

## MASTER

### Procurement at a large, multinational engineer-to-order firm

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*Award date:*  
2015

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Eindhoven, February 2015

**Procurement at a large, multinational  
Engineer-To-Order firm**

*Thesis report*

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in partial fulfilment of the requirements for the degree of  
**Master of Science  
in Innovation Management**

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Series Master Theses Innovation Management

purchasing; business strategy; management development

# Abstract

This research focuses on a combination of the topics of “procurement” and “Engineer-To-Order environment”. The Engineer-To-Order environment is project based, delivering unique products each cycle. This makes standard purchasing difficult and explains the often relatively low purchasing professionalism in companies operating in this environment (Van Weele, 2009). The successful structuring of the procurement process within such an environment, to obtain better results from suppliers, in terms of quality, lead time and cost, is the central matter in this research. Literature was reviewed in order to gain insight into how theory allows for the combination of these topics. After concluding the theoretical foundation, several models such as the House of Purchasing and Supply of Kearney (2011), the purchasing process model of Van Weele (2009) and the Kraljic-matrix (Kraljic, 1983) were used to assess the situation at a large, multinational company, based in the Netherlands, that operates in an Engineer-To-Order environment. Interviews with management, employees and suppliers, quantitative data, documentation and cases provided input for the case study and the redesign.

Purchasing professionalism turned out to be low, and an unambiguous cause for structural problems such as delivery delays, unsatisfactory supplier relationship and high costs. The redesign focused on re-organization the House of Purchasing and Supply, in terms of human resource management (training, education and leadership), information and knowledge management (investments in IT-systems), operating process management (a standardized procurement process) and supplier relationship management (an ABC-analysis, spend analysis and Kraljic-matrix). The result of this redesign, in terms of the re-organization of the House of Purchasing and Supply, is cost reduction, less absence and employee rotation, production of usable data and being able to do more with fewer suppliers.



# Executive summary

## Introduction

The organization at which the research is executed designs and manufactures lifting, drilling and sub-sea equipment for on- and offshore companies. It has several locations in Europe, Asia and South-America. Its fast growth affects many organizational functions, including the purchasing function.

Preliminary observations and discussions have shown that the process of buying is still adjusting to the growth. It deals with Engineer-To-Order (ETO), which puts emphasis on on-time delivery and quality, rather than price and makes quick response to project changes necessary (Van Weele, 2009). This makes suppliers key, and makes supplier relationship management (SRM) important.

The research was held at the headquarters, located in the Netherlands, and includes the central procurement department and the after-sales department aimed at Europe.

The Kearney's House of Purchasing and Supply (Figure 1) was used to guide the research, and consists of eight parts that lead to "purchasing excellence". In order to reach this, all preceding parts of the House of Purchasing and Supply have to be addressed. Based on literature and preliminary observations, purchasing at the researched organization is still building the foundation for this "purchasing excellence".

The research question can be formulated as follows:

How to structure the procurement process, in project business, in order to get better results from suppliers?

## Literature review

The sub question that is answered by the literature review is:

How to structure the procurement process, in project business, and what strategies to pursue?

The House of Purchasing and Supply (Kearney, 2011) shows the components of "purchasing excellence". This model provides an overview of what is needed for successful procurement. Other models and theories can be placed within this house as a deepening layer.

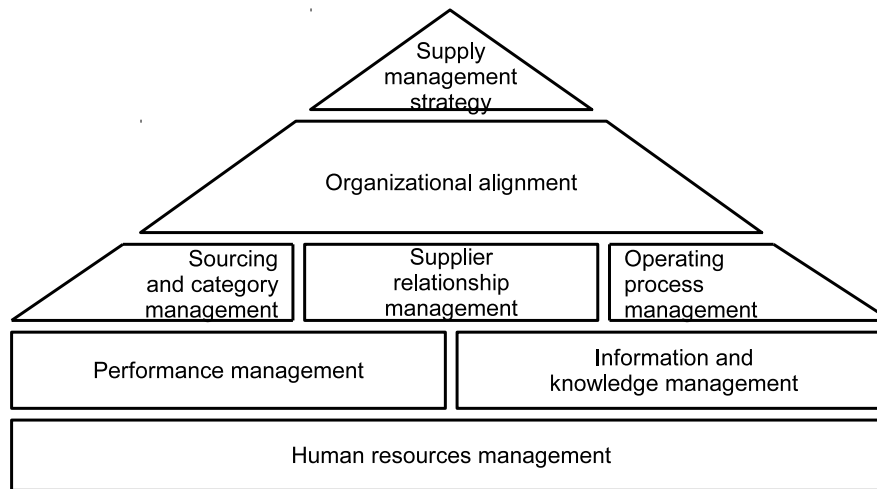


Figure 1: Kearney's House of Purchasing and Supply (A.T. Kearney analysis)

One of the components of the House of Purchasing and supply is operating process management. The six-step purchasing process model (Van Weele, 2009) describes the steps from specification phase to evaluation phase, and is divided into tactical purchasing and the order function. In ETO companies, where each customer receives a unique product, purchases vary from project to project.

The concept of strategy is represented within the House of Purchasing and Supply as well. Procurement is a functional area, and the inclusion within the corporate strategy is relatively new. However, it contributes directly to the bottom line. A fit between corporate strategy and purchasing strategy is of great importance. Furthermore, the general objective within such a purchasing strategy needs to fit purchasing activities, hence need to be translated into specific, measurable and actionable goals.

Supplier relationship management is at the center of the House of Purchasing and Supply. It is directly related to purchasing strategy. In complex product industries, like ETO, strategic supplier relationships are preferred because it decreases complexity. However, such strategic relationships do not fit each supplier. A spend-analysis provides insight into the amount of money that flows to which suppliers. Combined with supply risk these can be placed into a portfolio matrix, like the Kraljic-matrix (Kraljic, 1983). Placement within this matrix determines the type of relationship to be pursued with the supplier.

## Method

The aim of the research was to use theoretical insights (by means of a literature review) and practical insights (by means of a case study) to design a solution to the practical business problem. Well-suited for this is the "reflective redesign" as proposed by Van Aken, Berends, & Van der Bij (2012). The reflective redesign started with a general research question that concerned a business problem, as proposed in Chapter 1. The problem solving cycle was used to design a solution to the problem at hand, after the problem was explored

and validated by means of a case study.

An analysis and comparison of a selection of procurement situations was done, including interviews with buyers, expediter and suppliers (N=12). Data focusing on external transactions, ranging from January 1st, 2012 to December 31st, 2014 was used to analyze the supplier portfolio. Furthermore, management and staff of several departments (central procurement, after-sales, work-preparation and subcontracting, supply chain and quality assurance) were interviewed (N=18). Finally, documents from the organization archives (intranet) and the organizations' management system aided in finding out how processes and procedures concerning procurement and SRM were designed.

## Case study

The sub question that is answered by the case study is:

How does the organization being researched currently organize the procurement process, and what is the role and importance of suppliers?

Based on Van Weele (2009), low professionalism could be expected because purchases vary among projects. Based on Hicks, McGovern, & Earl (2000), a purchasing function that is "departmentalized and predominantly clerical in nature" could be expected. Analysis of the purchasing department leads to several conclusions.

Analysis of a selection of procurement cases showed delivery delays, a lack of formal evaluation, large amount of revisions, sending out unapproved purchase orders, not requesting quotations, other delivery issues and incorrect processing of information. Suppliers confirmed these findings, and in addition complained about unclear and complicated purchase orders and decisions based on subjective information. These findings were validated and explored by means of semi-structured interviews, desk-research, documentation and analysis of procurement data. Interviews confirmed case findings, and showed that the actual way of working deviated from the way of working as described in the management system. Desk-research and documentation showed that the management system is incomplete and outdated. Furthermore, in terms of education, employees do not meet all the requirements as explained in the job description.

Further research showed that there is no functional strategy or mission and no shared way of working. Monitoring is not done in a structural way, partially because of unreliable data due to the lack of a shared way of working.

For the new-build department, the A-category of suppliers, receiving 80% of the spend, consists of 9% of the supplier base. The B-category and C-category, receiving 20% of the spend, consists of 91% of the suppliers. For the after-sales department, this is respectively 16% and 84%. 37% has received a maximum of one purchase order. 27% of all purchase orders has a value below €200. The current approval procedure is necessary for order higher than €500, being 58% of all purchase orders.

The formal path for a vendor to be named "approved" is not clear. Decisions are made based on "gut-feeling", and evaluation is not done in a structural way. Several buyers and



suppliers indicate unsatisfactory relationships. The lack of evaluation causes intransparency, and increases the power of individual buyers.

Furthermore, the approval procedure is not synchronous to the purchasing process. Purchase orders are sent out without approval. Apart from the fact that this is not according to procedures, it might lead to hesitant or withholding supplier co-operation.

The evaluation phase is rarely present. Evaluations are not formally processed or shared. From a tactical point of view, transparency is desirable. Information that is not shared could be lost, and transparency makes decisions based on objective information possible.

The low professionalism in purchasing leads to delivery delays, increased costs (e.g. urgent transport), increased workload and unsatisfactory supplier relationships. The “but we always get the job done”-attitude, and the custom of blaming others, distracts attention from problems, which makes it more difficult to change the current situation. Finally, the problems in the procurement department lead to a negative image within the company.

## **Solution design and change plan**

The sub question that is answered by this chapter is:

How to structure the procurement process, in order to get better results from suppliers?

The solution design was built on the results of the case study. The ABC-analysis, spend analysis and Kraljic-analysis were used as parts of the redesign.

Based on the solution design and change plan, the recommendations are:

- Short term;
  - Use the ABC-analysis to renegotiate contract with A-category suppliers and decrease the number of suppliers in other categories;
  - Use the spend analysis to finalize the Kraljic-matrix and further define strategies, tactics and actions for each part-group.
- Medium term and long term;
  - Invest in a new, better suited and company-wide ERP system;
  - Invest in training and education of employees, to make sure they meet job requirements;
  - Create a standardized purchasing process, focusing on the operational part and evaluation of suppliers;
  - Strengthen the presence and influence of higher management and departmental management, by investments in IT and education, increasing engagement, emphasizing importance of change and translating the corporate strategy into a purchasing strategy.

- Monitor, discuss and emphasize the importance of these changes by means of bi-weekly departmental meetings, and constant (individual) dialogue.

The solution has several advantages:

- (1) Based on experience, a cost reduction of 3% – 6% can be expected;
- (2) Less absence and less employee rotation;
- (3) Production of usable data, produced by a transparent way of working;
- (4) able to do more with fewer suppliers, and better relationships with these suppliers.

## **Discussion and conclusion**

The research question was formulated as follows:

How to structure the procurement process, in project business, in order to get better results from suppliers?

The answer to this research question has been obtained by means of an extensive literature review, a case study and a solution design. Specific to the researched organization, several recommendations have been done.

Scientific reflection resulted in a more general discussion of how a company operating in an Engineer-To-Order (ETO) environment should engage in structuring the procurement process, in order to obtain better results from suppliers, in terms of lead time, quality and cost. The individual elements of the House of Purchasing and Supply should be addressed in order to reach “purchasing excellence”. For ETO companies, especially the inclusion of purchasing in the shaping of a corporate strategy is important because of the high contract value and wide range of specifications. Supplier relationship management (SRM) is important, because quality and lead time are vital. At the heart of SRM should be the evaluation of suppliers, and clear strategies, tactics and actions based on a financial and supply risk assessment. Because of often low professionalism in purchasing, being predominantly clerical in nature, a standardized purchasing process is important. It should focus on the operational part, especially supplier evaluation, to build a foundation for SRM.



# Preface

This paper is the result of the final phase of my student career, which I spent partly in Vlissingen, Eindhoven, Schiedam and sailing on various seas. The fact that it is over, leaves me with mixed feelings. But, where one adventure ends, another begins.

I would like to thank everyone who contributed.

My first supervisor at the university, Arjan van Weele. Discussions were motivating and inspiring each time. My second supervisor, Bob Walrave, providing constructive feedback from a different point of view. My study mates, with whom I had a great time during my masters.

My initial company supervisor for giving me the opportunity to research this fantastic company. His successor, taking over the task as supervisor without any doubt. My colleagues, fully supporting my research activities.

Last but certainly not least, Josephine, Tom, Tyas, friends and family for their support and encouragement.

*Roel François*

Schiedam, February 2015



# Contents

<b>Contents</b>	<b>xiii</b>
<b>List of Figures</b>	<b>xvii</b>
<b>List of Tables</b>	<b>xix</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Background . . . . .	1
1.2 Research focus . . . . .	1
1.3 Research question . . . . .	2
1.4 Outline . . . . .	3
<b>2 Literature review</b>	<b>5</b>
2.1 Introduction . . . . .	5
2.2 Method . . . . .	5
2.3 Strategy . . . . .	8
The concept of Strategy in Business . . . . .	8
Procurement Strategy . . . . .	9
Linking Business Strategy and Procurement Strategy . . . . .	11
2.4 Procurement process . . . . .	11
2.5 Project Business / ETO . . . . .	13
2.6 Management of Suppliers . . . . .	14
Supplier Relationship Management (SRM) . . . . .	14
Portfolio Management . . . . .	16
2.7 Conclusion . . . . .	20
Procurement process and project business . . . . .	20
Procurement strategy . . . . .	20
Supplier relationship management . . . . .	20
<b>3 Method</b>	<b>23</b>
3.1 Introduction . . . . .	23
3.2 Method for research . . . . .	23
3.3 Method for case study . . . . .	24
Method . . . . .	24

Cases . . . . .	24
Procurement data . . . . .	25
Interviews . . . . .	25
Documentation . . . . .	25
3.4 Method for solution design and change plan . . . . .	26
3.5 Quality of research . . . . .	26
3.6 Conclusion . . . . .	27
<b>4 Case study</b>	<b>29</b>
4.1 Introduction . . . . .	29
4.2 The researched organization, and the role of procurement . . . . .	29
4.3 Procurement cases . . . . .	30
4.4 Analysis of procurement processes . . . . .	31
Description of the should-be situation . . . . .	31
Analysis of the actual situation . . . . .	32
Conclusion . . . . .	34
4.5 Analysis of procurement data . . . . .	35
Analysis . . . . .	35
Conclusion . . . . .	35
4.6 Analysis of Supplier Relationship Management . . . . .	36
Description of the should-be situation . . . . .	36
Analysis of the actual situation . . . . .	36
Conclusion . . . . .	37
4.7 Conclusion . . . . .	37
<b>5 Solution design and change plan</b>	<b>39</b>
5.1 Introduction . . . . .	39
5.2 Design requirements . . . . .	39
5.3 Solution: short term . . . . .	40
ABC-analysis . . . . .	40
Kraljic-analysis . . . . .	40
Conclusion . . . . .	41
5.4 Solution: medium term and long term . . . . .	41
Information system . . . . .	41
Create a standardized procurement process . . . . .	42
Human resources . . . . .	44
Leadership . . . . .	45
Conclusion . . . . .	45
5.5 Justification . . . . .	45
5.6 Change plan . . . . .	46
Possible resistance to change . . . . .	47
Organizational support . . . . .	47
Actions and timing . . . . .	48

Conclusion . . . . .	49
5.7 Conclusion . . . . .	49
<b>6 Discussion and conclusion</b>	<b>51</b>
6.1 Discussion and conclusion . . . . .	51
Recommendations . . . . .	52
6.2 Scientific reflection . . . . .	53
6.3 Strengths and limitations . . . . .	54
<b>Bibliography</b>	<b>57</b>
<b>A Cases</b>	<b>61</b>
<b>B Interviews</b>	<b>65</b>





# List of Figures

1	Kearney's House of Purchasing and Supply (A.T. Kearney analysis) . . . . .	vi
1.1	Kearney's House of Purchasing and Supply (A.T. Kearney analysis) . . . . .	2
1.2	Structure of the report . . . . .	3
2.1	Kearney's House of Purchasing and Supply (A.T. Kearney analysis) . . . . .	12
2.2	Purchasing process model by Van Weele (2009) . . . . .	12
2.3	Capgemini Procurement Process Model (Capgemini, 2013) . . . . .	15
2.4	Quadrants and strategies, tactics and actions (Monczka, Handfield, Giunipero, & Patterson, 2008) . . . . .	19
3.1	Reflective redesign (Van Aken et al., 2012) . . . . .	24
3.2	Redesign (Van Aken et al., 2012) . . . . .	26
4.1	Flowchart of the procurement process, issues have been colored grey . . . .	33
4.2	Ishikawa-diagram . . . . .	38
5.1	Example purchase according to procedure . . . . .	43



# List of Tables

2.1	Selected journals, rating and number of articles . . . . .	7
4.1	Case comparison . . . . .	31
5.1	Design requirements (Van Aken et al., 2012) . . . . .	40
5.2	Expected sources of resistance . . . . .	48



# Chapter 1

## Introduction

### 1.1 Background

The organization at which the research is executed, designs and manufactures lifting, drilling and sub-sea equipment for on- and offshore companies. It has expanded rapidly, and still is. This fast growth affects many organizational functions, including the purchasing function and the process of buying, and everyone involved in this.

