Project Management Process (PMP) does not seem to be of influence on Purchasing involvement. Both projects that scored bad on the use of PMP did involve Purchasing late. However, when taking all projects into account, no general pattern becomes clear. From the interviews, it came forward that the project managers decide to what extent the PMP is used and who is involved in the project.

The projects that did not use the PMP, did not distinguish between new product development stages so much. Both project managers felt that their projects were not fit to have too much formal procedures and documents. Also in other projects, adapted ‘light’ versions of the PMP were used. In general, checklists are considered relevant. Some BG’s adapted the general PMP to meet their
specific needs. The PMP management tool, Project Plaza, is not used extensively and it is suggested to be improved. Most project teams used other documents, which were shared during meetings and via email.

**Pro-activeness**

*In every project with Purchasing involvement, Purchasing was approached for involvement.* Purchasing was thus not involved as a result of their pro-activeness. It is not clear whether the re-activeness of Purchasing has a negative or a positive impact or no impact at all.

### 3.8.3 Tasks on project and strategic level for Purchasing in NPD

This subsection elaborates on the actual Purchasing tasks found. Table 3.8 (see also appendix 15) shows an overview of all Purchasing tasks found in the case studies. Figure 3.20 depicts these tasks by modifying the research model as presented in chapter 2. The grey tasks have not been found at SFI.

![Diagram](image.png)

**Figure 3.20: Purchasing tasks for NPD with regard to supplier involvement**

**Project level tasks**

The only project that involved Purchasing from the start was also the only project that had Purchasing involved in the discovery stage already. Purchasing was involved in *organized idea scouting in the supply base*.

*Most Purchasing tasks were found in the scoping and build business case stages.* In the scoping stage, all tasks for Purchasing have been found; suggesting alternative suppliers, products or technologies, supplier selection for involvement in development project, determining the extent of supplier involvement, determining the moment of supplier involvement and encouraging suppliers to make suggestions. This is surprising, as only one project had Purchasing already included in the project
team in this stage. The most logical explanation is that Purchasing performs these tasks in a later stage. It is known that at project Red Beryl, Purchasing has suggested alternative suppliers, products or technologies in the development stage.

Purchasing also plays a role in building the business case stage in every project in which Purchasing is involved. The nature of these tasks is divers; making a strategic sourcing strategy, cost calculating, making a contingency plan, co-decide with regard to make or buy questions, giving advice on the business model, general consulting because of their multiple angle view and consulting about financial and supply chain issues. In project Emerald, Purchasing was a full team member and thus involved in everything that took place around building the business case.

In the development stage, none of the Purchasing tasks that were identified to be executed in that particular stage were actually done. This is not surprising when taking the previous paragraphs into account. If Purchasing is involved late in the process, the Purchaser(s) must choose which tasks to do in the remaining time. If they do the tasks concerning scoping and business case building tasks in the development stage, there is not much room left to also do things such as integrating first and second tier suppliers and coordinating development activities between supplier and the firm. It must be remarked that it is interesting to learn that Purchasers that are involved late in the process, choose to do Purchasing tasks that should have been done early in the process already. These tasks are probably tasks that are considered to be most important or having most priority.

For the next two stages, testing and validation and launch, there is not much data as four out of the six projects did not reach these stages yet. The task formalization and implementation of contingency and purchasing plans was already done in the build business case or development stage in three projects. This task may also belong to the set of important Purchasing tasks mentioned above.

The Purchasing tasks under investigation are not bound to one specific development stage. Next to this, some projects that included Purchasing, do not use the Stage-Gate approach at all.

**Strategic level tasks**

The presence of strategic tasks for Purchasing differs, depending on the Business Group. As explained above, there is probably a bias with regard to perceived existence of Purchasing tasks. Therefore, conclusions can only be drawn with caution. The strategic task exploiting the technical capabilities of suppliers has been found in every project. It is known that at BG Beryl, supplier markets are monitored together with Technology employees. Pre-selection of suppliers for co-development has been identified for all projects that involved Purchasing. However, none of the interviewees mentioned the exact content of this task or was able to explain this task in more detail. Another task found by all projects that involved Purchasing is evaluating the suppliers’ development performance. It has been explained that at BG Mineraloids, Purchasing evaluates big or important suppliers every year, and includes development performance in this evaluation. This evaluation is shared with the suppliers and put in a database. Purchasing is also involved in the NPD process evaluation for the BG. Four of the six projects indicated that supplier markets are monitored for technical developments and two projects found that Purchasing provides information on new products and technologies. At BG Carbon Allotropes it is known that Purchasing is active in monitoring supplier markets for developments with regard to sustainability. No more details are known.
It can be concluded that strategic Purchasing tasks directly related to suppliers are not structurally done at SFI. *It differs per BG what tasks are done and not everyone is aware of what exactly Purchasing does at a strategic level.*

### 3.8.4 ORGANIZATIONAL ENABLING FACTORS

If all enabling factors are taken into account, two projects catch the eye. This also goes for the organizational enabling factors only. The two projects that involved Purchasing earliest, project Opal and project Emerald, have the best score with regard to enabling factors. Both score well on four of the six enabling factors under investigation and have a neutral score on the other two factors. Those projects are also the only two projects of which the team members were positive about Purchasing involvement. The enabling factors definitely seem to influence whether Purchasing is involved in the NPD project early. However, this may be an indirect relation. Attitudes/opinion could be a mediator or presence of the enabling factors might moderate the relation between attitudes/ opinions and the timing of Purchasing involvement. Anyway, the presence of the enabling factors positively influences Purchasing involvement.

#### Purchasing department

The degree of specialization appears to be of influence on the timing of Purchasing involvement. In project Opal, Purchasing is very specialized in chemistry and technology, next to being knowledgeable concerning Purchasing. In project Emerald, Purchasing has mixed expertise; some have technical experience whereas others have a more economic background. The other projects had Purchasers with a more general background and no specific technical expertise. This may imply that a technical background helps a Purchaser to become involved in an NPD project.

No project scored well with regard to principle of specialization. Not a single case of congruence was found. It is not clear whether the non-congruence or misalignment issues have a positive or negative impact on Purchasing involvement or no impact at all.

#### NPD team

*No pattern is recognized with regard to the team structure.* There are many differences between projects. It is logical that different projects with different complexity, sizes and contexts require different team structures. There is no one optimal team structure for all projects with regard to Purchasing involvement.

The same conclusion can be drawn with regard to the team composition. Both project Emerald and project Opal had Purchasing included as a full team member earlier than any other project. However, the timing obviously is relevant as well. Including Purchasing in the project team in the very last stage obviously is not similar to having Purchasing in the project team from the start of the project.

All interviewees agree that co-location and face-to-face contact of team members is preferable or even critical. However, it does not seem to be directly related to Purchasing involvement. It must be noted though, that at the only project for which there was no co-location at all, the most negative opinions about Purchasing were found.

### 3.8.5 OTHER CASE STUDY FINDINGS

Next to the conclusions drawn above, several other findings have come to surface. This subsection will describe these findings.
Information sharing

Information sharing and availability seems to be an issue in several cases. In project Sapphire and project Diamond, team members indicated that they did not know the full spectrum of Purchasing tasks. Also the possible added value of Purchasing for NPD was not recognized or known to them. In both cases, Purchasing was not aware of the contents and contexts of the NPD project. In BG Carbon Allotropes, no information about what innovation projects are started or running is shared with the BG Purchasing community. In BG Corundum, no BG Purchaser had contact with team members or knew what the project was about. Project Sapphire was located far from the official Corundum site, and was a ‘forgotten’ project from the Purchasing side. No Purchasing contact was appointed for this project. This information very much gives the idea that functional silos are still an issue at SFI. Functional silos are a barrier with regard to Purchasing involvement.

Collecting the information during the case studies was sometimes very hard. Not all projects were open and willing to share information with SFI colleagues. This also testifies of a closed attitude towards sharing of information.

Manpower

All cases in which Purchasing was not involved from the start of the project had problems with regard to human resource availability. BG Corundum reports vacancies and a shortage of suitable Purchasers at their BG. Project Ruby had 3 different Purchasers working on the project because of a lack of resources. Next to this, there was no Purchasing contact at BG Corundum for project Sapphire. The same issue is present at BG Carbon Allotropes (project Diamond); there are too much vacancies and a shortage of people with a technical background. At BG Beryl, the project team members indicated that Purchasing had too little time at hand to spend on the projects. In project Red Beryl, it is explained that Purchasing did not have manpower enough to be present at all supplier meetings and that their role would have been bigger if they could spend more time on the project. Interviewees at project Emerald also feel that the amount of time Purchasing spends on the project is a bottleneck. Only project Opal of BG Mineraloids did not report any human resource related issue. Therefore, the availability of suitable human resources seems a relevant factor in the level of Purchasing involvement in NPD projects.

3.8.6 Purchasing involvement structures

Not all structures in the typology of Lakemond et al. (2001) have been found. For example, Purchasers that are full-time dedicated to a NPD project have not been observed. Only when a product has been launched, and the product thus is not an innovation project anymore but running business, a dedicated Purchaser is sometimes appointed. At SFI, none of the projects included more than one Purchaser in the team. However, in project Emerald, a Purchaser was a part-time team member and also coordinated a strategic sourcing project together with another Purchaser who was not a team member. No other coordination structure was observed.