Preliminary observations and discussions have shown that the process of buying is still developing and adjusting to the growth. It has come a long way from its start-up to becoming a multinational corporation, and is still in the process of adjustment. It deals with Engineer-To-Order (ETO), which puts emphasis on on-time delivery and quality rather than price, and makes quick response to project changes necessary (Van Weele, 2009). This makes suppliers key, and makes supplier relationship management (SRM) important. Furthermore, the American Petroleum Institute (API) requirements further increase the need for well thought out SRM methods.

Headquarter and main production location are in the Netherlands, as is the main after-sales location, aimed at Europe. In Central Europe, Asia and South-America there are also production locations. Furthermore, there are several smaller after-sales services on various locations. The research was held at the headquarters, located in the Netherlands, and includes the central procurement department and the after-sales department aimed at Europe.

### 1.2 Research focus

The researched organization is dealing with ETO and purchases varying from project to project. Because of this, low professionalism in purchasing can be expected (Van Weele, 2009), and a purchasing department that tends to be “departmentalized and predominantly clerical in nature” (Hicks et al., 2000). Furthermore, purchasing is still adjusting to the fast growth it has experienced. The purchasing department is aiming at well thought out processes and methods, and is pressured by the API requirements and the manage-

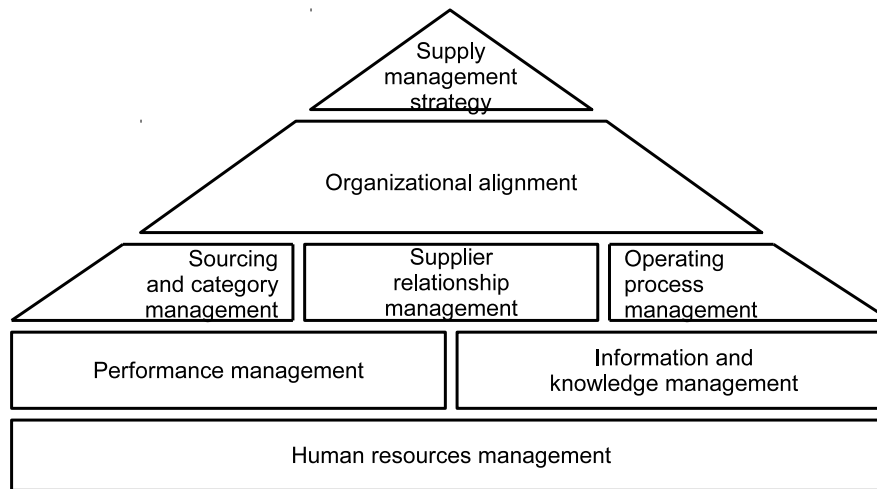


Figure 1.1: Kearney's House of Purchasing and Supply (A.T. Kearney analysis)

ment to reach this. The organization's management has recently emphasized that the efficiency within the organization requires attention. The management team states that "the method of working has to become more efficient, in order to warrant for healthy and stable foundation for the future". Four areas of interest are named, one of which is the "procurement of services and goods". The efficiency of the procurement department is directly named as an area of interest.

The Kearney's House of Purchasing and Supply (Figure 1.1) was used to guide the research, and consists of eight parts that lead to "purchasing excellence". In order to reach this, all preceding parts of the House of Purchasing and Supply have to be addressed. Based on literature and preliminary observations, purchasing is still building the foundation for this "purchasing excellence".

### 1.3 Research question

Based on expectations from literature and preliminary observations, the researched organization, dealing with ETO, needs to structure its procurement process in order to build a foundation for "purchasing excellence".

The research question can be formulated as follows:

How to structure the procurement process, in project business, in order to get better results from suppliers?

This research question will be answered in several steps.

- (1) How to structure the procurement process (in project business), and what strategies to pursue?

First, a literature review is conducted in order to find out the “*soll*” situation, how the procurement process should be organized and structured in project business, according the main literature stream.

- (2) How does the organization being researched currently organize the procurement process, and what is the role and importance of suppliers?

Second, in order to map the “*ist*” situation, the current situation at the company that is being researched, models found in literature will be used.

- (3) How to structure the procurement process, in order to get better results from suppliers?

The “*soll*” situation and the “*ist*” situation will be compared, in order to find out what has to be addressed at the company being researched in order to structure the procurement process and eventually get better results from suppliers, in terms of quality, lead time and cost. Furthermore, a change plan will be described to implement solutions.

## 1.4 Outline

First, the literature review focusing on the topics of “procurement” and “Engineer-To-Order environment” will be summarized (Chapter 2). Second, the method of research will be elaborated upon (Chapter 3). Third, the case study that is conducted at the purchasing department of an organization operating within this environment is summarized, and results will be made clear (Chapter 4). Fourth, a redesign for this organization will be presented in depth (Chapter 5). Finally, a discussion and conclusion will be presented, followed by limitations (Chapter 6).

Chapter 1 Introduction	Chapter 2 Literature review	Chapter 3 Method	Chapter 4 Case study	Chapter 5 Solution design implementation plan	Chapter 6 Discussion conclusion
Preparation			Analysis	Design and implementation	

Figure 1.2: Structure of the report





## Chapter 2

# Literature review

### 2.1 Introduction

In the Engineer-To-Order environment, organizations start their production after a customer has placed an order. Each product that is delivered is unique, and cannot be manufactured to place in stock. Because of the uniqueness of products, and the fact that production starts after a customer has placed an order, purchasing varies from project to project. Many parts cannot be ordered beforehand, and many parts differ for each project. This makes quality and lead-time essential. Furthermore, it makes purchasing the way it is done for relatively standard products, made ahead of customers demand, impossible.

Because of this, purchasing at Engineer-To-Order organizations face the challenge to adopt their purchasing in such a way that desired quality and lead time are maintained while purchases differ from project to project.

The question that is answered by the literature review is:

How to structure the procurement process, in project business, and what strategies to pursue?

This chapter describes the state of the art in literature, and addresses the method used in order to do this.

### 2.2 Method

In order to find out how organizations in an Engineer-To-Order environment should face the challenge of maintaining quality and lead time, the following approach has been taken.

First, the concept of strategy has been described, in terms of business strategy and procurement strategy. The necessary link between these two has been explained next.

*Keywords used: purchasing strategy; procurement strategy; sourcing strategy; business strategy; competitive strategy; corporate strategy*

After placing apart the concept of strategy, the standard purchasing process itself has been described. In order to be able to adopt this process to the Engineer-To-Order environment, the characteristics of this environment were described in depth.

*Keywords used: engineer to order; non make to stock*

Finally the method and importance of Supplier Relationships Management within such an environment, in order to secure quality and lead time, have been clarified.

*Keywords used: supply chain management; supplier relationship management*

Search efforts have concentrated solely on scholarly journals. The only professional journal that was included is the highly ranked Harvard Business Review. Furthermore, the ABS2010 rating, the ISI impact-factor and number of citations were used as determinants of suitability. Two articles published in a journal that was not rated were selected, because of fact that they were written by acknowledged writers. Selected journals include Academy of Management Review, European Journal of Operations Research, Harvard Business Review, Industrial Marketing Management, International Journal of Logistics Management, International Journal of Operations and Production Management, International Journal of Physical Distribution and Logistics Management, International Journal of Production Economics, International Journal of Project Management, Journal of Operations Management, Journal of Purchasing and Materials Management, Journal of Purchasing and Supply Chain Management, Journal of Supply Chain Management and Strategic Management Journal. Furthermore, several books of acknowledged experts have been used, and (annual) reports of large consulting firms.

Journal	ABS2010	ISI 2013	Articles
Academy of Management Review	4	7.817	1
European Journal of Operations Research	3	1.500	1
Harvard Business Review	-	-	2
Industrial Marketing Management	3	1.897	4
International Journal of Logistics Management	2	1.135	1
International Journal of Operations and Production Management	3	-	2
International Journal of Physical Distribution and Logistics Management	2	1.759	1
International Journal of Production Economics	3	-	2
International Journal of Project Management	2	1.758	1
Journal of Operations Management	4	4.478	2
Journal of Purchasing and Materials Management	-	-	1
Journal of Purchasing and Supply Chain Management	2	1.609	2
Journal of Supply Chain Management	-	3.717	2
Strategic Management Journal	2	2.993	3

Table 2.1: Selected journals, rating and number of articles

## 2.3 Strategy

### The concept of Strategy in Business

There are many definitions of strategy, a word that finds its roots in ancient Greece. It is derived from the word *strategos*, which means military general. A *strategos* plots a strategy, which ultimately helps him and his men triumph. This suggests that a strategy demands a goal. The origin of the word strategy already gives away the general notion of the word, and linked to business it could make one imagine a business as the army and the leader, or manager, as the *strategos*. Many researchers have shed their light upon the existence and types of strategy in business. Mintzberg (1987, 1994) describes four common uses of the word strategy: (1) strategy as plan, made in advance and developed consciously and purposefully; (2) strategy as pattern, consistent behavior over time in order to realize the plan; (3) strategy as position, as a mediator between internal and external factors in order to create a viable position; and (4) strategy as perspective, a shared view or even a “collective mind”, uniting people in thinking and acting.

In business, the leading strategy is corporate strategy. Other strategies are serving this strategy. According to Hofmann (2010), strategy exists on four levels within an organization: (1) network level, concerning the interaction between the company, and other companies; (2) corporate, concerning attractiveness of an industry and management of a set of businesses altogether; (3) business unit strategy, concerning the question of how the company should compete in order to create value; and (4) functional strategies, concerning operational activities or support activities. This is also what Monczka et al. (2008) stress: the alignment between business unit functions. After the business strategy has taken shape, functional strategies have to be defined. Furthermore, Monczka et al. (2008) states about the business strategy that it has to answer the following questions: (1) What markets will the firm compete in, and on what bases?; (2) What are the long-term and short-term business goals the company seeks to achieve?; and (3) What are the budgetary and economic resource constraints, and how will these be allocated to functional groups and business units?

Furthermore, there is the concept of competitive strategy, which is at the core of the corporate strategy (Watts, Kim, & Hahn, 1992). Competitive strategy is defined by Porter (1996): “*Competitive strategy is about being different. It means deliberately choosing a different set of activities to deliver a unique mix of value*”. Porter’s theory about competitive strategy became dominant within a few years after publication (Campbell-Hunt, 2000). This theory describes market scope (broad or focused) and source of the competitive advantage (cost or differentiation), or a “stuck-in-the-middle” situation, which lacks clear choices. Firms react to external forces and adjust accordingly. Furthermore, Porter (2005) says that strategy, besides giving a competitive advantage and delivering value, provides direction and sets goals. It also defines a market position and builds brand reputation and eventually adds superior performance.

Van Weele (2009) states that top management should take the so-called “strategic triangle” into account when designing a business strategy. The strategic triangle consists

of a company's three major stakeholders: (1) primary customers, positioning relative to these; (2) major competitors, competitive advantage relative to these; and (3) major suppliers, positioning versus these and supply chain strategies. The competitive position is a result of the elements of the strategic triangle. As suppliers are a part of the triangle, purchasing's part in the becoming of the business strategy is significant.

## **Procurement Strategy**

The inclusion of purchasing in the strategy is relatively new. It has only been viewed as a possibility for adding value to the firm when managed strategically since the eighties (Carr & Pearson, 1999, 2002). However, it has become (and is becoming still) a significant driver in terms of financial performance (Anderson & Katz, 1998). Purchasing can contribute directly to the bottom line, and is important in the possibility of creating durable strategic advantage (Chen, Paulraj, & Lado, 2004). The article of (Spina, Caniato, Luzzini, & Ronchi, 2013) provides an excellent overview of the state of art in Purchasing and Supply Management (what - processes, how - practices, why - competitive priorities) and shows that the orientation of PSM is strategic by delineating the importance of processes like reverse marketing, contract management and supply network negotiation.

Strategic purchasing is defined by Carr & Pearson (2002) as "the process of planning, evaluating, implementing, and controlling highly important and routine sourcing decisions". According to Carr & Pearson (1999), strategic buying has a positive impact on supplier evaluation systems, buyer-supplier relationship and a firm's financial performance. Procurement strategy is a functional strategy, with in its core its purpose: the right quantity of the right items, at the right time at the right price (Watts et al., 1992). Porter also views purchasing as a support activity that enables a company's primary activities and other support activities (Porter, 1985). Van Weele (2009) defines purchasing as "the management of the company's external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company's primary and support activities is secured at the most favorable conditions". As discussed in the previous section, it is derived from, or based on, business or corporate strategy. All functional areas are serving this strategy, and are subsequently influenced by it.

A company's purchasing strategy needs to be in line with long-term goals and objectives of a company, since purchasing needs to contribute to these goals and objectives and to the overall company performance. Purchasing serves the overall activities of the company. These activities are carried out in order to reach certain company goals. In turn, these goals are set in the corporate strategy. In order to reach these goals, the objectives of the purchasing function have to agree with the overall company objectives. A purchasing strategy that is derived from the overall company objective warrants this alignment. A strategy towards a goal is supported by tactical policies. In turn, the basic purchasing strategies on which tactical policies are based must be in line with the overall business strategy. This view is consistent in literature. A purchasing function operating at strategic level, enables senior PSM professionals to understand the organization-wide implications

of their decisions (Baier, Hartmann, & Moser, 2008). Furthermore, Baier et al. (2008) state that the CPO should be integrated into strategic planning decisions in order to unlock all potential. This means purchasing should not only derive their strategy from the overall corporate strategy, but should be involved in shaping this overall corporate strategy. This is possible, because a strategic purchasing function is viewed as an important resource to the firm, treated as an equal to other functions, possesses skills and knowledge to perform at a strategic level and pro-actively seeks opportunities that will have a positive impact on product quality and growth (Carr & Pearson, 2002).

After exploring purchasing strategy in more general terms, the shaping of such a strategy has to be studied. What does such a purchasing strategy typically consist of? Van Weele (2009) has described this in detail. Also, Monczka et al. (2008) have written considerably about this subject. Both books written by Van Weele (2009) and Monczka et al. (2008) are excellent guides in designing the strategic purchasing process.

Strategic purchasing management is a process. Business strategies and objectives translate into functional strategies, objectives and eventually functional goals, also for the purchasing function. The design of a purchasing strategy, resulting in objectives and goals, is a comprehensive process. Many factors have to be taken into account, and many decisions have to be made (Monczka et al., 2008; Van Weele, 2009). First, the “make or buy” decision has to be made: what will be done inside the company, and what will be attracted from outside the company? Goods that need to be attracted from outside of the company can be divided into categories, or commodities. Per commodity, a clear view of how much is being spent on how many suppliers has to be obtained by means of a spend analysis. Each commodity gets its own strategy, in line with the business strategy, also entailing handling and categorization of suppliers in terms of selection and qualification. There are three possible categories for suppliers: (1) commercial suppliers; (2) preferred suppliers; and (3) supplier partners. The order fulfillment process and the new product development process are both possibilities for integration of best-in-class suppliers. Furthermore, suppliers can be challenged to provide new ideas and improve quality. Finally, the concept of “strategic cost management” involves the reduction or elimination of costs in the supply chain, together with suppliers.

Furthermore, there are several enabling processes (Monczka et al., 2008; Van Weele, 2009) that are of importance. As discussed in previous sections, strategies should be aligned. Functional strategies, including the purchasing strategy, should be supporting the overall business strategy. In the development of these strategies (and plans) all stakeholders should be involved. Also, internationally operating companies that apply global sourcing should do this thoroughly, taking into account cultural differences and legal issues. Measurement is of great importance. Therefore, key performance indicators, integrated into periodic reports, enable effective management and monitoring of supplier performance. IT systems are necessary for effective and standardized information and purchasing. Finally, human resource development and training ensures the right people in the right positions, and enhances skill level (Carr & Pearson, 2002).

## **Linking Business Strategy and Procurement Strategy**

Purchasing strategy, being a functional strategy, is linked to business unit strategies (Hofmann, 2010). In other words, is it based on company plans on an ongoing basis (Carr & Pearson, 1999). Purchasing serves the primary processes of the company, and needs to operate in harmony with the overall strategy of the company. This means that the purchasing strategy has to be linked to the business strategy. Literature is consistent in acknowledging the importance of this alignment between purchasing's decisions and activities with the overall strategy. Baier et al. (2008) have found support for the hypothesis that such strategic alignment (fit between purchasing strategy and business strategy) and purchasing efficacy (fit between purchasing strategy and purchasing practices) are of great importance to superior financial performance.

As emphasized before, because purchasing supports the business strategy, it needs to be tailored in order to meet the specific requirements of the business strategy (Watts et al., 1992). Then, and only then, the business units' market position can be enhanced by purchasing management, and can purchasing management effectively adds to business units' market position. Once such a purchasing strategy has taken shape, purchasing practices that support this strategy have to be built. These differ for the pursued competitive priorities, e.g. quality, cost, innovation (Baier et al., 2008). If for example the competitive priority is "quality", talent and supplier management require attention. However, if cost is being prioritized, knowledge and information management are of the greatest importance. Pursuing innovation requires purchasing integration and core purchasing processes. Furthermore, purchasing management operating at strategic level enables senior purchasing professionals to think about the implications of their decisions. Since the purchasing strategy is linked to the business strategy, taking into account purchasing's potential in shaping this business strategy will unlock the largest potential for value-creation (Baier et al., 2008).

The link between purchasing strategy and other strategies is referred to as "integrative strategy development" by Monczka et al. (2008). The importance of alignment is stressed, and the need for a development process on four different levels is emphasized: (1) corporate strategies; (2) business unit strategies; (3) supply management strategies; and (4) commodity strategies. The "integrative" part emphasizes the need for input from the people responsible for implementation. Furthermore, general objectives have to be translated into specific (tangible) goals, that are measurable and actionable. Purchasing strategies that are aimed at the procurement of a commodity, or family of products, require involvement of personnel familiar with the specific commodity.

## **2.4 Procurement process**

The Kearney's House of Purchasing and Supply (Kearney, 2011) consist of several stages or layers, each containing prerequisites for "purchasing excellence" (Figure 2.1). The House of Purchasing and supply consist of human resource management, information and know-



ledge management, performance management, operating process management, supplier relationship management, sourcing and category management, organizational alignment and supply management strategy. Operating process management is placed relatively low as a prerequisite for “purchasing excellence”.

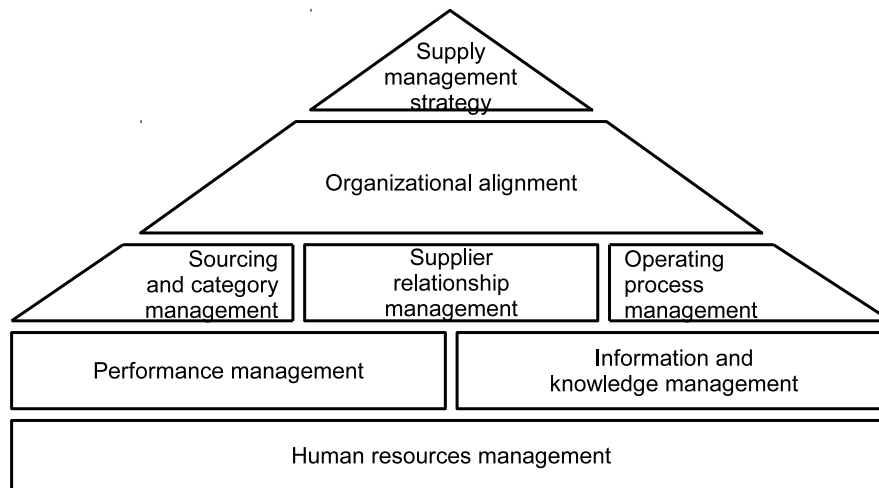


Figure 2.1: Kearney's House of Purchasing and Supply (A.T. Kearney analysis)

The purchasing process model of Van Weele (2009) is divided into tactical purchasing and order function, and consists of six steps (Figure 2.2). It starts with a demand from the internal customer. First, specifications are determined, after which a supplier is selected. As the final step of tactical purchasing, contracts are made. The order function starts with ordering, and expediting and evaluating the order. It ends with follow-up and evaluation.

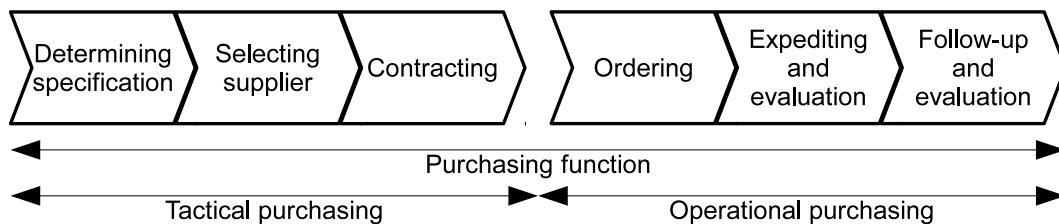


Figure 2.2: Purchasing process model by Van Weele (2009)

According to Monczka et al. (2008), responsibilities of purchasing that are included in their span of control are: (1) evaluation and selection of suppliers; (2) reviewing specifications; (3) act as primary contact between buyer and supplier; and (4) determine the method of awarding purchasing contracts.

## 2.5 Project Business / ETO

In developing a strategy, the environment is of great importance. Some companies produce ahead of customers' orders, and others react to customers' orders. Which strategic choice is made, depends on the type of service companies wish to deliver (Amaro, Hendry, & Kingsman, 1999). Project business is non make-to-order. In literature, various types of non make-to-order companies have been proposed (Amaro et al., 1999; Hicks et al., 2000): (1) assemble-to-order (ATO) production, the assembly of standard parts, mostly in stock already, is triggered by a customers order; (2) make-to-order (MTO) production, also triggered by customers order, sometimes also procurement or production of parts; and (3) engineer-to-order (ETO) production, requiring a unique design or customization, each customer receives a unique product. Redefining these three broader categories results in other categories, for example design-to-order, in which a product is even designed specifically for one customer. ETO is the most customized of the project business types. Core capabilities of ETO, or project manufacturing, are regarded to be tendering, design and contract management (Hicks et al., 2000). ETO is defined by being triggered by a customer and requiring the procurement and production of parts after this trigger. This results in challenges for purchasing. The fact that these purchases vary among projects often explains low professionalism in purchasing (Van Weele, 2009).

An Engineer-to-Order environment is characterized by highly customized or tailor-made products (Van Weele, 2009) designed from scratch or modified from an existing design. Furthermore, the customer-order decoupling point is at the design stage, so at the supplier (Gosling & Naim, 2009). According to Yang (2013), ETO shares characteristics with projects in being unique and temporary, and orders might be managed like projects. It delivers unique but similar products. On-time delivery and high quality are most important. According to Yang (2013), increasing liability or reduction of lead-times is a key competitive factor in ETO. In ETO, purchasing receives the specifications from the design function. This means that the specifications received by purchasing greatly determine the effectiveness of purchasing. Also, if these specifications are functional, it offers possibilities for innovation and cost reductions. Often, specifications are too detailed, leading to unnecessary activities in design and procurement that only increase cost and lead-time (Hicks et al., 2000). Furthermore, Hicks et al. (2000) state that purchasing in ETO companies tends to be "departmentalized and predominantly clerical in nature". Benefits of partnerships and a small base of reliable vendors are not recognized, because sourcing decisions are often made in the tender stage by customer specifications or design decisions by engineering. Vendor assessment and goods inspection are consequently necessary but both wasteful and cost and time consuming. According to Hicks et al. (2000), regarding procurement several factors are of importance in ETO companies:

- Early proactive involvement of procurement in tendering and product design decisions;
- The range of specifications, and the magnitude of contract value require the procurement function to be regarded as strategic;

- The role of the procurement specialist or manager.

This last item is approached differently in literature. Suggestions range a strategic role to an information and knowledge broker. However, there seems to be an agreement that the role of the procurement specialist should be more than just clerical or processing.

## **2.6 Management of Suppliers**

### **Supplier Relationship Management (SRM)**

Porter has been cited a number of times in the strategy section. However, in this section his views might not be concurring. Porter's view on supplier management is one that keeps several suppliers at arm's-length in order to increase bargaining power (Dyer & Singh, 1998). Dyer & Singh (1998) write about the success of Japanese companies that engage in partnerships with suppliers, and share information, invest in relation-specific assets and rely on trust. The writers address a third type of relationship, next to arm's-length and partnership: the durable arm's-length relationship, which is long-term and aimed at reducing administrative cost and realizing economies of scale in production. However, this type of relationship does not involve strategic inputs (Dyer & Singh, 1998).

There are several views on suppliers that determine the relationship dynamics between buyer and supplier. A dyadic buyer-supplier relationship is a relationship that solely takes into account the interaction between only these two actors. The value chain perspective looks at every step from raw material to end product, hence the company delivers this value to the customer together with its suppliers. A somewhat more narrow approach is looking at several upstream suppliers in the supply chain. The view on suppliers determines the relationship to pursue.

As discussed before, strategic buying has a positive impact on supplier evaluation systems, buyer-supplier relationship and a firm's financial performance (Carr & Pearson, 1999). The writers do place a remark that these impacts are stronger in the case of big firms. The amount of purchases of outside goods and services have increased (Anderson & Katz, 1998), as has the reliance on the upstream supply chain. The realization that purchasing has the potential to add value has been, and is being recognized by executives in many industries (Anderson & Katz, 1998). Supplier's capabilities support the purchasing strategy, and in turn the purchasing strategy supports the corporate strategy (Watts et al., 1992).

Dyer & Singh (1998) describe Porter's industry view, that attributes returns primarily to industry membership, and describes the Resource Based View, that attributes returns to a firm's resources and its heterogeneity within the market. They extend these views with interfirm linkages, and stress that a singular focus on a company or an industry might limit firm-level profitability. This fits the SRM focus, since SRM comprehends the link between trading partners and stresses the importance of it.

The concept of SRM is a popular topic in consultancy. Consulting firms like Accenture, Capgemini, APQC and Vantage Partners have reported about this subject. For example,

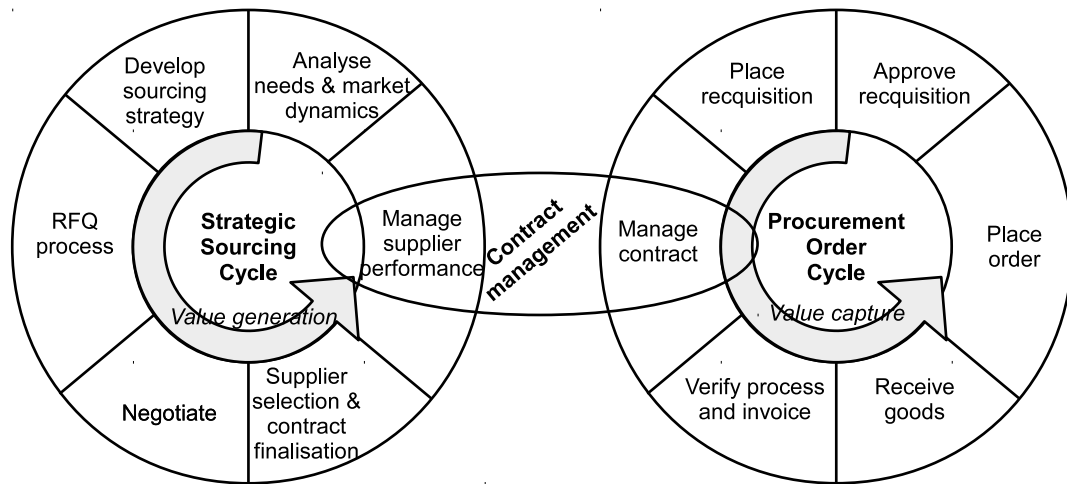


Figure 2.3: Capgemini Procurement Process Model (Capgemini, 2013)

Accenture and Capgemini have frameworks regarding procurement and SRM that are interesting. Accenture (2011) defines the concept of Supplier Relationship Management as “the systematic management of supplier relationships to optimize value through cost reduction, innovation, risk mitigation and growth throughout the relationship life cycle.” It extends the procurement focus and business focus, taking into account procurement, customers and suppliers (Accenture, 2012). The SRM framework as proposed by Accenture (2011) shows core components, supporting capabilities and linked capabilities that impact SRM.