Figure 3.21 shows the Purchasing involvement configurations for different contingencies. When a project is small of size, Purchasing is only involved indirectly, whereas when the project size is large, part-time integrated Purchasers are also used. Project Sapphire having insignificant indirect Purchasing involvement while two other projects with the same contingencies have integrated part-time Purchaser involvement looks off. It is not clear if project complexity influences the structure of Purchasing involvement in the NPD team.
In order to decide whether the project duration is long, the critical value of 5 years is found. With regard to the project budget and amount of people involved, the critical values of €5 million and 20 persons are found.

![Diagram](image)

**FIGURE 3.21: Purchasing involvement configurations for different contingencies**

### 3.9 ADDITIONAL FINDINGS

In section 2.3.2 it has been explained that the organizational enabling factors concerning the Purchasing department are the degree of specialization, the principle of specialization, horizontal complexity and reporting relationship. The multiple-case study was suitable for drawing conclusions with regard to the first two factors. With regard to horizontal complexity and the reporting relationship, some additional findings must be explained. In order to do this, the company information from section 1.2 and 2.3.1 is used.

**Horizontal complexity**

As explained in section 1.2 and as can be seen in appendix 2, 3 and 4, the organization of the Purchasing department is rather complex. The division Purchasing Chemicals and Utilities has centralized divisions for shared categories of products, but is decentralized at the BG’s. The division Purchasing Indirect Goods and Services is more centralized, but has subdivisions in geographic regions as well. All together, the department is decentralized enough to empower Purchasers and to enable direct communication with the internal customers. Horizontally, the organization appears to have a right amount of complexity; there are many different units or groups with a specific task. *This indicates that there is enough room for some Purchasers to endeavor activities beyond the normal Purchasing tasks.* The department seems suited for potentially having a separate innovation unit or coordinator as well, if needed.
Reporting relationship

Purchasers who are involved in an NPD project, continue to report to their line manager. Other team members and the project manager report to their respective managers as well. This situation is not optimal with regard to goal congruence of the employees involved.

It is not so that there is a total misalignment of all goals. As indicated in the previous section, Purchasing is recognized to have a positive influence on the product’s price and profit margin, which is an important aspect in most NPD projects. However, the orientation study in chapter 2 and the individual case studies in this chapter bring forward that team members and project members sometimes experience that Purchasing goals and their goals to not match. For example, in one orientation interview it is explained that ‘in the innovation project, time is everything... they want their product fast because the innovation process gets delayed otherwise, they do not care about negotiating precise payment terms.’ Sometimes Purchasers concentrate on issues that are not important to the Business at all.

3.10 CONCLUSIONS

The multiple case study and some general observations have lead to the following findings and observations, which are also summarized in figure 3.19, 3.20 and 3.21.

The new product’s costs and project risk were positively influenced by involving Purchasing early. Involving Purchasing had no effect on the time to market or project costs of NPD projects. Having the right people available, having a good structure for Purchasing involvement and the need for risk mitigation demonstrate a positive relation with Purchasing involvement.

In projects showing a high presence of the right enabling factors, indeed involved Purchasing early. No pattern is found with regard to the NPD team structure. Concerning Purchasing’s specialization, a Interviewees indicated that Purchasers with technical experience are associated with better involvement in NPD. In general, it is observed that the purchasing department’s organization has a fair amount of horizontal complexity and there seems to be enough room for Purchasers to endeavor activities beyond the normal Purchasing tasks. The goals resulting from a separate reporting relationship of the stakeholders involved were mostly non-congruent. Information sharing and availability proved to be an issue for both NPD projects and Purchasing. Human resource issues played a role too; there seems to be a lack of availability of suitable Purchasers for NPD projects.

It cannot be validated or disproved that involving Purchasing indeed leads to more supplier involvement. This is not surprising, as it seems logical that the choice whether to co-develop with a supplier depends on many factors. Also, Purchasing seems to have lack of competences with regard to innovation and tolling. Nevertheless, projects with late Purchasing involvement show a learning process with regard to early Purchasing involvement and NPD project team members indicate that Purchasing has valuable input in a project.

The exact use of the formal Project Management Process in NPD projects is not of influence in Purchasing involvement. It must be noted that it is the project managers that decides to what extent the PMP is taken into account in practice and who is involved in the project. However, having Purchasing mentioned as a function in the formal innovation process, including its own set of tasks, appears to work in getting Purchasing involved early. In BG’s where but few strategic Purchasing tasks
are executed, Purchasing is less likely to be involved in an NPD project. Projects in which there is a positive attitude towards Purchasing from the beginning of the project tend to have Purchasing involved early.

Most and probably the most popular Purchasing tasks were those in the Scoping and the Build Business Case stage, although the moment of execution was not always in those stages exactly. There is too few data to conclude anything about tasks in the Testing & Validation stage and the Launch stage. A summary of the Purchasing tasks found in the cases is shown in figure 3.20. Strategic activities related to supplier involvement are not structurally undertaken by Purchasing. However, due to a perception bias, the indicated presence of the strategic tasks of Purchasing may not be accurate.

A variety of Purchasing involvement structures was found, of which most structures deviated from those found by Lakemond et al. (2001). No full-time dedicated Purchasers in NPD teams were observed. Integrated Purchaser involvement was preferred in large projects. However, project complexity seemed not to play a role (yet) at SFI. A single coordinator role is found when other Purchasing experts were involved.

The findings from this chapter are used in chapter 4 to draw conclusions, discuss the implications of these conclusions, answer the research questions and make recommendations to SFI with regard to Purchasing involvement in NPD.
4 Conclusions and Discussion

4.1 INTRODUCTION

In this master thesis it is investigated how Purchasing can be involved in the chemical company Science Faceting Inc. (SFI). A multiple-case study was used to validate the effects of Purchasing involvement found in literature. Next to this, a broad range of enabling factors and Purchasing tasks were assessed to see what relational forces are at play when it comes to Purchasing involvement. The main research question in this thesis was:

What organizational and procedural changes are necessary to create a structure that enables Purchasing to be involved in NPD at SFI?

In section 4.2 the findings of chapter 3 and the implications hereof are discussed. In section 4.3 conclusions concerning the research question are drawn by answering the research sub questions and discussing the redesign directions for SFI. The final recommendations for SFI are elaborated on as well. The contributions to existing research are discussed in section 4.4. The content-related and methodological limitations of this research are discussed in section 4.5. To conclude with, recommendations for future research are given in section 4.6

4.2 DISCUSSION AND IMPLICATIONS

In chapter 3, the detailed research findings are presented as well as a summary of the results. In this section, these findings and the implications of these findings are discussed. Literature has been used in order to derive implications from the findings. This section has been structured similar to section 2.10, but the additional findings and remarks have been integrated in the main sections.

4.2.1 EFFECTS OF PURCHASING INVOLVEMENT

Although it is extensively argued and shown in literature that Purchasing involvement in NPD is associated with supplier involvement in NPD (Farmer, 1981; Axelsson & Hákansson, 1984; Williams & Smith, 1990; Guy & Dale, 1993; O’Neal 1993; Atuahene- Gima, 1995; Wynstra et al., 2001; Chen et al., 2002; Nijsen et al., 2002; Van Echtelt, 2004; Monczka et al., 2005), in this research no conclusive evidence has been found to validate or disprove this. Although this finding might seem to contradict academic work, it is not a striking result, as the choice whether to involve a supplier for co-development or not depends on many factors. The fact that Purchasing can play an important role in supplier involvement (Farmer, 1981; Axelsson & Hákansson, 1984; Williams & Smith, 1990; Guy & Dale, 1993; O’Neal 1993; Atuahene- Gima, 1995; Wynstra et al., 2001; Chen et al., 2002; Nijsen et al., 2002; Van Echtelt, 2004; Monczka et al., 2005) does not necessarily mean that there is a causal relation between Purchasing involvement and supplier involvement in NPD projects. Also, the findings from chapter 3 indicate that SFI is not optimally structured en organized for Purchasing involvement in NPD yet. If the situation is improved in the future, an increased amount of Purchasing involvement in NPD may still lead to an increase in supplier involvement since literature strongly associates Purchasing involvement in NPD with supplier involvement in NPD.

As making the case for Purchasing involvement largely consisted of arguing for the perfect position and characteristics of Purchasing with regard to supplier involvement in literature, one might ask whether the above finding dismantles the value proposition of Purchasing concerning involvement in
NPD. The opposite comes forward from the findings in chapter 3. Here, it is empirically shown that involving Purchasing has a positive effect on product costs and lowers project risk but at the same time has no negative effect on project costs and development time. This makes quite a value proposition for Purchasing involvement in NPD.

In literature, several positive effects of Purchasing involvement on NPD performance have been found in literature as well. Mendez & Pearson (1994) specifically prove that Purchasing helps to reduce product development time. Surprisingly, no such effect has been found at SFI. To be more specific, it has been found that Purchasing does not affect the product development time in any way. The same result has been found with regard to the project costs. In the preliminary investigation in the orientation phase of the investigation (see section 2.2 and figure 2.3), it was found that Purchasing involvement is often associated with delaying the project and the negative effects of this (for example increased project costs). Actually, this was identified to be a contributory cause of a bad image of Purchasing and not recognizing the added value of Purchasing by some stakeholders, which negatively affects Purchasing involvement in NPD. The finding that Purchasing does not affect project duration or costs at all can be used in improving the Purchasing image. It must be noted that although Purchasing involvement currently does not affect product development time at SFI, if in the future Purchasing is involved more and in a structural way in the future, Purchasing may still help to reduce product development time as indications for this are found in literature (Mendez & Pearson, 1994).

As stated above as well, one of these positive effects found in this study is that Purchasing contributes to the profit margin and price of the new product, which is a relevant characteristic. Not only does Purchasing positively affect the profit margin and price, it also came forward that when Purchasing is involved too late, huge issues can arise with regard to the product price (plus profit margin) and supply position. In project Red Beryl, it became clear that the consequences can be severe; the market position of the product is difficult and it is critical that the product price goes down in the future in order to maintain their only customer and continue to make a little profit of the undertaking. These findings underline the importance of early Purchasing involvement with regard to risk mitigation (i.e. avoiding such problems). This is in line with the previously discussed findings of Burt and Soukup (1985) who find that in order to avoid problems such as secured supply and product pricing, Purchasing should be involved as from the scoping stage in the NPD process. Another explanation is that, theoretically, the occurrence of such issues may also cause project managers to involve Purchasing in the first place. Both explanations are supported by the occurrence of a learning effect by all project that involved Purchasing late; it is recognized that at the next NPD project, Purchasing should be involved more early.

This might be explained by the fact that as the project advances, the degrees of freedom for Purchasing decreases (Van Weele, 2010; see also figure 2.6). Also, the costs of introducing changes rise. As important decisions with regard to the product design are taken early in the development process, this leads to a very rigid position if Purchasing is involved at a point where there is but little room left for change. If the decisions taken in the first stages of the development process were made without taking proper care of the supply side of the product, this may lead to an impossible position for Purchasing when involved later in the project. This could result in consequences such as those found at project Red Beryl.
4.2.2 NPD processes

SFI uses an official, organization wide, NPD process with matching tools (the PMP). BG’s adapted the PMP to their needs and created their own tools. It is found that when Purchasing is included as a function in the PMP tools together with a set of tasks, Purchasing is involved from the start. This finding confirms the arguments of Burt and Soukop (1985), Athuahene-Gima (1995) and Nijssen et al. (2002) that it is vital to include Purchasing activities in the formal processes of NPD. Scholars reason that by doing this, top management shows recognition of the importance of Purchasing for value creation at SFI and this enables Purchasing involvement in NPD (Burt & Soukup, 1985; Athuahene-Gima, 1995; Wynstra, 1998; Nijssen et al., 2002). The same authors explain that it is essential for top management to recognize that innovation is an organizational endeavor instead of a functional endeavor. The case studies in this thesis show that Purchasing involvement does not come naturally in all projects. By involving Purchasing in formal processes, SFI can make sure that Purchasing is involved in a cross-functional NPD team. For example, BG Mineraloids included Purchasing in their formal process and tools. At this BG, interviewees from project Opal clearly explained that 'it is natural to involve Purchasing from the beginning of the project' and that involving Purchasing in NPD is mandatory. In some BG’s where Purchasing is not included as a function in the PMP, project managers were not even aware what Purchasing could possibly contribute to an NPD project. The above implies that by including Purchasing as a function in the PMP, a company can make sure that Purchasing is involved in NPD early. However, it is also found that project managers decide to what extent they want to use the PMP or BG tools in their projects and who is involved in the project. This indicates that personal contact and communication with the project manager is very important in ensuring involvement in an NPD project.

The cross-case comparison shows no sign of pro-activeness of Purchasers. This study does not provide empirical evidence with regard to the effect of pro-activeness on Purchasing involvement. Literature however, clearly shows that in order to be involved, Purchasing needs to be pro-active (Guy & Dale, 1993; Athuahene-Gima, 1995; Botter & Wynstra, 1996, Wynstra et al., 2000; Zsidisin & Ellram, 2001).

4.2.3 Tasks for purchasing in NPD concerning supplier involvement

In projects where it is recognized that Purchasing performs a lot of strategic tasks, most tasks on project level were found as well. An explanation for this finding is that many long-term strategic tasks enable related tasks at project level and most likely also enable the tasks to be executed in a shorter amount of time. For instance, at supplier interface management level, evaluating suppliers’ development performance and pre-selecting suppliers for product development cooperation are of help in selecting suppliers for involvement in the development project at process management level. Also, it is mentioned in literature that Purchasing tasks on different management levels need to be balanced in order to have full effect (Wynstra, 1998; Wynstra et al.,1999; Wynstra et al., 2000; Wynstra et al., 2001). It is striking, and a possible consequence of the abovementioned explanations, that in the projects with early Purchasing involvement, most strategic tasks have been identified. It is also possible that at BG’s where Purchasing is included in the PMP, Purchasers pay more attention to a systematic approach in enabling the Purchasing tasks mentioned in the PMP.

The same projects that recognize most strategic tasks, also showed the most positive perceptions and attitudes towards Purchasing. The NPD projects in which fewer tasks were recognized showed negative perception or ‘do-it-yourself’ attitudes. The perceptions or attitudes of project team members have been shown to cause a bias with regard to recognizing Purchasing activities (see also
section 3.9 for an elaborate discussion). This observation may also partly explain the findings with regard to the strategic tasks. Literature underlines the importance of the perception of Purchasing in other departments as well. Athuahene-Gima (1995) shows that such perceptions are very important with regard to the perceived strategic importance of Purchasing and its added value to NPD. On top of this, scholars also explain that interdepartmental trust and openness are of influence (Wynstra et al., 2000; Zsidisin & Ellram, 2001).

Most Purchasing project tasks found, concerned those typically done in the Scoping and Build Business Case. This may be explained by the fact that Purchasing has most degrees of freedom for value adding tasks early in the NPD process (Van Weele, 2010; see also figure 2.6) and thus simply can do more in these stages such as the Scoping stage and Build Business Case stage. It is striking that cases where Purchasing was involved much later also showed more tasks that were typically done in the early stages. As explained in section 3.9, this might be due to the fact that those tasks were found to be most important and having priority over the other tasks. An alternative explanation may be that these tasks are the most obvious and simple tasks among the set of Purchasing tasks investigated. All together, most value adding tasks of Purchasing with regard to NPD are typically done in the Scoping and Build Business Case stage.

It must be noted that the task ‘formalize & implement purchasing and contingency plans’ is found to be executed in the Build Business Case stage at SFI already instead of in the Launch stage as implied in literature. There are but few indications that the strategic tasks are systematically undertaken in all BG’s. This implies that if Purchasing want to have a systematical approach to these Purchasing tasks in order to enable project tasks, the department should develop a more systematical approach.

4.2.4 ENABLING FACTORS

Organizational enabling factors

Purchasing is involved early in the projects that score remarkably well with regard to the organizational enabling factors. This is no surprise as Wynstra (1998) already described that enabling factors are elements that make it possible or easier to execute Purchasing activities in NPD. This implies that when it comes to creating an optimal organization for early Purchasing involvement, arranging for enabling factors should be taken seriously. As explained in section 3.9 it is very well possible that (some of) enabling factors are also linked to the perceptions of other departments. However, no conclusive statements can be made about this based on the case-study results. All together, the findings confirm the expectations that were drawn up in section 2.3.

Nevertheless, it is found that one of the enabling factors discussed in section 2.3 – team structure – is not related to Purchasing involvement. Although it is mentioned by Wynstra (1998) and Wynstra et al. (2000) that the team structure can enabling Purchasing involvement, they also explain that the choice for a structure seems to be dependent the nature, priority and resources of the project and the companies’ habits towards cross-functional teams. The latter seems to be applicable to SFI as well.

Another notable finding was that the cross-case comparison of the individual cases shows that none of the cases scored well with regard to the principle of specialization. In section 2.3 it is found that, the basis on which the Purchasing department and other relevant departments with regard to NPD are specialized, determines the alignment between those departments (Wynstra, 1998; Lakemond et al., 2001). However, there has been not a single case that showed misalignment issues. Also, no
relationship was detected, as there is too little data with regard to the effects of a non-congruence of the principle of specialization. As changing the degree of specialization would require extensive changes to the Purchasing process and required Purchaser skills, this will probably negatively affect the interface with suppliers (Lakemond et al., 2001). Therefore, it does not seem wise for a company to change the principle of specialization of their departments based on this research.

The case study results show that projects that involve Purchasing early, have Purchasers with technical experience whereas Purchasers responsible for projects that did not involve Purchasing early did not have a technical background. This implies that a technical background helps a Purchaser to get involved in the project. Scholars also report such findings. In their multiple-case study, Botter and Wijnstra (1996) found that companies preferred Purchasers that finished their education at a technical university. Several years of experience in NPD or service were a plus. In general, high technical and general skills are among the characteristics wished for in Purchasers (Guy & Dale, 1993; Athuahene-Gima, 1995; Botter & Wijnstra, 1996; Wynstra, 1998; Wynstra et al., 2000; Lakemond et al., 2001).

A general observation is that the Purchasing department has quite some horizontal complexity; there are many different units responsible for a particular set of tasks. In literature it is explained that having many different units with specific tasks in Purchasing may influence Purchasing involvement (Botter & Wijnstra, 1996; Wynstra, 1998; Lakemond et al., 2001). Lakemond et al. (2001) explain that this leads to an organization in which Purchasers can endeavor activities beyond their normal set of tasks, such as NPD.

Another general observation is that Purchasers report to their line managers, as do other team members and the project manager. In literature it is described that reporting to the same manager positively affects the alignment of goals and thus the alignment of their activities in NPD (Wynstra, 1998). The preliminary investigation (see section 2.2) and the multiple-case study indeed bring forward that in some cases team members and project managers feel that their goals and those of Purchasing mismatch. This does not necessarily mean that the misalignment of goals is only due to the reporting relationships. However, the non-congruence of goals is likely to affect Purchasing involvement in a negative way. A misalignment of goals may also contribute to a negative perception of Purchasing.