- Linked capabilities are (1) sourcing / tendering; and (2) contract management.
- Supporting capabilities are (1) supplier segmentation; (2) roles, organization and governance; (3) change management and culture; and (4) systems and enablers.
- Core components are (1) supplier performance management; (2) supplier development and collaboration; and (3) supplier qualification and accreditation.

Capgemini (2013) proposes the procurement process in a model, the Capgemini Procurement Process Model (Figure 2.3), which is split in value generation (strategic sourcing cycle) and value capture (procurement order cycle). This model gives an excellent overview of the procurement process and the steps this process comprehends. Additionally, Capgemini (2013) divides the SRM process in nine sub-categories: procurement intelligence, project management, sourcing, supplier management, contract management, catalogue management, operational procurement, external resources and business process outsourcing. Furthermore, Vantage Partners (2013) report on the importance of SRM in the oncoming years, and state that additional investments will be made in SRM despite the fact that companies will need to undergo significant changes (moderate change to total transformation).

The largest payoffs are expected when investing time on SRM activities, skill building and (formal SRM) governance and business processes. In terms of Supplier Category Management, which is a part of SRM, APQC (2012) present some interesting findings. Strategic implications (based on best practices), which are most relevant to this literature review, are:

- Adopt a business driven focus;
- Balance long-term vision and planning with short-term agility;
- Separate strategic processes from tactical processes;
- Recognize supplier segmentation as a foundation for category management
- Engage procurement in the full value chain with a specific focus on customer needs and values.

The findings of APQC (2012) correspond to findings of Watts et al. (1992), long before publishing of the APQC (2012) report. Watts et al. (1992) report about a shift from an adversarial relationship to a cooperative relationship between buyer and seller. This is also something that is advised by APQC (2012). Furthermore, a shift from product/commodity based towards capability based supplier selection is something Watts et al. (1992) reports on. These shifts are characterized by terms like short-term to strategy and price/quality based to continuous improvement.

In complex-product industries, strategic supplier relationships tend to be preferred because the complexity increases the value that these relationships have (Dyer & Singh, 1998). Before deciding to engage in a strategic partnership, several factors have to be taken into account: financial issues, organizational culture and strategy issues, technology issues and other factors like business references and the supplier's customer base (Ellram, 1990). A complicating factor is the difficulty of measuring "soft" factors as management compatibility, goal congruence and strategic direction (Ellram, 1990). Furthermore, the long-term focus orientation makes the use of current performance measurement difficult.

Naturally, relationships shall not be maintained with every supplier. Gadde & Snehota (2000) delineate some remarks:

- The supplier must be motivated and interested as well;
- Potential relationship benefits must exceed investment cost;
- There are limits to investments that can be made, and every investment competes with others.

## **Portfolio Management**

In order to engage in SRM, the structuring and managing of a strategic supplier portfolio is vital. This subject has been discussed extensively in literature (Olsen & Ellram, 1997; Wagner & Johnson, 2004; Gelderman & Van Weele, 2005).

Gelderman & Van Weele (2005) discuss several portfolio models and recommendations (also those by Olsen & Ellram (1997)). The Kraljic-matrix, which is a product portfolio model that serves as a basis for classification of purchases and setting strategies for each of these purchases. It consists of four quadrants and is based on profit impact and supply risk. These two dimensions define the placement within the matrix. The four possible quadrants are (Gelderman & Van Weele, 2005):

- Non-critical items, having low profit impact and low supply risk. These need to be processed efficiently.
- Leverage items, having high profit impact but low supply risk. Purchasing power needs to be exploited.
- Strategic items, having high profit impact and high supply risk. Keywords in this quadrant are diversificate, balance or exploit.
- Bottleneck items, having low profit impact but high supply risk. For this category volume needs to be assured, and alternatives ought to be sought.

Gelderman & Van Weele (2005) state that because portfolio models are subject to interpretation, they require critical thinking and sophistication from the purchase function. Sophistication is explained as or measured in terms of reporting level (report to top management or lengthy reporting chain), contribution to competitive position (strategic or nonstrategic function), orientation on collaboration (partnership or adversarial relationship), cross-functional teams, strategies (skills to develop these) and clerical activities (strategic or administrative). This sophistication is determinant for the usage of portfolio models (Gelderman & Van Weele, 2005).

Olsen & Ellram (1997) provide a three step portfolio-model, in order to manage the different steps to manage supplier relationships. They also discuss the Kraljic-matrix (Kraljic, 1983). Wagner & Johnson (2004) also provide a three step approach to configuration and management of strategic supplier portfolios. There are differences and similarities between both approaches. In the approach by Olsen & Ellram (1997), the first step is analyzing the company's purchases. This is not limited to the amount of money spent on those purchases, but influenced by a number of factors. These factors include the strategic importance of the purchase and the difficulty of managing the purchase situation, and result in a 2x2 portfolio-matrix. The next step is analyzing the relationships in terms of relative supplier attractiveness and the strength of the relationships. This results in a 3x3 supplier-relationship matrix. Based on these matrices, step three consists of the development of actions plans. These are aimed at exploiting power (Gelderman & Van Weele, 2005). In the approach by Wagner & Johnson (2004), based on case study data, step one is planning. This planning phase comprises which suppliers to include and consequently which strategies to use for the individual relationships (that need to be specified). This portfolio is based on supplier strengths and own requirements. The second step is implementation of this portfolio, which consists of configuration (and reduction) of the supplier base, supplier development and integration of suppliers. Step three is monitoring and control,

varying from measuring outputs to measuring behaviors or actions. Interestingly, all firms studied (12 multinational companies) recognized that supplier portfolio management was of strategic importance (Wagner & Johnson, 2004). The paper is of value because it discusses the actual approach to configuration and management of portfolios, instead of solely emphasizing their importance. In configuration of these portfolios, the supply base is a vital part. Suppliers that are a part of the supply base, have once been chosen and need to be reconsidered. Weber, Current, & Benton (1991) discuss criteria and methods for vendor selection. This study provides an overview of which criteria are used to select vendors, and is a great tool in configuring a portfolio. Monczka et al. (2008) have extended the Kraljic purchasing portfolio matrix (Kraljic, 1983) with a strategy for each quadrant. Commodities can be divided into one of the portfolio categories, based on their complexity or risk impact and value potential. The division into quadrants below has been explained already, but will be extended by strategies, tactics and actions proposed by Monczka et al. (2008) (Figure 2.4).

Furthermore, a spend analysis gives insight into the amount money that is being spent on which suppliers, and provides supplementary information for the division in quadrants. Commodities are divided into bottleneck, critical, routine and leverage commodities. Each of these categories deserves a different strategy and different tactics, and results in a different set of actions. Once the suppliers are divided into one of the categories, they shall be evaluated to assess their suitability and narrowing the number of suppliers.

Dubois & Pedersen (2002) stress that the complexity of the network of suppliers (inter-firm interaction and relationship interdependence) has to be taking into account when working with portfolio models, and separate products and suppliers.

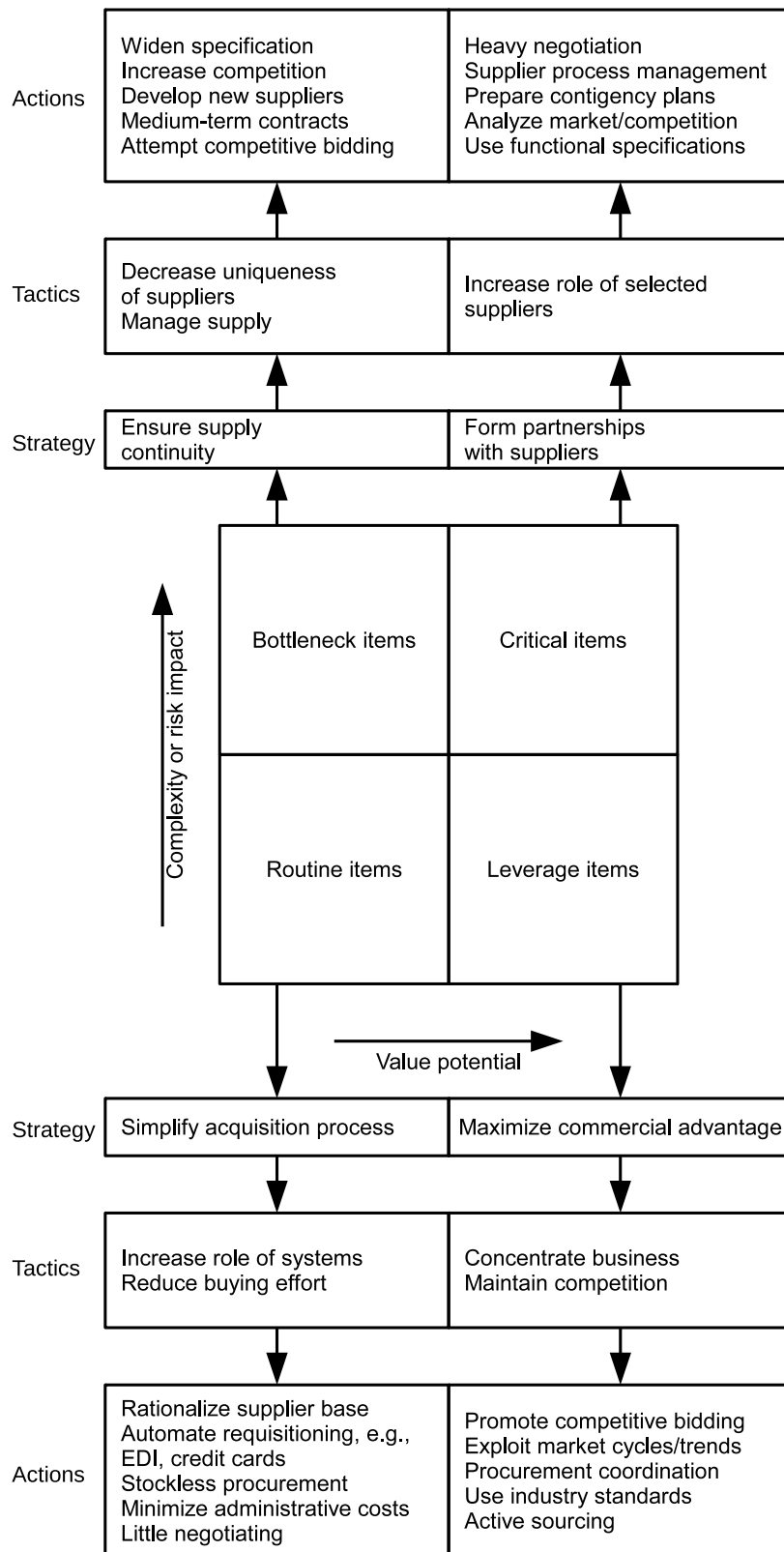


Figure 2.4: Quadrants and strategies, tactics and actions (Monczka et al., 2008)



## 2.7 Conclusion

The question that was asked at the beginning of this literature review was:

How to structure the procurement process, in project business, and what strategies to pursue?

The House of Purchasing and Supply (Kearney, 2011) shows the components of “purchasing excellence”. This model provides an overview of what is needed for successful procurement. Other models and theories can be placed within this house as a deepening layer. Several models and theories have been chosen to assess a selection of elements of the House of Purchasing and Supply, that make it possible to answer the above question.

### **Procurement process and project business**

One of the components of the House of Purchasing and supply is operating process management. The six-step purchasing process model (Van Weele, 2009) (Figure 2.2) shows the steps from specification phase to evaluation phase, and is divided into tactical purchasing and the order function. The way the procurement process is structured is dependent on the environment. In ETO companies, where each customer receives a unique product, purchases vary from project to project. In ETO, high quality and on-time delivery are essential. It is also considered a key competitive factor to increase liability and reduce lead-times. However, procurement is dependent on specifications of the design department. Incomplete or functional design requirements could increase cost or lead-times. This makes early proactive involvement of procurement in tendering and design decisions important. Furthermore, the range of specifications and the contract value requires procurement to be regarded as strategic.

### **Procurement strategy**

The concept of strategy is represented within the House of Purchasing and Supply as well. Procurement is a functional area, and the inclusion within the corporate strategy is relatively new. However, it contributes directly to the bottom line. A purchasing strategy is a functional strategy, based on the corporate strategy and in line with overall goals and objectives. A fit between corporate strategy and purchasing strategy is of great importance. Furthermore, the general objective within such a purchasing strategy need to fit purchasing activities, hence need to be translated into specific, measurable and actionable goals.

### **Supplier relationship management**

Supplier relationship management is at the center of the House of Purchasing and Supply. It is directly related to purchasing strategy. In complex product industries, like ETO, strategic supplier relationships are preferred because it decreases the complexity. However,

such strategic relationships do not fit each supplier. A spend analysis provides insight into the amount of money that flows to which suppliers. Combined with supply risk these can be placed into a portfolio matrix, like the Kraljic-matrix (Kraljic, 1983). Assessing this risk requires sophistication from the purchase department. Furthermore, part of relationship management and responsibility of purchasing, are the selection and evaluation of suppliers per commodity.



## Chapter 3

# Method

### 3.1 Introduction

This chapter describes the research method. It gives a clear overview of how the research is conducted, how data is collected and how the literature review and case study were used to design a solution and a change plan.

### 3.2 Method for research

After conducting a literature review on the topics of “procurement” and “Engineer-To-Order environment”, an opportunity to conduct a case-study at the purchasing department of an organization operating in this environment was accepted. This created a possibility to execute a practical business improvement project.

The aim of the research was to use theoretical insights (by means of a literature review) and practical insights (by means of a case study) to design a solution to the practical business problem. Well-suited for this is the “reflective redesign” as proposed by Van Aken et al. (2012) (Figure 3.1). This started with a general research question that concerned a business problem, as proposed in Chapter 1. The problem solving cycle was used to design a solution to the problem at hand, after the problem was explored and validated by means of a case study. This is explained in detail in Chapter 4. After the problem solving cycle, a solution to this problem in the case of the researched organization was posed in Chapter 5. A summary of the literature review and generalization of the case posed generic guidelines for business problems of this kind in Chapter 6.

The method was design-oriented and theory-informed. The problem faced by the purchasing department was explored and validated by means of interviews, a case study, documentation and data-analysis, in order to improve it. Findings from these interviews, desk-research and observation of the daily operations of the purchasing department and attending department meetings resulted in an Ishikawa-diagram, presenting causes for the business problem.