Other findings

The enabling factors that have been taken into account in the research design are of organizational nature. In section 1.4 it is explained that in order to stay within an organizational scope other enabling factors such as information exchange and quality of human resources were not taken into account from the start. Although not assessed for in particular, it was impossible not to notice patterns with regard to other enabling factors. In particular, it has been found that information exchange and human resource availability are also related to Purchasing involvement in NPD. In literature it appears that the three most relevant enabling factors have to do with the right organization for Purchasing and NPD teams, exchange and recording of information and quality of human resources (Guy & Dale, 1993; Botter and Wynstra, 1996; Wynstra, 1998; Wynstra et al., 2000; Wynstra et al, 2001; Zsidisin & Ellram, 2001; Nijssen et al., 2002). The empirical findings in this thesis confirm that these three factors are all essential; their influence on Purchasing involvement in NPD cannot be ignored.
In particular, it has been found that the availability of human resources was an issue in projects that did not involve Purchasing early. Lakemond et al. (2001) explain that the availability of human resources plays a role in deciding on the structure of Purchasing involvement and how much time is spend on Purchasing tasks in NPD. The findings and simple logic implies that this is also the case at SFI.

Issues with regard to information sharing are that Purchasers often are not aware of the existence and contents of NPD projects and project managers are often not aware of what Purchasing can add to NPD projects. If Purchasers have little knowledge about the NPD projects at SFI, this makes it hard to be proactive. Also, if project managers do not know that Purchasing can to be of added value in NPD it is not surprising that it does not occur to them to involve Purchasing. As explained above already, openness and trust also play a role Purchasing involvement (Wynstra et al., 2000; Zsidisin & Ellram, 2001). It is likely that openness and trust have a link to the sharing of information about NPD projects with Purchasers. Stimulating and facilitating information sharing may not only directly enable Purchasing involvement, but also influence openness towards Purchasers.

4.2.5 Purchasing Involvement Structures

No full time dedicated Purchasers have been observed in the NPD projects. It is possible that the issues concerning availability of human resources are the cause of this, as explained in the previous section. Lakemond et al. (2001) also find that the availability of human resources plays a role in deciding to involve a Purchaser full-time or not. The effects of the choice whether or not to involve a Purchaser on a full-time basis or not, do not come forward in this study. Nevertheless, literature hints towards having a dedicated Purchaser in NPD projects in some cases. For example Lakemond et al. (2001) advise that a dedicated Purchaser should be involved in large projects.

The structures found have been compared in section 3.9. The chosen Purchasing structure does not seem to depend on the project complexity. Although Lakemond et al. (2001) expect that project complexity would affect the Purchasing involvement structure, they do underline the fact that their findings need further verification in order to be validated. Their statement that the Purchasing involvement structure depends on the project size is validated by the research results. Large projects integrate their Purchaser, where small projects find it sufficient to use ad hoc Purchasing involvement.

4.3 Recommendations

In order to answer the main research question, an overview of relevant literature and a preliminary investigation were used to derive a set of four sub questions. These sub questions are as follows:

1. What protocols and procedures concerning NPD are used in NPD projects and how do these relate to Purchasing involvement in NPD?
2. How is Purchasing currently involved in NPD and how is this working out?
3. Does the way in which the purchasing department and NPD project team are organized enable Purchasing involvement in NPD?
4. What are the project team members’ perceptions of (the potential added value of) Purchasing and how does this relate to Purchasing involvement in NPD?
In this section the research results from chapter 3 and the discussion from section 4.2 are used to answer these questions. This is done by summarizing the empirical findings per topic, repeating the literature used in the discussion and translating this into redesign directions. The section is closed by translating the redesign directions resulting from the research questions into general redesign recommendations.

1. **What protocols and procedures concerning NPD are used in NPD projects and how do these relate to Purchasing involvement in NPD?**

Results from the discussion and the proposed redesign direction are summarized in figure 4.1.

![Figure 4.1: Redesign directions with regard to research question 1](image)

SFI uses a formal NPD process and formal tools based on Cooper’s Stage-Gate model. This approach is successfully applied at the greater part of the companies (Cooper et al., 2002a; 2004). The different business groups adapt the PMP and tools to their specific needs and NPD management approach. This means that different BG’s can use different tools and different interpretations of the PMP. An important finding in this thesis is that at BG’s that include Purchasing in their PMP version and tools as a function, including their own set of tasks, Purchasing is involved early. Also literature advises Purchasing to be included in the formal processes and tools (Burt & Soukup, 1985; Athuahene-Gima, 1995; Nijssen et al., 2002). Therefore, it is advised that SFI includes Purchasing, with their own set of tasks, in the PMP and the matching tools. However, this should be accompanied by personal contact between Purchasing and the project manager, since this is the person who decides how the PMP is used exactly and who is involved in the project.

2. **How is Purchasing currently involved in NPD and how is this working out?**

In order to answer this question, several topics need to be addressed. Figure 4.2 summarizes the discussion with regard to the topics of interest and show the direction for redesign.

Purchasing was involved in two thirds of the projects, but only one third involved Purchasing early in the NPD process already. Most tasks were found in the Scoping and the Build Business Case stage (see figure 3.20. In case of late Purchasing involvement, the tasks typically done in the Scoping or Build Business Case stage are executed instead of tasks assigned to later stages. It is also found that early Purchasing involvement in an NPD project leads to reduced risk and a higher profit margin. Literature supports these findings and underlines the importance of involvement Purchasing early in the NPD project; as from the Scoping stage. Involving Purchasing does not affect project costs or development...
time at SFI. Therefore, SFI should make sure that Purchasing is involved as from the Scoping stage. SFI already performs the subsequent tasks to a certain extent and should therefore minimally structure these further; suggesting alternative suppliers, products or technologies, supplier selection for involvement, deciding the timing of involvement, deciding the extent of involvement, encouraging suppliers to make suggestions, making a strategic sourcing strategy, providing cost information, providing counsel concerning the business model, general consulting and formalizing and implementing purchasing and implementation plans.

No pro-activeness of Purchasers is observed when it comes to involvement in NPD projects. Literature strongly recommends this, and therefore it is advised that Purchasing becomes more proactive.

Conducting a fair set of strategic long-term activities is associated with doing Purchasing tasks at project level. Literature confirms that having strategic Purchasing tasks for NPD contributes to the structure for Purchasing involvement on project level as an enabler. In literature, it is also explained that in order to obtain long-term benefits from Purchasing involvement in NPD and in order to optimally conduct Purchasing tasks for NPD, there needs to be a balance between strategic tasks and project tasks. SFI is advised to conduct strategic tasks in a systematic way. As SFI is already executing the tasks evaluating suppliers’ development performance and exploiting the technical capabilities of the supplier to some extent; Purchasing should further structure these tasks to begin with. The other strategic tasks related to supplier involvement are pre-selecting suppliers for product development collaboration, monitoring supplier markets for technical developments and providing information on new products and technologies.

Persons from some departments have a negative or ‘do-it-ourselves’ attitude towards Purchasing. If this is the case, less Purchasing tasks are recognized and Purchasing is involved later. Scholars have explained that perceptions indeed are very relevant; negative perceptions negatively influence if, how and when Purchasing is involved. Openness and trust are also related to this (see also figure 4.2). SFI should thus improve the Purchasing perception on other departments, especially those with a negative perception or ‘do-it-ourselves’ mentality. Also, SFI needs to work on two-way interdepartmental openness and trust.

No full-time dedicated Purchasers have been observed at NPD projects. Literature concludes that whether or not a Purchaser is involved full-time or not is a decision that depends on many company specific factors. In literature, it cannot be found whether involving a Purchaser full-time or not has impact on NPD performance or increases the added value of involving Purchasing. Sometimes, a Purchaser needs help from Purchasing categories or other colleagues. If this is the case, the Purchaser who is involved in the projects also fulfils a coordinator role.

It is found that small projects find indirect Purchasing involvement sufficient, whereas large project prefer to integrate a Purchaser in their NPD team. Literature confirms this finding. For this reasons, SFI is recommended to integrate Purchasers in large NPD projects.

At SFI, Purchasing involvement did not have any effect on the time to market or project costs of NPD projects. This finding is important as it was found in the preliminary investigation that some project managers and team members believe that Purchasing involvement delays the project; it is now proven that this is not so. Time will tell whether Purchasing involvement will have the positive effect on the product development time as indicated in literature in the future. Purchasing involvement has
a positive effect on the product’s profit margin. As already said above, by involving Purchasing early in the project, also project risks are reduced. Products in which Purchasing is involved do not necessarily have more involvement of suppliers in the NPD project. This might change in the future, since strong links between Purchasing involvement in NPD and supplier involvement in NPD have been found in literature. When Purchasing is involved, project managers and team members find the contributions of Purchasing valuable.

![Diagram](image)

**Figure 4.2: Redesign directions with regard to research question 2**

### 3. Does the way in which the purchasing department and NPD project team are organized enable Purchasing involvement in NPD?

Figure 4.3 summarizes the findings from the discussion in section 4.2 with regard to this topic and also presents suggestions for redesign.
It is found that the right presence of the organizational enabling factors degree of specialization, composition of project team and physical location positively affects Purchasing involvement. Therefore SFI is recommended to make sure that these enabling factors are complied to.

It should be natural or mandatory to have Purchasing in the NPD team. Next to this, Purchasers with a technical background are more likely to be included in NPD projects. It is also mentioned that Purchasers have a lack of competence with regard to innovation and tolling. SFI should thus assess for technical education and experience in the hiring or selection process and/or train Purchasers. Another option is to give Purchasers the chance to gain more experience in technical of NPD related field (for example by job rotation) (Guy & dale, 1993; Athuahene-Gima, 1995; Botter & Wijnstra, 1996). These redesign directions are supported by literature.

The goals of the purchasing department and other departments are not congruent enough with regard to NPD. Literature finds that congruent goals result in better coordination of their actions. Also, setting innovation targets and rewards for Purchasers, stimulates their involvement in innovation. Therefore, SFI should make Purchasing goals more congruent with NPD in general. Also, if
SFI makes a separate NPD unit within Purchasing, this unit should have goals more congruent to those of other department with regard to NPD.

Purchasing has many units with different Purchasing tasks, leaving enough room to organize for activities beyond the normal tasks. Also, all cases in which Purchasing was not involved from the start of the project reported human resource issues. Literature states that Purchasing should be organized such that Purchasers can undertake NPD activities and thus SFI should do this as well. Next to this, human resource availability for NPD should be increased. Since there is enough room to organize for innovation tasks, a good way to increase availability is to appoint a separate NPD unit within Purchasing in which Purchasers are specialized in NPD related tasks and available for this as well.

Information sharing and availability is an issue; some departments do not know what Purchasing does and can do in NPD project whereas Purchasers are sometimes not aware of NPD projects and their contents. In literature it is found that information availability and two-way information sharing is an essential factor in enabling Purchasing involvement.

4. What are the project team members’ perceptions of (the potential added value of) Purchasing and how does this relate to Purchasing involvement in NPD?

Figure 4.4 displays the findings and directions for redesign for this research question. The perceptions of the team members and project managers are diverse. Negative perceptions or a ‘do-it-yourself’ attitude have a negative impact on Purchasing involvement, whereas positive attitudes are associated with early Purchasing involvement. In project where Purchasing was involved late, team perceptions changed to the positive during the project.

As already explained above, AFI thus needs to improve the Purchasing perception in other departments and arrange for openness.

**Figure 4.4: Redesign directions with regard to research question 4**
Total redesign

All recommendations described above lead to the following redesign. The redesign is organized according to three general areas of redesign: procedures/tasks, structure and people. These topics look a lot like the three areas of attention originally presented by Wynstra et al. (2001).

Procedures/tasks

- Include Purchasing in the PMP/tools, with their own set of tasks.
- Make it mandatory to involve Purchasing in the kick-off meeting at the start of the process (Scoping stage) and at the gates of every NPD project. The project manager and Purchaser should discuss possible contributions and involvement structures.
- The possible decision of not involving Purchasing must be justifiable by the project manager to higher management.
- Large projects must integrate Purchasing in the team unless the project manager and Purchaser agree that this is not (yet) necessary.

Structure

- Purchasing should make a system leading to execution of the long-term strategic tasks on a structural basis.
- Improve two-way information sharing and information availability for NPD projects and Purchasing.
- Work on improving the Purchasing image by communication and by positive contributions to projects in which Purchasing is involved.
- Make sure that the right enabling factors are present as much as possible; a high degree of specialization, congruent principles of specialization, horizontal complexity, overlapped reporting relationship/congruent goals, multifunctional team structure, project team composition includes Purchasing and physical co-location.
- Make Purchasing goals more congruent with NPD goals, at least for those Purchasers that are to be involved in NPD.
- Organize the Purchasing department such that Purchasing can endeavor NPD activities beyond their normal tasks. Having a separate unit for Purchasers specialized in NPD tasks and having a Purchaser coordinator for NPD are good ways to do this.

People

- Purchasers need to be more pro-active.
- Increase human resource availability for NPD by appointing specialized Purchasers to NPD tasks or an NPD unit within Purchasing.
- With regard to NPD involvement, technical education or experience should be an important aspect in hiring process and/or current Purchasers without technical experience should be given the chance to gain more experience in this field by training or job rotation.
Purchasing involvement structures
As can be read above, it is advised that SFI must integrate Purchasing in large projects. Based on the findings in chapter 3 and the sections above, a more detailed decision model is developed with regard to deciding on the exact Purchasing involvement structure. (See appendix 14 for this detailed decision tree.) Purchasing involvement at SFI can be structured in three ways: indirect ad hoc involvement, integrated involvement and integrated involvement with a coordinator function for the Purchaser in addition.

Purchasing should be involved in every NPD project. However, it can differ to what extent Purchasing is involved. With the conceptual model in figure 3.19, it is explained that the need for risk mitigation drives the need for more integrated Purchasing involvement in an NPD project. Also the size of the project drives the need for integrated and dedicated Purchasing involvement; large projects need integrated Purchasing involvement. In this thesis, it is found that an NPD project is large if the project has a year budget of more than €5 million and/or has more than 20 employees working on the project. Projects that have a low need for risk mitigation and small projects may suffice with indirect ad hoc Purchasing involvement. As mentioned above, the presence of a coordinator role is dependent on whether the Purchaser involved needs help from the Categories or other colleagues or when a product or service concerns multiple BG’s.

As discussed in section 4.2, it is the project manager who decides what kind of Purchasing involvement will be used in an NPD project. No dedicated Purchasers in NPD projects have been found in this research, but literature recommends having dedicated Purchasers at large projects (Lakemond et al., 2001). In section 3.8 it is also explained that in some NPD projects at SFI, a need for dedicated Purchaser involvement has been expressed. Although no dedicated Purchasers have been found at SFI yet, in the future SFI should thus have dedicated Purchasers for large NPD projects in order to provide optimal Purchasing support in NPD projects. Whether an integrated Purchaser is involved part-time or full-time also depends on the availability of a suitable Purchaser; both the availability of Purchasers for NPD projects and the suitability in terms of specialization and (technical) experience play a role. As stated above, these aspects currently need improvement. For starters, Purchasing and the project managers should discuss together if part-time or full-time integrated Purchaser involvement is needed and possible. In the future, SFI Purchasing should make early integration of full-time Purchasers in large NPD projects possible.

As also Lakemond et al. (2001) explain, the appropriate structure of involvement may change over time. The project manager and Purchasing should thus review this together after every stage in the PMP/Stage-Gate model.

4.4 CONTRIBUTIONS TO LITERATURE

In this section, a reflection on literature is made. Next to this possible new insights with regard to Purchaser involvement are discussed as well.

It is stated that this thesis might provide a better understanding of how literature findings with regard to Purchasing involvement are applicable to the chemicals industry. The empirical findings in this thesis are mostly in line with the existing literature, but there are some exceptions.
With regard to the effects of Purchasing in NPD performance, Mendez and Pearson (1994) state that Purchasing involvement helps to reduce product development time. In this thesis project, it is found that Purchasing involvement does not have effect on product development time at all. Next to this, the results imply that Purchasing involvement has a positive effect on the new product’s profit margin. Although this might seem logical as Purchasing is trained for negotiations and optimizing spend, literature on Purchasing involvement in NPD has not mentioned this as an effect of Purchasing involvement before. In Burt & Soukup (1985) it is shown that Purchasing needs to be involved early in order to avoid problems and missed opportunities for product improvement. Since 1985, there have been no other scholars who studied the risk mitigating effects of Purchasing in NPD projects. This thesis confirms the findings of Burt and Soukup (1985). However, Burt and Soukup solely describe the effects on NPD projects when Purchasing is involved too late, but do not explore why this could be so. This thesis also provides possible additional explanations for his arguments that Purchasing should be involved early by using Van Weele (2010; see also Botter & Wijnstra, 1996) who explains that as the project advances, the degrees of freedom for Purchasing decrease, the product specification become more rigid and the costs of changes rise. The finding that Purchasing involvement in NPD lowers project risk and product costs but does not affect project costs and product development time is a good nuance of the findings in literature so far.

Burt and Soukop (1985), Athuahene-Gima (1995) and Nijssen et al. (2002) argue that it is vital that Purchasing is included in the formal NPD process in order to get Purchasing involved. Athuahene-Gima (1995) mentions that some of her respondents suggested to include Purchasing in the formal procedures for NPD, but there has not been any other empirical study that validates the effect of formal processes. This thesis does validate this.

The positive effect of enabling factors found in literature on early Purchasing involvement in NPD is validated by this study as well.

Concerning the scholarly work on Purchasing tasks with regard to NPD, some interesting findings must be noted as well. In literature it is found that formalizing and implementing purchasing and contingency plans is a task that is conducted later in the process (Wynstra et al., 2001). In this work, it is found that this task is typically conducted in the Build Business Case stage already. Also, literature finds no Purchasing tasks in the Build Business Case stage. In this thesis, it is found that a lot of tasks are conducted in this stage already; tasks regarding advice on the business model, detailed cost information and making a strategic sourcing strategy have been found as well.

Perhaps even more important is the adaptation made in this thesis to the model of Purchasing tasks presented by Wynstra (1998) and used by various other scholars. In this model and in previous models in purchasing literature concerning Purchasing tasks in NPD, Purchasing tasks on a project level have been structured according to development progress. However, the structures used did not comply with the formal NPD procedures used by most companies. In this thesis, Purchasing tasks are structured according to the Stage-Gate model, which is used by most companies (Cooper 2002a; 2004). The new model (figure 2.9) can thus be used by most companies in order to assess the timing and execution of Purchasing tasks with regard to NPD. This uniformly phased model also enables comparability among projects, among companies and with innovation literature.