The role of the researcher was theory-informed, implying that acquiring information,

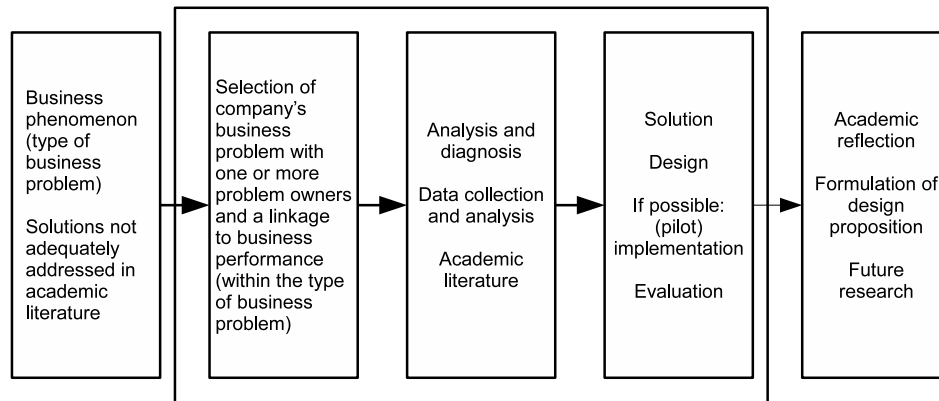


Figure 3.1: Reflective redesign (Van Aken et al., 2012)

obtaining feedback and developing acceptance were realized by regular discussions with stakeholders, in order to warrant for the greatest practical applicability. Analysis and solution of the problem were also theory-informed (Chapter 2), in order to realize a strong theoretical foundation. After the problem solving cycle, literature findings were combined in order to pose a generic guideline for organizations operating in an ETO environment.

### 3.3 Method for case study

#### Method

The next logical step was to compare the should-be situation with the actual situation. Data was used in order to map the current situation, and compared to models found in literature, in order to validate and explore the problem. This was done based on the purchasing process model of Van Weele (2009).

A description of the company was given, in terms of size, market, products, turnover and strategy. Once a broad picture of the company was painted, the procurement process was zoomed in on. The situation that was desired, according to process owners, was portrayed using documents from the organizational archives (intranet) and the organizations' management system. The data is partly unobtrusive, which means that it is collected without direct involvement of people.

#### Cases

An analysis and comparison of a selection of procurement situations was done, including interviews with buyers, expeditor and suppliers (N=12). This source of information was used to portray the current procedures in an objective manner and to compare them in order to find patterns (Appendix A). Purchases were analyzed and compared in order to find out what the common method of procurement is being used by buyers. Four purchases were selected, analyzed and compared (Appendix A). All persons involved were

interviewed (N=12). They were selected in consultation with management, and based on a combination of value, criticality and type of problems encountered. Furthermore, suppliers involved were approached with a questionnaire. In most cases, it was possible to discuss the case with the supplier during a meeting with the supplier, either at the researched organization, or at the facility of the supplier. Due to confidentiality and traceability, answers given by suppliers and buyers are presented as a summary and comparison.

## **Procurement data**

Data of external transactions, ranging from January 1st, 2012 to December 31st, 2014, was used to analyze the supplier portfolio, in terms of the amount of money, transactions and purchase orders. It was selected after discussion with the persons responsible for internal (master) data control and analysis, which have in-depth understanding of the data available for research. The values shown are invoice values, and the dates shown are invoice dates. The data source was the ERP-system (ISAH).

## **Interviews**

Management and staff of four departments (central procurement, after-sales, work-preparation and subcontracting, supply chain, quality assurance), and representatives of several suppliers were interviewed (N=18) (Appendix B). The semi-structured interviews were used to find out the information that is not accessible from data, or is not being recorded, such as supplier performance.

The respondents were chosen by means of the degree of involvement in the problem, or distance to the problem. Persons directly involved or related to the problem were interviewed. This includes persons responsible for departments engaging in procurement-related activities, persons operating in procurement-related activities concerning critical items, persons maintaining or managing relationships with suppliers, including persons performing supplier quality audits and persons representing suppliers themselves. The following persons were interviewed: Manager Supply Chain and Procurement, Assistant Manager Supply Chain, Assistant Manager Procurement, Supply Chain Coordinator, Strategic buyers (3), Procurement Officers (7), Expediter, Manager Work Preparation and Subcontracting, Manager Area Sales, Quality Assurance Coordinator, Process Analyst Engineering and contact persons at four suppliers (7).

## **Documentation**

Documents from the organization archives (intranet) and the organizations' management system aided in finding out how processes and procedures concerning procurement and SRM were designed.

The documents from organizational archives were found on the internal servers, or provided by persons active in the process of purchasing.

### 3.4 Method for solution design and change plan

Figure 3.2 shows the steps from problem analysis to design. After the analysis of the problems in the purchasing department, and the development of design requirements, the synthesis-evaluation iterations follow in the form of 'sketching' (Van Aken et al., 2012). Inputs to sketching were problem-related inputs and a model of the present business system, both following from the case study, and solution-related inputs following from a comparison between the should-be situation and current situation.

Ideas for possible solutions, together with requirements from stakeholders within the procurement department, and boundary conditions were part of the solution-related input. These ideas could be from stakeholders within the organization, but need not be. Each chosen solution was described in terms of how this solution could solve the problem.

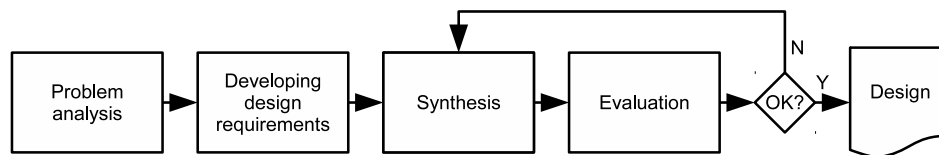


Figure 3.2: Redesign (Van Aken et al., 2012)

### 3.5 Quality of research

Shrivastava (1987) poses several criteria for rigor. An extensive literature review warranted for conceptual adequacy. The use of procurement data (objective and quantifiable), and the use of and comparison between different instruments (triangulation) secured methodological rigor. Furthermore, Shrivastava (1987) explains criteria for relevance. Close contact with people involved in all stages made sure the research would evolve into a practically useful redesign and change plan. The aim was to validate and describe the problem at hand with the highest possible accuracy, and to be understandable and adequate in order for the redesign to be meaningful. Furthermore, the redesign aimed to transcend commonsense solutions by being innovative. The extensive change plan has clear action implications to secure operational validity, and contains performance indications relevant to management goals. Finally, the change plan assesses possible resistance, actions and timings in order to warrant for feasibility of the redesign.

Additional criteria for quality research are reliability, validity, controllability and recognizability (Cooper, Schindler, & Sun, 2008; Van Aken et al., 2012). In order for research to be reliable and valid, it should allow to be validated. A detailed description of the method that makes exact replication possible is necessary. Instruments that were used are procurement data, interviews and company documents. Interviews were compared and employees from different departments and places within the hierarchy were inter-

viewed, as well as suppliers themselves. These sources of information were triangulated in order to minimize bias and maximize reliability. In turn, reliability is a condition for validity, measuring what is actually intended to be measured. Content validity was secured by means of the theoretical foundation, and comparing the research and results to the research reviewed in the theoretical foundation to check whether the concept is covered completely. Construct validity was secured by means of the extensive literature review. Using this while designing the measurement methods made sure that these measured what was needed to be measured. The internal validity was challenged by finding other plausible explanations. If none were found, the internal validity was judged satisfactory. External validity is of lesser importance in problem solving projects, and of greater importance in theory-oriented research.

### **3.6 Conclusion**

The method used for the research was the “reflective redesign” (Van Aken et al., 2012). The literature review provided a strong theoretical foundation. The general research question was validated and explored by means of interviews, a case study, documentation and data-analysis. Next, the problem solving cycle was used to design a solution for the problem at hand. The method of research warranted for high quality, and attention was given to the rigor and relevance of the research.





## Chapter 4

# Case study

### 4.1 Introduction

This chapter describes the case study. The aim to portray the current situation. As a starting point, a selection of procurement cases was analyzed. The results of these cases were verified by means of semi-structured interviews, analysis of procurement data and analysis of internal documents. The current situation is summarized in an Ishikawa-diagram. Possible solutions after analysis of the current situation are presented at the end of this chapter.

The question that is answered by the case study is:

How does the organization being researched currently organize the procurement process, and what is the role and importance of suppliers?

In order to find out how the procurement process is currently organized, the literature review has been used as a starting point. The procurement process at the researched organization is analyzed based on the House of Purchasing and Supply (Kearney, 2011) and compared to the six-step purchasing model by (Van Weele, 2009) (Figure 2.2). The procurement strategy is compared to the description in literature. Furthermore, supplier relationships and the management and evaluation of these have been analyzed based on the literature about these subjects.

### 4.2 The researched organization, and the role of procurement

The researched organization designs and manufactures lifting, drilling and sub-sea equipment for on- and offshore companies. It is a globally operating company, with locations in Europe, Asia and South-America. Furthermore, there are several service locations in Europe, South-America and North-America. Its annual turnover is approximately €450 million.

In June of 2014 the CEO presented his vision in the company magazine. He states that strengths lie in innovative solutions, high quality and reliable equipment and long-term

trustful relationships with clients. Several of the presented goals appeal to procurement, for example strengthening relationships with the supply chain and reduction of costs by 5-10% a year. The mission statement was launched in the company magazine as well: "To be acknowledged by our clients, our people and other stakeholders for delivering what we promise: a competitive edge through high-quality solutions and services that are consistently best in class and on the cutting edge of technology." However, this corporate strategy has not been translated into a functional purchasing strategy or mission.

Decreasing oil prices affect the offshore market. The researched organization notices this and sees the number of orders decline, or at least the necessary effort to win orders increase. This makes concessions necessary in terms of price decreases and delivery time decreases. This difficult market environment makes cost cutting necessary throughout the organization.

### **4.3 Procurement cases**

As a starting point, a selection of cases was analyzed (N=4) (Appendix A). For each case, buyer, expeditor and supplier were interviewed.

The analysis revealed that no supplier or case was formally evaluated. Decisions were based on subjective information ("gut-feeling"). The objective information that was recorded, such as confirmed delivery date, was processed incorrectly. No supplier performance was recorded.

Each of the cases was delivered with a delay, but the cause of delay was not uncovered, nor recorded. In two cases, a not-approved purchase order was sent. The supplier in question was dealing with uncovered costs due to a canceled not-approved purchase order. In three cases, the amount of revisions (up to revision H) caused confusion and the repercussions of these revisions, in terms of delivery delay and increased costs, were not discussed.

Feedback from suppliers confirmed findings from the case studies. One supplier indicated that problems often originated from "partly complicated and unclear composition of purchase orders". A second supplier expressed his concern about the threat of management intervention, and even the "creation of fear" and "strong emotional management", not based on objective information. Furthermore, the number of revisions during manufacturing, incomplete engineering and re-occurrence of problems were mentioned as a problem by several suppliers. After these findings, further analyses were done in order to validate and explore the above discoveries.

Furthermore, table 4.1 shows a comparison of the cases.

	Case I	Case II	Case III	Case IV
Delivery delay	✓	✓	✓	✓
No formal evaluation	✓	✓	✓	✓
Revisions	✓	✓	✓	
Not-approved purchase order			✓	✓
Single sourcing				✓
Delivery issues	✓			
Incorrect processing of information				✓

Table 4.1: Case comparison

## 4.4 Analysis of procurement processes

### Description of the should-be situation

Currently, the intranet offers the Management System, which shows processes in a large flowchart (Figure 4.1). Procurement is present in two places of the flowchart: in the procurement of project related goods and in the procurement of after-sales parts.

According to the Management System, the process for project related goods is as follows. The work-preparation department prepares the purchase request, and sends it to procurement. Work-preparation decides whether the product has to be procured externally or has to be subcontracted. If according to work-preparation the goods have to be acquired externally, the purchase orders are forwarded to the purchasing department. Furthermore, work-preparation is to forward revisions to purchasing. Purchase orders and revisions are sent to the right person, based on his or her commodity. For existing articles, reference contracts are looked up in the contract database. For new articles, a request for quotation is placed. The next step is the creation of a purchase order, which has to be approved by the budget-holder (in case the buyer is not authorized) and the CEO (in case it is a critical component). After authorization, a purchase order is sent. After confirmation from the supplier, the acknowledgment has to be checked and accepted, after which the purchase order has to be updated. The expediting phase follows, and repeats if there is a delivery delay. In this case, the planning has to be adjusted. If no external goods check is needed, or the check is satisfactory, the receive-and-release phase is entered. After receiving and checking of documents and quality, goods are released to the requesting department.

This flowchart is supported by documents. The intranet offers several documents to employees. The majority of these documents has not been updated during the last five to ten years. The purchase procedure has been written in 2004. In 2009 a work-instruction is added to the intranet, which is an executive instruction of how to use the ERP system to create a purchase order.

Human Resources are the foundation of the Kearney House of Purchasing and Supply (Kearney, 2011). At the organization that was researched, commodity buyers are di-

vided into two categories: Procurement Officers and Strategic Buyers. Within these categories there is a difference between respectively B and C, and Medior and Senior. A Procurement Officer has a Higher Vocational Education, preferably in a technical subject, and has completed NEVI-courses level 1 and 2. A Strategic Buyer has the same requirements in terms of education, yet his market, product and procurement knowledge as well as his network in his commodity is important. A Senior needs to have additional knowledge about worldwide trade.

## **Analysis of the actual situation**

There is no functional strategy or mission that provides a foundation for measurable actions. Due to the absence of a strategy or mission, it is not clear what the (common) goal is. The terms interviewees use most frequently are short-term and ad-hoc, to describe the current way of working. This is also confirmed by interviews, observation and desk-research. These show that there is no common method of working. There is structural deviation from the process as shown in the management system. Considering the growth the organization has experienced since the last update of the documentation, its usability is limited.

During the interviews, the purchasing process as described by (Van Weele, 2009) and the process as described in the management system where used to compare and benchmark. The method of procurement differs for each interviewee. However, some interviewees find this positive, since it gives them a lot of freedom in doing their job. Yet most interviewees emphasize a need for more guidance or uniformity. The positive part of the interview is mostly the emphasis on the fact that the job is getting done either way ("But we always get the job done").

A comparison of several procurement cases shows deviations from the procurement process in several forms. Purchase orders are sent without approval, and are in some cases approved after the actual delivery has already taken place. In some cases this is due to the approval procedure that often takes long. However, this approval procedure is necessary for amounts of higher than €500. One can imagine that suppliers might tend to be hesitant, because the purchase order has not been formally approved. This in turn might lead to delays. However, this method is risky: one interviewed supplier that on request already started without the approved purchase order was now dealing with cancellation of this purchase order, and uncovered costs. Furthermore, different delivery locations are placed in one purchase orders, which can lead to miscommunication and delivery to the wrong location. The supplier in question confirmed this and complained about unclarity concerning the delivery address ("Unclear to which location the goods should be shipped"), which lead to significant delays. Finally, in some cases no alternative suppliers were considered and no requests for quotation were sent out. A long relationship with a supplier was used as a reason for not making contracts.