The variables used in the case studies and the cross-case comparison (represented in table 2.4) are a result of an extensive assessment of the available literature with regard to this topic. This table is thus
very suitable to be used in other case studies or assessments concerning Purchasing involvement in NPD in the future.

In section 1.4 it is said that this study may provide empirical proof that Purchasing involvement causes more supplier involvement in NPD. However, this study cannot validate or disproof that Purchasing involvement causes more supplier involvement.

Lakemond et al. (2001) state that their findings with regard to Purchasing involvement structures need verification. This thesis validates their findings that project size influences the Purchasing involvement structure. However, no effects of project complexity on the Purchasing involvement contingencies could be confirmed.

A finding of methodological nature is that participative observation proved to be suitable way to conduct a preliminary investigation in the orientation phase of a project. Participative observation is not mentioned by works such as Van Aken et al. (2007) as a means for orientation in an investigation.

4.5 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

The master thesis project was a design oriented project. This entails that the primary objective of this study is to develop a solution for the situation of SFI in particular. This makes it hard to generalize the conclusions of this study to other companies. Yin (2003) also states that the more cases are studied, the more generalizable the results are. In this study, 6 cases are investigated, thus the theoretical generalizability may still be limited. The research is of a qualitative nature, which contributes to this as well.

It must also be noted that this research has only investigated short term effects of Purchasing involvement. Due to time-constraints, this study was not suitable for investigating long-term effects of Purchasing involvement in NPD. Future research may provide valuable insights with regard to long-term effects of Purchasing involvement in NPD by conducting a longitudinal study.

With regard to the Purchasing tasks in NPD, this work mostly concentrated on Purchasing tasks related to supplier involvement. However, other tasks have been found in literature as well (Farmer, 1981; Burt & Soukup, 1985; Guy & Dale, 1993; Mendez & Pearson, 1994; Wynstra, 1998, Wynstra et al., 1999; Wynstra et al., 2000; Wynstra et al., 2001; Wynstra et al., 2003; Van Weele, 2010). In order to capture the full potential of Purchasing involvement in NPD, these other tasks may be taken into account as well.

Due to a limited number of available cases, the NPD projects studied in this in projects were either recently launched or in the Development stage of the Stage-Gate process. As a result, there is no data about the Testing & Validation stage and the Launch stage of four out of the six projects under investigation. It is recommended for future research, to investigate more projects that have launched their new product already, in order to further investigate the occurrence and timing of Purchasing tasks in these stages.

Last, NPD project performance has been measured by qualitative measures only. This was largely a result of the fact that the NPD projects under investigation were not launched yet or were launched recently. Although having qualitative measures is largely accepted in case studies (Yin, 2003), it would
have been advantageous to have quantitative measures for determining the project's performance and/or success.
5 REFERENCES


Author/editor or compiler Year of the most recent version, Title, version number (if applicable), description of document (if applicable), name and place of the sponsor of the source, viewed Day Month Year, <URL either full location details or just the main site details>.


OECD (2008) *Open innovation in global networks*. OECD.


6 APPENDICES

APPENDIX 1: ORGANIZATIONAL CHART OF SFI

APPENDIX 2: ORGANIZATIONAL CHART OF THE PURCHASING DEPARTMENT

FIGURE 6.1: Organization chart of SFI

FIGURE 6.2: Organization chart of the Purchasing department of SFI
APPENDIX 3: DETAILED ORGANIZATIONAL CHART OF THE CHEMICALS AND UTILITIES DIVISION

![Diagram](image)

FIGURE 6.3: Detailed organization chart of the Chemicals and Utilities division of the Purchasing department of SFI

APPENDIX 4: DETAILED ORGANIZATIONAL CHART OF INDIRECT GOODS AND SERVICES DIVISION

![Diagram](image)

FIGURE 6.4: Detailed organization chart of the Indirect Goods and Services division of the Purchasing department of SFI
**Figure 6.5:** Organization chart of the hubs of the Purchasing Indirect Goods and Services division

**Global categories**

- Category Directors
  - Sourcing analysts
  - Global category managers
  - Contract managers

**Regional/Local hubs**

- Hub Directors
  - Sourcing analysts
  - Regional category managers
  - Regional contract managers

- Hub managers
  - Buyers
  - Contract managers
  - Purchasing assistants

**Comments**

- Directors are part of the Leadership Team Purchasing Indirect (LTPi)
- Sourcing analyst has a direct role to the director and supports its respective global category or regional hub
- For each regional category, one Regional CAM will be the Primus inter Pares (PIP)
- Regional CAM will have a functional reporting line to the Category Director

**Figure 6.6:** Further organization chart details of the Purchasing Indirect Goods and Services division
In order to derive the problem definition, a series of intake meetings and orientation interviews have taken place with regard to Purchasing involvement in NPD. Interviews and meetings with the following Purchasers have taken place. For confidentiality reasons, only the function titles of the interviewees are mentioned. If applicable, it is also mentioned whether a person was a principal or supervisor with regard to this master thesis project.

**Intake Meetings:**
- Buyer BG Corundum 1
- Buyer BG Corundum 2
- Category Manager (Purchasing Indirect Goods and Services) – supervisor
- Market Analyst 1 (Purchasing Chemicals and Utilities)
- Communication Manager
- Vice President Purchasing Chemicals and Utilities – principal

**Orientation Interviews:**
- Hub Director (Purchasing Indirect Goods & Services) – principal and supervisor
- Hub Manager 1 (Purchasing Indirect Goods & Services) – supervisor
- Controller BG Corundum
- Purchasing Assistant BG Corundum
- BG Amethyst Purchasing Director
- Market Analyst 1 (Purchasing Chemicals and Utilities)
- Predecessor Buyer BG Corundum 1

Next to this, 10 orientation meetings with my team members from PSD work group Innovation took place plus at least 5 meetings with part of the team. The PSD work group Innovation consisted of:
- BG Amethyst Purchasing Director
- Hub Manager 2 (Purchasing Indirect Goods & Services)
- Market Analyst 1 (Purchasing Chemicals and Utilities)
- BG Amethyst Innovation Manager
As part of the PSD, a series of 3 total team days were attended. On these days, 58 people from Purchasing or other departments shared their findings on different purchasing related strategic topics, including Purchasing involvement in innovation. On some of these PSD days, challengers from within SFI and external advisors from the Corporate Executive Board took part in the discussions.

**APPENDIX 7: GENERAL OVERVIEW OF ENABLING FACTORS FOUND IN LITERATURE**

**Table 6.1: General overview of enabling factors found in literature**

<table>
<thead>
<tr>
<th>Enabling factor</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust, open culture</td>
<td>Wynstra et al. (2000), Zsidisin &amp; Ellram (2001)</td>
</tr>
<tr>
<td>Commercial orientation design process</td>
<td>Guy &amp; Dale (1993)</td>
</tr>
<tr>
<td>Good perception of other departments concerning added value</td>
<td>Athuahene-Gima (1995)*</td>
</tr>
<tr>
<td>New product development is top priority</td>
<td>Nijssen et al. (2002)</td>
</tr>
</tbody>
</table>

* Author indicates that his findings must be seen as tentative due to small sample size and limited generalizability beyond the limits of Australia.
APPENDIX 8: LETTER OF INTRODUCTION/ STATEMENT OF PURPOSE

Dear ..., 

This mail is to introduce Jolet van Erum, a master student at Eindhoven University of Technology. Ms. Van Erum has been assigned to investigate the involvement of Purchasing in innovation at SFI. Next to this she also takes part in the Purchasing Strategic Dialogue workgroup focusing on this subject. As part of her investigation, she will be conducting case studies of innovation projects at SFI.

The result of this investigation will be a set of recommendations concerning involvement and cooperation of the purchasing department and suppliers in the new product development process at SFI. These recommendations will show SFI a way to reap the potential added value of Purchasing and suppliers in the new product development process and will be used in the implementation trajectory of the new Purchasing Strategy.

From a list of 55 innovation projects at SFI, we have selected a number of projects of interest, including the project ".........". We would like to ask you if you are willing to cooperate in this investigation. We would need a couple of hours of your time, from some of the other project team members’ time and from the buyer you work(ed) with. Ms. Van Erum also would require access to project-related documents such as reports, evaluations, minutes-of-meeting and PMP documents. Your cooperation is most essential if the case studies are to result in an accurate set of recommendations.

Should you wish to be informed of the final results of the investigation, Ms. Van Erum will be glad to make the proper arrangements.

On our behalf, in advance, we wish to express our gratitude for your assistance.

Best regards,

............................

Hub Director (Purchasing Indirect Goods and Services)

APPENDIX 9: DETAILS OF THE CASE STUDY REPORT OUTLINE

Introduction

In this section, it is explained what the NPD project is about and why the product is (being) developed. Next to this, an introduction to the case study is given as well.

Process

In this section, the BG procedures and checklists are assessed, in particular with regard to Purchasing tasks. A summary of the NPD process, how the project is managed and the project performance are described here as well.
Purchasing and supplier involvement

Here, it is described in detail how Purchasing was involved in and contributed to the project. The timing of Purchasing involvement will become clear as well as whether Purchasing was involved proactively or not. Next, the roles of Purchasing and suppliers are assessed. To conclude with, experiences and perception with regard to Purchasing involvement in NPD are also described.

Analysis of activities at project level

Here, the selection of Purchasing tasks presented in table 2.1 are reviewed for their presence and their execution. It is also explained what Purchasing tasks and contributions were found in the Build Business Case stage. Survey results of table 2.1 will be summarized in an appendix by means of showing the percentages of the interviewees indicating the presence of certain Purchasing tasks or Purchasing activities in the innovation project.

Analysis of activities at strategic level

In this part of the case study review, the long term Purchasing tasks shown in table 2.2 are reviewed for their presence. Survey results of table 2.2 will be represented in an appendix in the same way as table 2.1.

Analysis of enabling factors

In this section, the NPD team organization is explained and depicted in detail. The project is assessed for the enabling factors team structure, team composition and physical location. Also the organizational enabling factors degree of specialization and principle of specialization are elaborated on.

Organizational structure Purchasing involvement

Here, the structure of Purchasing involvement is derived from the data and depicted. Next to this, both project complexity and project size are elaborated on for the particular NPD project.

Conclusions

In this closing section, the most relevant findings are summarized. Next to the important aspects resulting from research models, also other interesting or relevant findings may be underlined here.
# Appendix 10: Sources of Evidence for the Individual Case Studies

## Table 6.2: Sources of evidence for the individual case studies

<table>
<thead>
<tr>
<th>NPD Project</th>
<th>Documents</th>
<th>Archives</th>
<th>Semi-structured Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emerald</strong></td>
<td>BG formal NPD procedures</td>
<td>Newspaper article</td>
<td>Project Manager</td>
</tr>
<tr>
<td></td>
<td>BG checklists</td>
<td>SFI website</td>
<td>Project Team member</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sourcing Analyst</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Project Management Office Manager with regard to the BG adaptations to the PMP</td>
</tr>
<tr>
<td><strong>Red Beryl</strong></td>
<td>Minutes of meetings</td>
<td>Project Manager</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BG formal NPD procedures</td>
<td>Project Team member</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BG checklists</td>
<td>Purchaser who was involved in the NPD project</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project Owner</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project Management Office Manager with regard to the BG adaptations to the PMP</td>
<td></td>
</tr>
<tr>
<td><strong>Opal</strong></td>
<td>BG formal NPD procedures</td>
<td>Project Manager</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BG checklists</td>
<td>Project Team Member</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BG NPD tool kit</td>
<td>Purchaser who is involved in the NPD project</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Project profile from Project Plaza</td>
<td>Predecessor of the Purchaser who is currently involved in the project</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project Management Office Manager with regard to the BG adaptations to the PMP</td>
<td></td>
</tr>
<tr>
<td><strong>Ruby</strong></td>
<td>BG formal NPD procedures</td>
<td>Video of a meeting/presentation</td>
<td>Project Manager</td>
</tr>
<tr>
<td></td>
<td>BG checklists</td>
<td>SFI website</td>
<td>Project Team Member</td>
</tr>
<tr>
<td></td>
<td>All documents available on Project Plaza</td>
<td>3 Purchasers who were involved in the NPD project</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Purchasing Category Specialists</td>
<td></td>
</tr>
<tr>
<td><strong>Sapphire</strong></td>
<td>BG formal NPD procedures</td>
<td>Press release joint venture</td>
<td>Project Manager</td>
</tr>
<tr>
<td></td>
<td>BG checklists</td>
<td>Newspaper articles</td>
<td>2 Project Team members</td>
</tr>
<tr>
<td></td>
<td>A selection of project briefs from Project Plaza</td>
<td>Intranet SFI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier profile ‘Gold Mines’</td>
<td>Internet website</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Project planning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 6.2: Sources of evidence for the individual case studies

<table>
<thead>
<tr>
<th>NPD Project</th>
<th>Documents</th>
<th>Archives</th>
<th>Semi-structured Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond</td>
<td>BG formal NPD procedures</td>
<td>Video from intranet news</td>
<td>Project Manager</td>
</tr>
<tr>
<td></td>
<td>BG checklists</td>
<td></td>
<td>Project Team Member</td>
</tr>
<tr>
<td></td>
<td>Project brief presentation</td>
<td></td>
<td>Purchasing contact at the BG</td>
</tr>
<tr>
<td></td>
<td>Business Feasibility Presentation</td>
<td></td>
<td>Project Management Office</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Manager with regard to the BG</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>adaptations to the PMP</td>
</tr>
</tbody>
</table>
### APPENDIX 11: PURCHASING TASKS AT PROJECT LEVEL PER CASE

**Table 6.3:** Purchasing activities at project level at project Emerald (percentage of interviewees indicating presence of Purchasing activities in the innovation project)

<table>
<thead>
<tr>
<th>Development phase</th>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td><strong>Discovery</strong></td>
<td>New technology/ component scouting</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
<td>X</td>
</tr>
<tr>
<td><strong>Scoping</strong></td>
<td>Suggest alternative suppliers, products or technologies resulting in a better product design and description (plus avoiding supplier lock-in and cost savings)</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Supplier selection for involvement in NPD project</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Determining extent of supplier involvement</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Determining moment of supplier involvement</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
<td>X</td>
</tr>
<tr>
<td><strong>Build Business Case</strong></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Development</strong></td>
<td>Integrating activities between first tier suppliers</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Integrating activities between first tier suppliers and second tier suppliers</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
<td>X</td>
</tr>
<tr>
<td><strong>Testing &amp; Validation</strong></td>
<td>Configuration management supplier &amp; manufacturer</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Coordinating prototyping supplier &amp; firm</td>
<td>X</td>
</tr>
<tr>
<td><strong>Launch</strong></td>
<td>Coordinating production start-up activities</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
<td>X</td>
</tr>
<tr>
<td>Development phase</td>
<td>Purchasing Activity</td>
<td>Indicated presence (%)</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td><strong>Discovery</strong></td>
<td>New technology/ component scouting</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
<td>X</td>
</tr>
<tr>
<td><strong>Scoping</strong></td>
<td>Suggest alternative suppliers, products or technologies resulting in a better product design and description (plus avoiding supplier lock-in and cost savings)</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Supplier selection for involvement in NPD project</td>
<td>X</td>
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<tr>
<td></td>
<td>Determining extent of supplier involvement</td>
<td>X</td>
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<td></td>
<td>Determining moment of supplier involvement</td>
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</tr>
<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
<td>X</td>
</tr>
<tr>
<td><strong>Build Business Case</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Development</strong></td>
<td>Integrating activities between first tier suppliers</td>
<td>X</td>
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<td></td>
<td>Integrating activities between first tier suppliers and second tier suppliers</td>
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</tr>
<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
<td>X</td>
</tr>
<tr>
<td><strong>Testing &amp; Validation</strong></td>
<td>Configuration management supplier &amp; manufacturer</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Coordinating prototyping supplier &amp; firm</td>
<td>X</td>
</tr>
<tr>
<td><strong>Launch</strong></td>
<td>Coordinating production start-up activities</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
<td>X</td>
</tr>
</tbody>
</table>
Table 6.5: Purchasing activities at project level at project Opal (percentage of interviewees indicating presence of Purchasing activities in the innovation project)

<table>
<thead>
<tr>
<th>Development phase</th>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Discovery</td>
<td>New technology/ component scouting</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
<td>X</td>
</tr>
<tr>
<td>Scoping</td>
<td>Suggest alternative suppliers, products or technologies resulting in a better product design and description (plus avoiding supplier lock-in and cost savings)</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Supplier selection for involvement in NPD project</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Determining extent of supplier involvement</td>
<td>X</td>
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<tr>
<td></td>
<td>Determining moment of supplier involvement</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
<td>X</td>
</tr>
<tr>
<td>Build Business Case</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Development</td>
<td>Integrating activities between first tier suppliers</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Integrating activities between first tier suppliers and second tier suppliers</td>
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</tr>
<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
<td>X</td>
</tr>
<tr>
<td>Testing &amp; Validation</td>
<td>Configuration management supplier &amp; manufacturer</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Coordinating prototyping supplier &amp; firm</td>
<td>X</td>
</tr>
<tr>
<td>Launch</td>
<td>Coordinating production start-up activities</td>
<td>X</td>
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<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
<td>X</td>
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</tbody>
</table>
### Table 6.6: Purchasing activities at project level at project Ruby (percentage of interviewees indicating presence of Purchasing activities in the innovation project)

<table>
<thead>
<tr>
<th>Development phase</th>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>atraction activities at project level at project Ruby (percentage of interviewees indicating presence of Purchasing activities in the innovation project)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Discovery</strong></td>
<td>New technology/ component scouting</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
<td>X</td>
</tr>
<tr>
<td><strong>Scoping</strong></td>
<td>Suggest alternative suppliers, products or technologies resulting in a better product design and description (plus avoiding supplier lock-in and cost savings)</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Supplier selection for involvement in NPD project</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Determining extent of supplier involvement</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Determining moment of supplier involvement</td>
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</tr>
<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
<td>X</td>
</tr>
<tr>
<td><strong>Build Business Case</strong></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Development</strong></td>
<td>Integrating activities between first tier suppliers</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Integrating activities between first tier suppliers and second tier suppliers</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
<td>X</td>
</tr>
<tr>
<td><strong>Testing &amp; Validation</strong></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Configuration management supplier &amp; manufacturer</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Coordinating prototyping supplier &amp; firm</td>
<td>X</td>
</tr>
<tr>
<td><strong>Launch</strong></td>
<td>Coordinating production start-up activities</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
<td>X</td>
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</table>
### Table 6.7: Purchasing activities at project level at project Sapphire (percentage of interviewees indicating presence of Purchasing activities in the innovation project)