Because of differences in purchasing processes, it is difficult to monitor and measure. Research shows that there is no structural monitoring. Data is partially reliable, because it is not processed consequently and correctly. Opinions concerning the point in time after

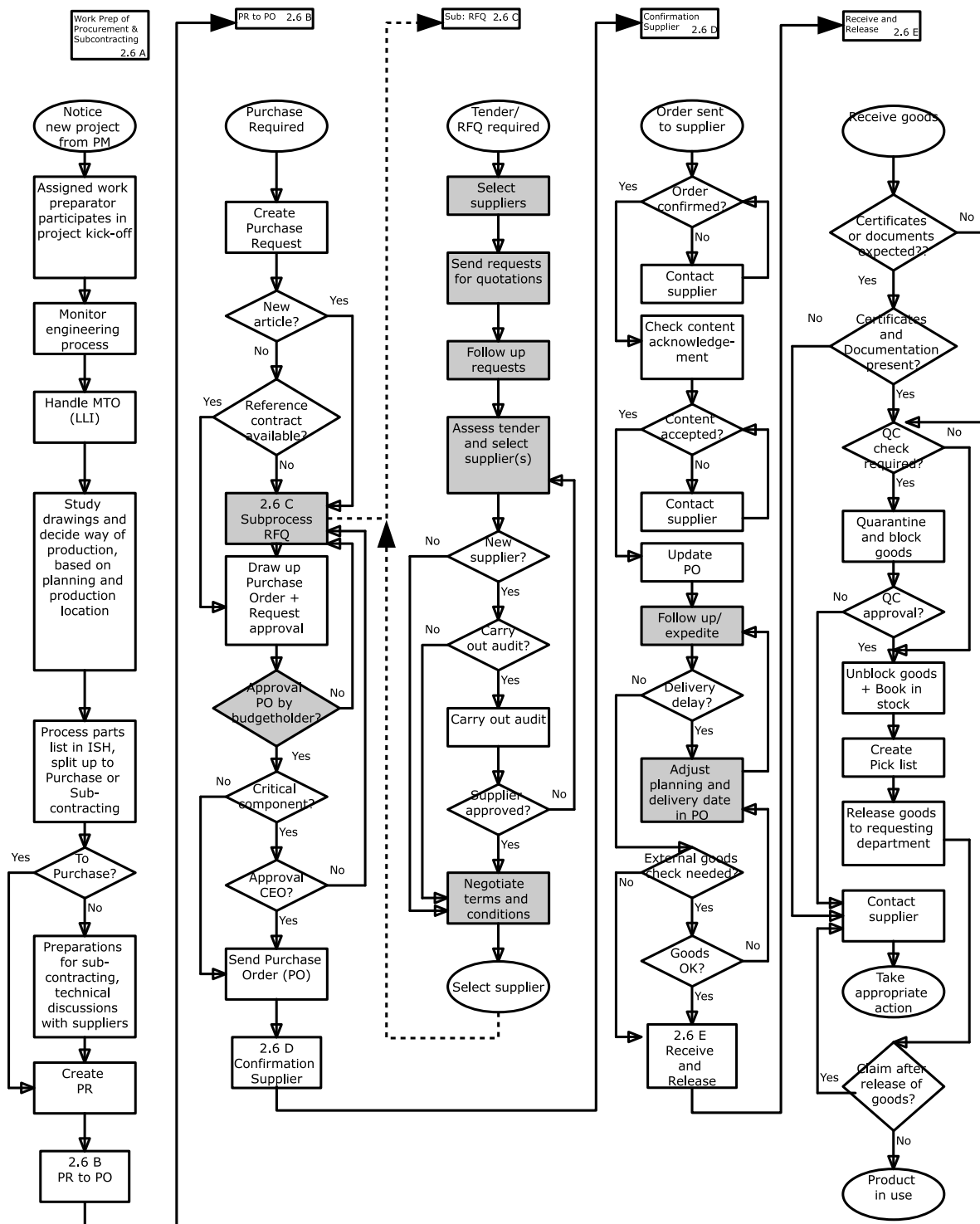


Figure 4.1: Flowchart of the procurement process, issues have been colored grey

which the data is reliable differ. Generally, data is regarded as reliable after 2011 – 2012. Although there is data and incidental reports are made, it is not being used to monitor in a structural way. However, it is clear that delivery delays are a problem. These are partially caused by incomplete specification or over-specification, which limits the choice of suppliers or results in unnecessary troubles.

Furthermore, observations and interviews show that there is little cooperation between the central procurement department and the after-sales department. Consequently, there is a difference in purchasing maturity and purchasing processes between central procurement and after-sales.

Next to the central procurement department and the after-sales department, the work-preparation is one of the main departments that engage in procurement actions. Work-preparation receives requests from engineering and decides whether the product has to be procured externally or has to be subcontracted. If according to work-preparation the goods have to be acquired externally, the purchase orders are forwarded to the purchasing department. Orders are forwarded to buyers based on commodity. The number of forwarded request partly determines the workload of each buyer, next to the commodity he or she buys. Buyers indicate that the workload differs significantly between them. Work-preparation also forwards revisions to the central procurement department. Often, these are passed on to the supplier without discussing repercussions for delivery times and price. In one of the cases, up until revision H was processed. Suppliers also complain about the number of revisions, and unfinished specifications received. They request to be informed earlier about revisions, and about changes in the process.

To a certain degree, purchases are being done by other departments, and not by the top three biggest departments that engage in procurement activities. After delivery, the procurement department is asked to create a purchase order. In several cases, there are production-related services and products that are not represented by a purchase order. The management and staff of the procurement department are trying to decrease this “wild buy”. However, interviewees indicate that this is difficult, since the image known to them, which is shared by many, is that procurement is a “necessary evil”.

Furthermore, research shows that the ERP software being used is limited. There are many purchase orders, many suppliers and few framework contracts.

## **Conclusion**

The professionalism in the procurement department is low. There is no strategy or mission and there is no shared way of working. The process as described in the management system is deviated from, and the supportive documentation has not been updated during the last five to ten years. Furthermore, monitoring is currently not done, so there is no clear view on the current situation within the procurement department. As a result, there are many delivery delays. These are partially due to the amount revisions, which are not always forwarded to the responsible buyer. These lead to increased cost, by for example a need for urgent transport. The low professionalism, leading to unforeseen complications, leads to the departments negative image.

## **4.5 Analysis of procurement data**

### **Analysis**

Objective procurement data was used to analyze indicators of unsatisfactory procurement and supplier relationships.

Data of external transactions, ranging from January 1st, 2012 to December 31st, 2014, was analyzed. The goal of this analysis was to uncover signs of inefficiency and possibilities for cost reduction.

The ABC-analysis shows for both the new-build department and the after-sales department which suppliers received how much spend in 2014. A-category suppliers received 80% of the spend, B-category suppliers the next 15% and C-category suppliers the final 5%. For the new-build department, these categories were respectively 9%, 14% and 77%. For the after-sales department, these categories were respectively 16%, 22% and 62%. A small part of the suppliers, especially for the new-build department, received a large amount of the total spend.

The new-build department represented 85% of the spend during 2012, 2013 and 2014. The central procurement department spends 84% of these 85%. The remaining spend is represented by the work-preparation department. After-sales (10%) and other departments (5%) represented the remaining total spend.

Of all production-related orders, 97% is represented by a purchase-order. Of all orders, including non-production related, 64% is represented by a purchase-order.

For new-build purchases, the approval procedure is necessary for order values of higher than €500. In the past years, this means that 58% of orders had to be formally approved by the approval procedure.

Of all suppliers that have received production-related purchase orders in 2012, 2013 and 2014, 37% have received a maximum of one purchase order. In 2014, this was 35% of these suppliers. Of all purchase orders, 55% is lower than €1000, 27% is lower than €200 and 23% lower than €150.

60% of the suppliers receiving production-related orders, is labeled as “approved”. These suppliers receive 88% of the production-related spend in 94% of the production-related purchase orders. The approved suppliers are subdivided into commercial (77%), preferred (17%), critical (6%) and partner suppliers (1%).

### **Conclusion**

There are many suppliers, and the C-category of suppliers is large, especially for the new-build department. A substantial amount of suppliers has received a maximum of one purchase order. Furthermore, because purchase orders are made for low-value, frequent orders (like nuts and bolts) the value per purchase order is low and the bottom line of a large part of the purchase orders increases dramatically because of handling cost.



## **4.6 Analysis of Supplier Relationship Management**

### **Description of the should-be situation**

Among the documents that support the flowchart is a performance matrix for suppliers, which was updated last in September 2007. It also contains an instruction for evaluating suppliers and subcontractors. This was last updated in May 2004. One of the steps in this instruction is monthly updating the aforementioned performance matrix, which has not been done during the last seven years. Terms and conditions that are used, are written in 2003. However, they are scheduled for replacement.

As mentioned before, there is an approved vendor list that is being updated on a regular basis. Furthermore, several suppliers are labeled 'approved' in the ERP-system. Next to the "approved"-label, there are classifications. These are ad-hoc, commercial, preferred, partner or critical.

### **Analysis of the actual situation**

There is a list of approved vendors, and certain vendors are labeled as "approved vendor" in the ERP system. However, it is not completely clear which formal path is taken to label a supplier as "approved vendor". The buyer chooses the supplier he or she finds best based on previous experiences, which is subjective information, resulting in decisions made based on "gut-feeling". Performance is not formally recorded or shared with other buyers. Supplier evaluation is not being done in a structural way. Several interviewees indicate that supplier relationships are unsatisfactory. This is confirmed by experiences of the quality assurance department, indicating that supplier audits often start off negatively because of the view suppliers have of the organization is negative. This is also confirmed by interviews with suppliers, which address the existence of a possible threat of management involvement and losing a client. One interviewed supplier referred to this as "strong emotional management" and the "creation of fear".

Intransparency about the cause of problems, and the share of the supplier, makes it possible for a buyer to refrain from doing business with this supplier without questions being asked. Because there is no objective information about performance, either due to the fact that performance is not recorded or that data is incorrectly processed (for example, confirmed delivery dates), the cause of the problem cannot be found easily and buyer can provide his own explanation. If a buyer personally dislikes the supplier, this makes it possible for him to decrease the number of orders at this supplier.

Furthermore, this inconsequential and incorrect processing of dates (for example request, approval, delivery dates and modifications) leads to unexpected delays or problems, which could have been anticipated upon.

## Conclusion

The lack of vendor management results in decisions made based on “gut-feeling”. Supplier performance is not recorded and there is lack of transparency about causes and effects of problems. This intransparency increases the power of individual buyers, because there is no objective data to limit them in their actions.

### 4.7 Conclusion

Results, in terms of causes, were summarized in an Ishikawa-diagram (Figure 4.2). Causes were divided into four categories in the Ishikawa-diagram, and the discussion: (1) management and staff; (2) method / process; (3) product; and (4) information system.

Before analysis, based on Van Weele (2009), low professionalism could be expected because purchases vary among projects. Based on Hicks et al. (2000), a purchasing function that is “departmentalized and predominantly clerical in nature” could be expected. Analysis of the purchasing department, in terms of interviews, internal documents, procurement data and comparison of several cases, leads to several conclusions. Many adhere to expectations based on literature concerning purchasing in project environments.

The professionalism in the purchasing department is low. The purchasing methods and processes are an unambiguous cause for unsatisfactory procurement and supplier relationships. The lack of a shared way of working (and documentation about this) lead to inconsequential and incorrect processing and sharing of information. In turn, this leads to confusion and vagueness about progress of orders and expected delivery. Subsequently, problems are not recognized in time and lead to unforeseen situations, in which information (e.g. revisions) is not readily available to all stakeholders. Once problems arise, several solutions have already become impossible.

Another consequence of the lack of a shared way of working is the output of unreliable data. This makes monitoring difficult, since the data might lead to unjust conclusions. However, due to the lack of monitoring, there is no objective view on the status quo of the purchasing function. The business tool that is available is currently not widely used to monitor, partly because of lack of understanding among the targeted users. Within the “plan-do-check-act”-cycle, this directly impedes the possibility to perform the “plan”, “check” and “act” steps. Obtaining an objective view on performance and being able to adjust accordingly is not possible.

The ERP-system that is used is scheduled for replacement. It is limited in use. Currently, it is used for all purchases. For each part or product that has to be ordered, including low value, commonly ordered consumables, a purchase order is made. This results in many low-value orders, 23% below €150 and 27% below €200. In such cases, the cost of processing the order greatly adds to the bottom line price of the product.

Furthermore, the approval procedure is not synchronous to the purchasing process. Purchase orders are sent out without approval. Apart from the fact that this is not according to procedures, it might lead to hesitant or withholding supplier co-operation, since

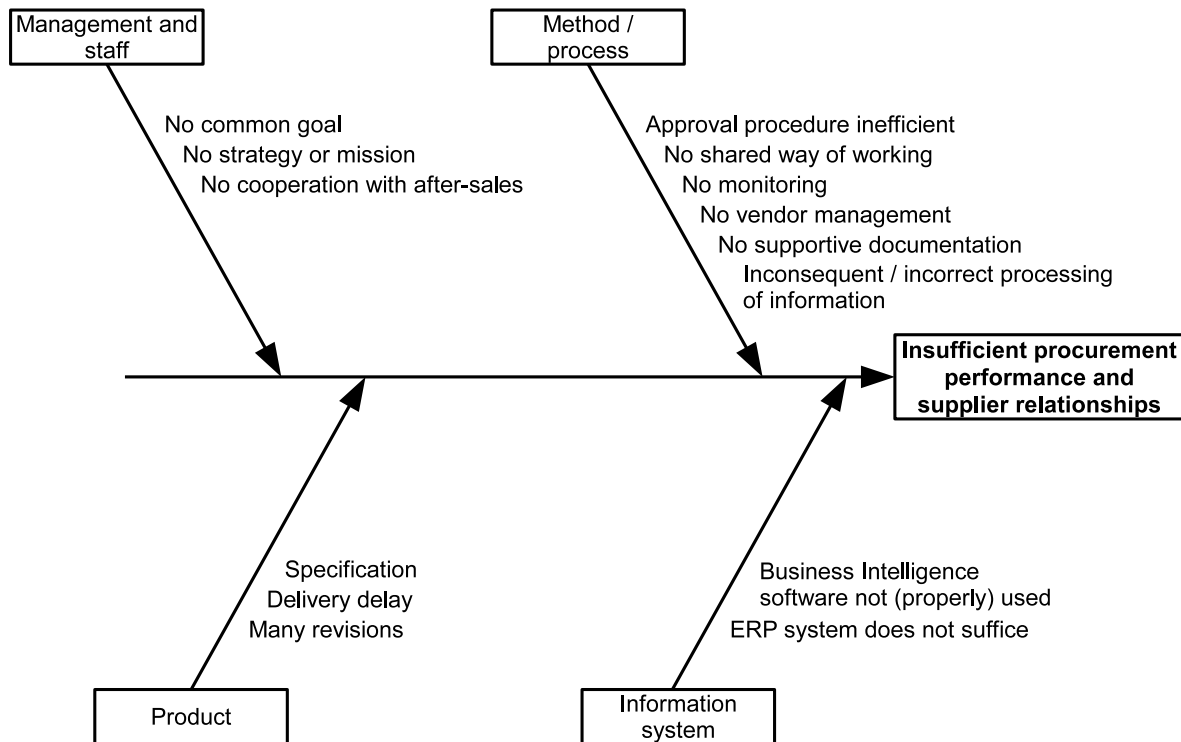


Figure 4.2: Ishikawa-diagram

a not-approved purchase order might not provide a sufficient base for full co-operation. However, the approval time for a purchase order might consume time that is critical for timely delivery.