<table>
<thead>
<tr>
<th>Development phase</th>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Discovery</td>
<td>New technology/ component scouting</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
<td></td>
</tr>
<tr>
<td>Scoping</td>
<td>Suggest alternative suppliers, products or technologies resulting in a better product design and description (plus avoiding supplier lock-in and cost savings)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supplier selection for involvement in NPD project</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Determining extent of supplier involvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Determining moment of supplier involvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
<td></td>
</tr>
<tr>
<td>Build Business Case</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td>Integrating activities between first tier suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Integrating activities between first tier suppliers and second tier suppliers</td>
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<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
<td></td>
</tr>
<tr>
<td>Testing &amp; Validation</td>
<td>Configuration management supplier &amp; manufacturer</td>
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<tr>
<td></td>
<td>Coordinating prototyping supplier &amp; firm</td>
<td></td>
</tr>
<tr>
<td>Launch</td>
<td>Coordinating production start-up activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
<td></td>
</tr>
</tbody>
</table>
### Table 6.8: Purchasing activities at project level at project Diamond (percentage of interviewees indicating presence of Purchasing activities in the innovation project)

<table>
<thead>
<tr>
<th>Development phase</th>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Discovery</td>
<td>New technology/ component scouting</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
<td>x</td>
</tr>
<tr>
<td>Scoping</td>
<td>Suggest alternative suppliers, products or technologies resulting in a better product design and description (plus avoiding supplier lock-in and cost savings)</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Supplier selection for involvement in NPD project</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Determining extent of supplier involvement</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Determining moment of supplier involvement</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
<td>x</td>
</tr>
<tr>
<td>Build Business Case</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Development</td>
<td>Integrating activities between first tier suppliers</td>
<td>x</td>
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<tr>
<td></td>
<td>Integrating activities between first tier suppliers and second tier suppliers</td>
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<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
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</tr>
<tr>
<td>Testing &amp; Validation</td>
<td>Configuration management supplier &amp; manufacturer</td>
<td>x</td>
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<tr>
<td></td>
<td>Coordinating prototyping supplier &amp; firm</td>
<td>x</td>
</tr>
<tr>
<td>Launch</td>
<td>Coordinating production start-up activities</td>
<td>x</td>
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<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
<td>x</td>
</tr>
</tbody>
</table>
APPENDIX 12: PURCHASING TASKS AT STRATEGIC LEVEL PER CASE

**Table 6.9:** Purchasing activities at strategic level at project Emerald (percentage of interviewees indicating presence of Purchasing activities in the innovation project)

<table>
<thead>
<tr>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Pre-selecting supplier for product development collaboration</td>
<td></td>
</tr>
<tr>
<td>Exploiting the technical capabilities of the supplier</td>
<td></td>
</tr>
<tr>
<td>Evaluating the suppliers’ development performance</td>
<td></td>
</tr>
<tr>
<td>Monitoring supplier markets for technical developments</td>
<td></td>
</tr>
<tr>
<td>Providing information on new products and technologies</td>
<td></td>
</tr>
</tbody>
</table>

**Table 6.10:** Purchasing activities at strategic level at project Red Beryl (percentage of interviewees indicating presence of Purchasing activities in the innovation project)

<table>
<thead>
<tr>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
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</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>Pre-selecting supplier for product development collaboration</td>
<td></td>
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<tr>
<td>Exploiting the technical capabilities of the supplier</td>
<td></td>
</tr>
<tr>
<td>Evaluating the suppliers’ development performance</td>
<td></td>
</tr>
<tr>
<td>Monitoring supplier markets for technical developments</td>
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</tr>
<tr>
<td>Providing information on new products and technologies</td>
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</table>
**Table 6.11: Purchasing activities at strategic level at project Opal (percentage of interviewees indicating presence of Purchasing activities in the innovation project)**

<table>
<thead>
<tr>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
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<td></td>
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</tr>
<tr>
<td>Pre-selecting supplier for product development collaboration</td>
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</tr>
<tr>
<td>Exploiting the technical capabilities of the supplier</td>
<td></td>
</tr>
<tr>
<td>Evaluating the suppliers’ development performance</td>
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</tr>
<tr>
<td>Monitoring supplier markets for technical developments</td>
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</tr>
<tr>
<td>Providing information on new products and technologies</td>
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</table>

**Table 6.12: Purchasing activities at strategic level at project Ruby (percentage of interviewees indicating presence of Purchasing activities in the innovation project)**

<table>
<thead>
<tr>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Pre-selecting supplier for product development collaboration</td>
<td></td>
</tr>
<tr>
<td>Exploiting the technical capabilities of the supplier</td>
<td></td>
</tr>
<tr>
<td>Evaluating the suppliers’ development performance</td>
<td></td>
</tr>
<tr>
<td>Monitoring supplier markets for technical developments</td>
<td></td>
</tr>
<tr>
<td>Providing information on new products and technologies</td>
<td></td>
</tr>
</tbody>
</table>
**TABLE 6.13:** Purchasing activities at strategic level at project Sappire (percentage of interviewees indicating presence of Purchasing activities in the innovation project)

<table>
<thead>
<tr>
<th>Purchasing Activity</th>
<th>Indicated presence (%)</th>
</tr>
</thead>
<tbody>
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</tr>
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<tr>
<td>Exploiting the technical capabilities of the supplier</td>
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</tr>
<tr>
<td>Evaluating the suppliers’ development performance</td>
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</tr>
<tr>
<td>Monitoring supplier markets for technical developments</td>
<td></td>
</tr>
<tr>
<td>Providing information on new products and technologies</td>
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</tbody>
</table>

**APPENDIX 13: SUMMARY FINDINGS OF ALL CASE STUDIES**

**TABLE 6.14:** Summary findings of all individual case studies.

<table>
<thead>
<tr>
<th>Project</th>
<th>Emerald</th>
<th>Red Beryl</th>
<th>Opal</th>
<th>Ruby</th>
<th>Sapphire</th>
<th>Diamond</th>
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</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>Supplier involvement</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project tasks</td>
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<td>Strategic tasks</td>
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</tr>
<tr>
<td>Purchasing mentioned in formal procedures</td>
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<tr>
<td>Use of formal procedures</td>
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<tr>
<td>Timing of involvement</td>
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</tr>
<tr>
<td>Pro-activeness</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Degree of specialization</td>
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<tr>
<td>Principle of specialization</td>
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<tr>
<td>Team structure</td>
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<td>Team composition</td>
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<tr>
<td>Co-location</td>
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</tr>
<tr>
<td>Attitude of team members</td>
<td></td>
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<tr>
<td>Performance/ goals</td>
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<td>Time to market</td>
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</tr>
</tbody>
</table>
APPENDIX 14: DETERMINATION OF PURCHASING INVOLVEMENT STRUCTURE IN NPD PROJECTS

The different structures of collaboration, indicated in the decision tree with the letters A, B and C, are elaborated on below.

A. **Indirect ad hoc Purchaser involvement**: Purchasing specialists are contacted by the NPD team on an ad hoc basis (see figure 6.9).

B. **Integrated Purchaser involvement**: Purchasing specialists are integrated into the project team and work closely with engineers on specific materials, parts or technologies (see figure 6.10).

C. **Integrated Purchaser involvement with coordinator role**: A Purchasing coordinator is integrated in the project team and coordinates Purchasing specialists who are not integrated in the team (see figure 6.11).
## APPENDIX 15: SUMMARY PURCHASING TASKS IN ALL CASE STUDIES

### Table 6.15: Purchasing tasks related to supplier involvement found at SFI projects.

<table>
<thead>
<tr>
<th>Development Phase</th>
<th>Purchasing activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovery</td>
<td>New technology/ component scouting</td>
</tr>
<tr>
<td></td>
<td>Organized idea scouting in supply base</td>
</tr>
<tr>
<td>Scoping</td>
<td>Suggest alternative suppliers, products or technologies resulting in a better product design and description (plus avoiding supplier lock-in and cost savings)</td>
</tr>
<tr>
<td></td>
<td>Supplier selection for involvement in development project</td>
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<td></td>
<td>Determining extent of supplier involvement</td>
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<td></td>
<td>Determining moment of supplier involvement</td>
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<tr>
<td></td>
<td>Encourage suppliers to make suggestions (for example cost savings)</td>
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<tr>
<td>Build Business Case</td>
<td>Integrating activities between first tier suppliers</td>
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<tr>
<td></td>
<td>Integrating activities between first tier suppliers and second tier suppliers</td>
</tr>
<tr>
<td></td>
<td>Coordinating development activities supplier &amp; firm</td>
</tr>
<tr>
<td>Testing &amp; Validation</td>
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</tr>
<tr>
<td></td>
<td>Coordinating prototyping supplier &amp; firm</td>
</tr>
<tr>
<td>Launch</td>
<td>Coordinating production start-up activities</td>
</tr>
<tr>
<td></td>
<td>Formalize and implement contingency plans and purchasing plans</td>
</tr>
</tbody>
</table>

### Strategic Purchasing activities

- Pre-selecting suppliers for product development collaboration
- Exploiting the technical capabilities of suppliers
- Evaluating suppliers’ development performance
- Monitoring supplier markets for technical developments
- Providing information on new products and technologies

EMERALD | RED BERYL | OPAL | RUBY | SAPPHIRE | DIAMOND
---|---|---|---|---|---
1 | 0 | 1 | 0 | 1 | 0
0 | 1 | 0 | 1 | 0 | 1
1 | 0 | 0 | 1 | 1 | 0
1 | 0 | 0 | 0 | 1 | 0
0 | 1 | 1 | 1 | 0 | 1

143