The evaluation phase is rarely present. Evaluations are not formally processed or shared, which results in supplier selection decisions based on ‘gut-feeling’ and subjective information. From a tactical point of view, transparency is desirable. Information that is not shared could be lost if the person that possesses that information is not readily available (anymore). Furthermore, transparency makes decisions based on objective information possible, and makes it harder to act solely based on “gut-feeling”.

The low professionalism in purchasing leads to delivery delays, increased costs (e.g. urgent transport), increased workload and unsatisfactory supplier relationships. The “but we always get the job done”-attitude, and the custom of blaming others, distracts attention from problems, which makes it more difficult to change the current situation. Finally, the problems in the procurement department lead to a negative image within the company.

## Chapter 5

# Solution design and change plan

### 5.1 Introduction

This chapter provides an in-depth discussion of the selected solutions to the problem, including a justification and a change plan.

The question that is answered by this chapter is:

How to structure the procurement process, in order to get better results from suppliers?

### 5.2 Design requirements

The redesign is subject to several design requirements Van Aken et al. (2012). These can be divided into four categories: (1) functional requirements; (2) user requirements; (3) boundary conditions; and (4) design restrictions. Table 5.1 shows these categories and the requirements included.

Category	Requirement
Functional	Provide process uniformity Improve efficiency and effectiveness Have benefits in monetary terms Improve supplier relationships
User	Be supported by majority of stakeholders Be supported by management
Boundary	Be conclusive about responsibilities Be practical Fit into an ETO environment Fit into the corporate strategy and mission Fit into the company culture

Table 5.1: Design requirements (Van Aken et al., 2012)

### 5.3 Solution: short term

#### ABC-analysis

The ABC-analysis shows that 9% of the suppliers receive 80% of the spend. The contracts with these A-category suppliers need to be (re-)negotiated, resulting in better terms and savings. The B-category and C-category, receiving 20% of the spend but consisting of 91% of the supplier base, need to be reduced in amount of suppliers.

Once supplier evaluation has been accepted as a part of a standardized purchasing process, a foundation for supplier management is laid. This makes it possible to downsize the supplier base to a smaller number of reliable vendors. A standardized purchasing process and the structural processing of supplier evaluations (both medium term or long term solutions) provides input for an effort to downsize the supplier base, and use supplier performance as a topic to address during negotiations.

#### Kraljic-analysis

Each commodity requires its own strategy, based on the functional strategy of the purchasing department. This has to be supporting the overall business strategy (Baier et al., 2008). This integration of strategies is called “integrative strategy development” (Monczka et al., 2008). A commodity strategy entails handling, categorization, qualification and selection of suppliers.

A Kraljic-matrix should be created (Kraljic, 1983). Purchases are placed in this matrix based on financial risk and supply risk. The possible quadrants are: (1) non-critical items; (2) leverage items; (3) strategic items; and (4) bottleneck items. Such models are subject to interpretation, and require input from several functions.

The top 25 part-groups for new-build projects have been placed into a matrix. These part-groups are placed into different quadrants. Financial risk is based on a spend ana-

lysis of purchase data concerning external transactions of production-related part-groups in 2014. Supply risk is based on the impact of an interference of the availability of the product, the number of alternatives, the technological development speed and the ease of switching to an alternative. Supply risk was assessed together with the Supply Chain Coordinator, but needs to be checked by project coordinators and commodity buyers.

Placement within this matrix determines the strategies, tactics and actions that have to be followed (Monczka et al., 2008).

An example of a strategic item is “hydraulic cylinders”. Because supply risk is high, a partnership with suppliers should be formed. They should enjoy an increased role, and should receive functional specifications. Buyers should have excellent market knowledge, which can be used during negotiations. If possible, competition should be increased. Part-groups having similar financial risk, but lower supply risk, are “plates” and “steel-structures”. These are leverage items, which means that in terms of strategy, commercial advantage should be maximized. This way, an effort is made to decrease the financial risk, by for example competitive bidding or active sourcing, and concentrating business to exploit purchasing power. A different approach should be taken towards suppliers of “sheaves”. The financial risk in this case is relatively low, yet the supply risk is high, making it a bottleneck item. Continuous supply should be assured and new supply possibilities should be researched, in order to decrease the supply risk. A part-group like “inserts/accessories/consumables” and “cables” enjoys low supply risk as well as low financial risk. The purchasing of these items should be simplified, because the handling cost is relative to the item cost is relatively high.

## **Conclusion**

“Quick wins” are short term possibilities to reduce cost. An ABC-analysis allows for supplier base reduction, and renegotiation of contracts. A spend analysis shows part-groups and suppliers related to a monetary amount. Together with supply risk, this makes placement into a Kraljic-matrix possible. The placement within this matrix determines strategies, tactics and actions.

## **5.4 Solution: medium term and long term**

### **Information system**

The ERP system is not sufficient and an investment should be made in a new ERP system, that is company wide. IT systems are needed for effective and standardized information (Monczka et al., 2008).

It should be easily accessible which supplier delivers which product or service, and who controls the budget or project. Furthermore, it should be easier to record supplier performance, and access this information in order to engage in vendor management.

## **Create a standardized procurement process**

The current way of working differs per buyer in terms of supplier selection, contracting, ordering, expediting, follow-up and evaluation. Findings from the analyses show that in some cases, there are no quotations requested or alternatives considered. Orders are sent out without approval. Some buyers expedite themselves and some buyers ask the expeditor to do this. Evaluation is rarely done and not recorded.

A standardized, recorded and transparent way of working entails clear steps to be followed by each buyer in order to make sure that the responsibilities of purchasing are followed. According to Monczka et al. (2008), these include evaluation and supplier selection, reviewing specifications, awarding contracts and acting as a primary contact between buyer and suppliers.

Based on the purchasing model by Van Weele (2009), this would mean that the purchasing process needs to be divided into several steps. These steps form the foundation of the standardized purchasing process.

An example of a purchase is given in Figure 5.1. The operational purchasing phase requires the most attention, because the biggest issues are in these operational steps. This is also the phase that will be explained first.

### **Operational purchasing**

Once a supplier is selected and the contract is finished, the approved purchase order should be sent to the supplier. At the researched organization, the order has to be approved first. This approval often takes a lot of time and as a consequence of this, orders are often sent without approval. As part of the standardized purchasing process, buyers should be able to authorize the order themselves, up to a higher amount than the current €500.

Currently, there are few framework agreements. This number should be extended, and a call-off agreement with several suppliers should be made. This might also force engineers to apply standardization in their designs, in order to fit the framework agreements. Furthermore, the number of purchase orders concerning consumables with low value should be reduced. A framework agreement about such consumables should be made, and the ordering software of the supplier should be used to order such items by the user himself.

Furthermore, the number of orders without purchase order should be reduced. The practice of sending an invoice to a buyer after the product or service has been delivered, asking him to create a purchase order, should be stopped.

The buyer should check the progress of the order regularly. The expeditor should be kept informed and should have a helicopter view which enables him to proactively discover and attack problems. If problems arise, the case should be handed over to the expeditor and he should act as a primary contact between supplier and company. This decreases the possibility of miscommunication and unnecessary communication.

The final phase is of vital importance: the follow-up and evaluation. Evaluations of

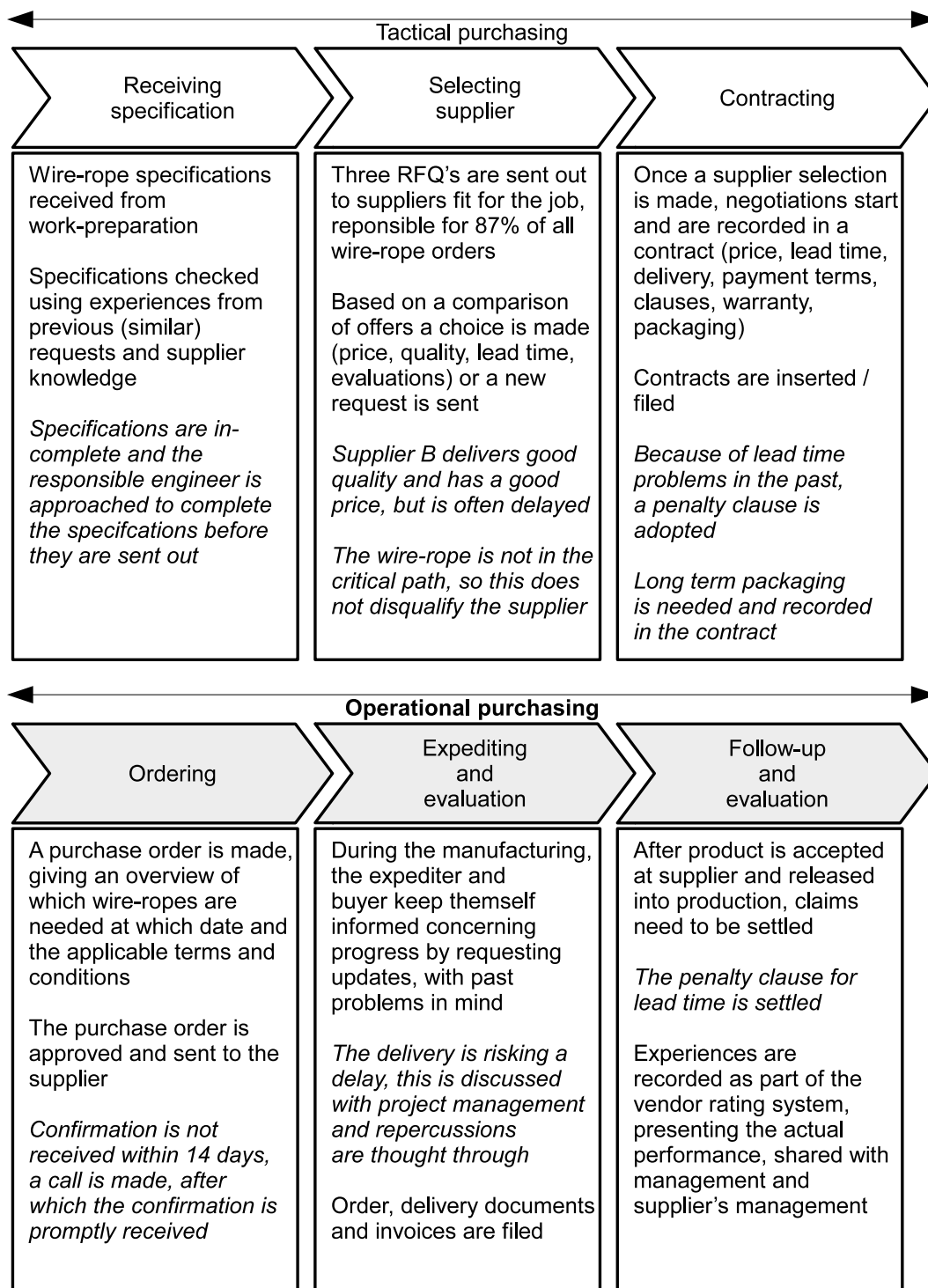


Figure 5.1: Example purchase according to procedure



suppliers form the basis of vendor rating. Performance of each individual supplier should be recorded in terms of delivery and quality. This makes it possible to assign a score to a supplier, and reduce the supplier base to a smaller amount of high-quality and reliable suppliers. Key performance indicators enable measurement and monitoring of supplier performance.

### **Tactical purchasing**

A buyer receives specifications from work-preparation. These specifications are sometimes received too late or incomplete. This might cause delays. Specifications have to be checked as far as the knowledge of the person checking reaches. Furthermore, if specifications are received late, immediate feedback to engineering has to be given and the reason for late receipt has to be discovered in order to prevent recurrence. All stakeholders have to be informed about the possible delay due to late receipt. Finally, if buyer (or supplier) notice that the specifications are unnecessarily detailed, they should provide this feedback to engineering. Specifications should be documented.

Supplier selection should be aided by knowledge of the commodity buyer, and a supplier management system. Because in ETO, delivery time and quality are leading, cost is of lesser importance. After selecting several suitable suppliers that are able to deliver the quality needed, quotations should be requested. If there is time pressure, delivery time is leading. If offers are equal and there is only a cost difference, cost is leading. A comparison of offers should be made, leading to a definite selection. This comparison should be documented. In some cases, several suppliers could be selected to carry out parts of the order, because often orders are large and comprehensive. If there is not enough time and work should be started immediately, it might not be possible to start a tender procedure and price negotiations.

The final part of the technical phase is the contracting phase. There should be agreements about prices, delivery terms, payment terms and possible clauses. Currently, the terms and conditions are added to the purchase order and often possible clauses are added (such as a penalty clause and warranty). The terms and conditions should be renewed. Furthermore, negotiations should take place to adjust them to fit the specific order and add possible clauses. All contract should be recorded in a contract management system, in order to make them accessible and re-usable in similar situations.

### **Human resources**

The foundation of the Kearney's House of Purchasing and Supply (Kearney, 2011) is not finished, because several Procurement Officers and Strategic Buyers do not meet the job requirements. Schooling of the current employees will make the foundation of the house more solid. Development and training enhances skill level, and ensures the right people in the right position (Carr & Pearson, 2002). According to the job description, each buyer should have passed level 1 and 2 courses of the NEVI (the Dutch Association for Purchasing Management). Buyers that have not yet passed these courses, should (re-)take them.

## **Leadership**

The present and influence of management should be strengthened. Several interviewees have indicated a need for stronger leadership. However, the main reason for more management engagement is emphasizing the importance of, and need for change.

Higher management should be facilitating change. This could be in terms of investments in education, training and IT systems. This could also be in speeding up the approval procedure, showing that an effort is being made on their side. Finally, a selection of partner suppliers could meet members of higher management (for example, the Chief Operating Officer) to underline their importance.

Management on departmental level should be more present, to become more accessible for employees. The amount of time spent away from the department should not decrease the time that is necessary to be engaged with challenges and daily practices that buyers experience. Furthermore, the importance of change should be underlined by management on department level. Change should be accomplished by inclusion of all stakeholders, but management should not be afraid to use their power to settle a discussion that seems unable to be settled on its own.

The recently introduced corporate strategy should be translated into a procurement strategy, providing a foundation for further tactics and actions. It should be in line with the overall goals and objectives. The general objective within such a purchasing strategy need to fit purchasing activities, hence need to be translated into specific, measurable and actionable goals.

## **Conclusion**

All buyers should follow the standardized purchasing process, and this should be monitored by management. Buyer should make sure they receive specifications in time. A contract management system should be created, and all contract should be recorded. The approval procedure should be faster, and a larger part of the authority should be handed over to buyers. There should be more framework agreements and less purchase orders for consumables and frequent orders. Also, all suppliers should be evaluated and rated. Finally, all phases need to be documented, in order to increase transparency.

Management should be more facilitating, present and accessible. In situations that need an exceeding power to settle a discussion, management should not deviate from its duty to do so.

## **5.5 Justification**

According to (Van Aken et al., 2012), solution justification is carried out on basis of (1) a description of path (analysis and design) to solution; (2) an explanation of why this solution will solve the problem; and (3) a cost-benefit analysis.

A thorough literature review provided a basis for the execution of this research. This review produced several models. These models were used to analyse the situation at the procurement department at a large, multinational Engineer-To-Order company. The inputs were case studies, interviews, documentation and data concerning all external transactions during 2012, 2013 and 2014. Analysis showed a deviation from the models as stated in literature, that is endangering business at the researched company. The comparison of literature and case study showed deviations, and literature was used to design a solution. Furthermore, input from supervisors and company supervisors was used to warrant for high quality and problem solving power.

The chosen solution is split into a short term part and a medium term / long term part. Short term solutions are quick wins: this part is relatively easy to implement and has large effects. This part of the solution focuses on improvements of results. Medium term and long term solutions require investments and dedication from management and employees. These improvements are mainly focused on facilitation. Better procedures, better IT systems, better trained and skilled buyers and stronger leadership facilitate successful procurement and supplier management, and produce better output in terms of quality, reduction of problems and reduction of cost.

Investments need to be made in a better suited ERP system. Furthermore, training and education require an investment. However, these investments facilitate the solution to the problem of insufficient procurement performance and supplier relationships. The current way of working is costly, inefficient and the cause of many problems. Savings on urgent transport, the creation of unnecessary purchase orders, a large supplier base and re-negotiation of contracts exceed the cost of investments at large.

Originating from these solutions, several advantages can be named:

- (1) Based on experience, a cost reduction of 3% – 6% can be expected;
- (2) Less absence and less employee rotation;
- (3) Production of usable data, produced by a transparent way of working;
- (4) able to do more with fewer suppliers, and better relationships with these suppliers.

## **5.6 Change plan**

According to (Van Aken et al., 2012), the redesign should be seen as “an important starting point and guide for the subsequent change process and the process of learning for performance”, and not as “an immutable entity to be inserted into a passive organization”. During implementation, a solution may be adapted to circumstances.

The objective of the redesign is to structure the procurement process at the organization in question, in order to get better results from suppliers, in terms of quality, lead time and cost. It consists of medium term and long term solutions, being a redesigned

purchasing process, supported by IT systems, training and education and stronger leadership. Furthermore, several short term solutions, being an ABC-analysis, a spend-analysis and a Kraljic-analysis, leading to quick wins.

### **Possible resistance to change**

There are major differences between the current way of working, and the redesigned way of working. There are also minor differences, that will be left to the ability of people within the business system.

The redesign provides a structured, transparent way of working. The current way of working is less formal and less streamlined. Management involvement will increase, and the distance between management and employees will decrease. Employees will be trained and educated to increase their knowledge and skill level.

Several sources of resistance are in line with expectations. These can be divided into four categories, which can be found in Table 5.2. The greatest resistance can be expected from strategic buyers and internal clients. Strategic buyers might consider the current way of working as sufficient, or might not be supportive of the redesign because it means greater transparency and more limitations. Furthermore, they might have a different solution in mind. Internal clients might be used to the current way of working, and their position within this system, and view the redesign as a threat. Procurement officers might view the current system as sufficient, and the redesign as an interference. Department management might be conflicted between management assignments, and interests of employees. However, department management is not likely to view the redesign as an attack on “their” current system, because the current systems is a taken over from the previous manager. This removes the largest resistance that could be expected at such a redesign. Finally, the general management might be lacking trust in the competences of the employees or department as a whole, based on their current image within the company.

Bi-weekly departmental meetings provide a platform to counter this resistance. The introduction of changes can be done during these meetings, where the department manager, supply chain coordinator and buyers are present. This provides a possibility for attendees to express their concern or resist changes and provide feedback, and an opportunity for discussion and countering this resistance. If matters cannot be solved during these meetings, individual discussions are necessary.

If other stakeholders require to be informed or included, these could be invited to meetings or additional meetings can be scheduled. If necessary, higher management can take part in, or be present at the discussion, to underline the importance of change.

### **Organizational support**

Recently, a change in department management has taken place. A consequence of this is that within the organization, an awareness for a need of change has grown. General

management has emphasized the need for change, and its full support for the new department management in realizing this change. This chain of events has greatly decreased possible resistance, because the new department management enjoys full support of the general management, and the need for change has been emphasized, additionally by the change of department management. Several changes have been initiated already during the design phase itself. Furthermore, the research has been done in an interactive way and in discussion with the department, and has been prepared in detail. This additionally limits resistance.

	Lack of understanding	Differences in opinion	Lack of trust	Low willingness to change	Conflicts of interest
General management			✓		
Department management					✓
Procurement Officers	✓			✓	
Strategic Buyers	✓	✓		✓	
Internal clients	✓	✓		✓	
Suppliers					

Table 5.2: Expected sources of resistance

## Actions and timing

As stated, there currently are bi-weekly meetings of the purchasing department. At these meetings, all buyers are present, as well as the department manager and the supply chain coordinator. The department manager introduces changes, and buyers can address topics they would like to discuss. Attendees can hand in topics to be place on the agenda, minutes of meetings are made and distributed and an action list is made and monitored.

Some changes have already been introduced during these meetings. This way of introducing changes to the department fits the redesign. Monitoring is of great importance, and the importance of the redesigns has to be emphasized each time. A recent effort to introduce a standardized procedure for carrying out and filing a purchase order has shown that constant monitoring and feedback is vital for its success. The elements of the redesign can be introduced to stakeholders, which provides a possibility to express enthusiasm or concern. After the introduction of the element, actions can be allocated to a person, or a group of persons.

Furthermore, changes to the management or individuals need to be introduced by means of dialogue. Management has to become aware of their position within the new

system, which could be accomplished by reading this document. This creates awareness of the importance of their involvement. Individuals that require more training or education in order to fit their job requirements, need to be advised about their possibilities, and what is expected of them.

In terms of timing, there is no reason for delaying the introduction of solutions. The problem at hand requires immediate action that need to be monitored constantly. Each deviation from procedures should only be done after management approval.

## **Conclusion**

The change plan provides an overview of the possible resistance, organizational support and the necessary actions and their timing. Bi-weekly departmental meeting provide a platform for introduction of change, providing and receiving feedback and monitoring. Individual changes or changes to the management need to be introduced by means of dialogue. The introduction of the proposed solutions should not be delayed, and each deviation from the process should only be done after management approval.

## **5.7 Conclusion**

It is essential to create a foundation for SRM. Before this can be introduced, several lower parts of the House of Purchasing and Supply should be re-organized.

In the short term, an ABC-analysis and a Kraljic-matrix based on a spend analysis make it possible to reduce cost, by renegotiation of contracts, reduction of the supplier base and adopting appropriate strategies, tactics and actions.

In the medium term and long term, several enabling factors have to be realized. These include investments in the renewal of the ERP systems and training and education of employees, in order to make their skills and education meet job requirements. Furthermore, the implementation of a standardized purchasing process, with an initial focus on the operational purchasing part, makes sure that responsibilities of purchasing are followed, and the process is transparent and provides usable data. Stronger leadership on high level and departmental level must emphasize the importance of and need for change. Translating the recently introduced corporate strategy into a purchasing strategy, with measurable and actionable goals, provides a foundation for further tactics and actions.

Possible resistance should be approached during either the bi-weekly departmental meeting, or individual dialogue. The departmental meeting provides a platform for introduction of changes, and providing and receiving feedback. Resistance to changes should be approached by means of individual dialogue, or addressing resistance during departmental meetings. Deviations from procedures should only be done after management approval.

The result of this redesign, in terms of the re-organization of the House of Purchasing and Supply, is cost reduction, less absence and employee rotation, production of usable data and being able to do more with fewer suppliers.



## Chapter 6

# Discussion and conclusion

This chapter discusses the findings of the research and presents a conclusion. Furthermore, it addresses the limitations of this research.

The research question that was posed at the beginning of the research, was:

How to structure the procurement process, in project business, in order to get better results from suppliers?

By means of a literature review and a case-study, this question has been researched.

### 6.1 Discussion and conclusion

The researched organization is a multinational, operating in an Engineer-To-Order environment, meaning that it designs and manufactures unique products triggered by customers' demands. Procurement start after this trigger, and differs for each project. Because of this, professionalism in purchasing tends to be low, and procurement tends to be departmentalized and clerical in nature. This was confirmed by the case study. However, it plays an important role, because lead times have to be short and quality has to be high. Furthermore, taking into consideration difficult market conditions because of current historically low oil prices, cost has become more important.

Research showed a lack of a functional strategy or mission and a shared way of working resulting in delivery delays, delivery issues and increased cost. The operational part of purchasing requires initial attention. The management system is outdated and incomplete. It is structurally deviated from. This causes intransparency and output of unreliable data. The foundation for vendor management or SRM, supplier evaluation, is lacking.

As stated, the low professionalism in purchasing leads to delivery delays, increased costs (e.g. urgent transport), increased workload and unsatisfactory supplier relationships. The "but we always get the job done"-attitude, and the custom of blaming others, distracts attention from problems, which makes it more difficult to change the current situation. Finally, the problems in the procurement department lead to a negative image within the company.



## Recommendations

Better results from suppliers, in terms of quality, lead time and cost, can only be obtained if the procurement process is structured well and is adjusted to the unique ETO environment. In order to do this, the purchasing department has to re-organize the House of Purchasing and Supply. In the short term, an ABC-analysis provides valuable input to start renegotiation of contracts and reduction of supplier base. A spend analysis, combined with an assessment of supply risk, provides input for a Kraljic-matrix. Based on the quadrant in which the part-group is placed, strategies, tactics and actions can be defined. These short term, result oriented solutions provide an opportunity for “quick wins”.

Long term solutions, focused at the process, include investments in a renewal of the ERP system, and the education and training of buyers to make their skills and education meet job requirements. The procurement process needs to be standardized, to produce objective data and increase transparency. The initial focus should be on the operational part, consisting of ordering, expediting and evaluation and follow up and evaluation. Evaluation provides a basis for vendor management and SRM. Management involvement should increase to emphasize the importance of, and need for change. Furthermore, the corporate strategy should be translated into a purchasing strategy, and measurable and actionable goals.

The introduction and monitoring of these changes should be done by higher management and department management. Bi-weekly departmental meetings provide a basis for this, as well as monitoring and providing and receiving feedback. Resistance should be addressed by means of individual dialogue, and could also be addressed during these departmental meetings.

Summarized, these recommendations are:

- Short term;
  - Use the ABC-analysis to renegotiate contract with A-category suppliers and decrease the number of suppliers in other categories;
  - Use the spend analysis to finalize the Kraljic-matrix and further define strategies, tactics and actions for each part-group.
- Medium term and long term;
  - Invest in a new, better suited and company-wide ERP system;
  - Invest in training and education of employees, to make sure they meet job requirements;
  - Create a standardized purchasing process, focusing on the operational part and evaluation of suppliers;
  - Strengthen the presence and influence of higher management and departmental management, by investments in IT and education, increasing engagement, emphasizing importance of change and translating the corporate strategy into a purchasing strategy.

- Monitor, discuss and emphasize the importance of these changes by means of bi-weekly departmental meetings, and constant (individual) dialogue.

The solution has several advantages:

- (1) Based on experience, a cost reduction of 3% – 6% can be expected;
- (2) Less absence and less employee rotation;
- (3) Production of usable data, produced by a transparent way of working;
- (4) able to do more with fewer suppliers, and better relationships with these suppliers.

## 6.2 Scientific reflection

The aim of this research was to combine rigor and relevance, or design and research. It aimed to solve an existing problem. Being management science, it involved a complex organization and people being studied. Below, the results for this specific organization are generalized, and combined with the literature review.

Literature is rich on the concept of procurement. It addresses procurement processes, supplier relationship management and purchasing strategy. Furthermore, research has been done on the Engineer-To-Order environment. However, research about structuring the procurement process within this project-based, Engineer-To-Order environment is limited. The literature review, that is part of this research, into the combination of the topics of “procurement processes” and “Engineer-To-Order environment”, combined with conclusions from the case study, could help organizations operating within this environment to organize their procurement.

In an Engineer-To-Order environment, companies react to customers’ orders. The customer requires a unique design or customization. Often, these orders have a high value and a large range of specifications. In this ETO environment, on-time delivery and quality are most important.

Regarding procurement in general, the Kearney’s House of Purchasing and Supply (Kearney, 2011) shows the components of “purchasing excellence”. This model provides an overview of what is needed for successful procurement. It consists of human resource management, information and knowledge management, performance management, operating process management, supplier relationship management (SRM), sourcing and category management, organizational alignment and supply management strategy. These factors will be addressed to greater or lesser extent below, based on their importance within ETO companies, considering that, based on Van Weele (2009), low professionalism can be expected because purchases vary among projects and based on Hicks et al. (2000), a purchasing function that is “departmentalized and predominantly clerical in nature”.

Several factors are of importance regarding procurement in ETO companies. According to Hicks et al. (2000), these are early pro-active involvement in tendering and product design decisions and regarding the procurement function as strategic, because of high

contract value and range of specifications. Regarding the procurement function as strategic implies that procurement is of value in implementing the corporate strategy, hence there should be an alignment between the corporate strategy and the procurement strategy.

Van Weele (2009) states that, in designing a business strategy, the “strategic triangle” should be taken into account. This consists of (1) primary customers; (2) major competitors; and (3) major suppliers. The result of this triangle is the competitive position of the company. The alignment of business strategy and procurement strategy, being a functional strategy, is important because purchasing is a support activity enabling a company’s primary activities and other support activities (Porter, 1985). After translating the business strategy into a purchasing strategy, objectives and goals specific to purchasing result in a basis for a purchasing process.

Because quality and lead-time are of great importance in ETO, strong relationships with important suppliers is key. Goods that need to be attracted from outside the company should be divided into categories, or commodities. Each commodity gets his own strategy (in line with business and purchasing strategy), entailing handling and categorization of suppliers in terms of selection and qualification. Possible categories are (1) commercial suppliers; (2) preferred suppliers; and (3) supplier partners. This categorization is part of vendor management. In turn, vendor management is part of the purchasing process. The six-step purchasing process model of Van Weele (2009), consisting of a tactical purchasing phase and an operational purchasing phase, encompasses a supplier selection part and an evaluation part. Because of the often low purchasing professionalism, the initial focus should be on the operational purchasing phase. A part of this is the evaluation part, which forms a foundation for supplier relationship management (SRM). Based on the need for high quality and short lead-times, supplier relationships are important for businesses operating in an ETO environment.

Within SRM, the structuring and managing of a strategic supplier portfolio is vital. This can be done based on a portfolio model. The Kraljic-matrix (Kraljic, 1983) is a method for configuring such a portfolio, based on financial risk and supply risk. To assess financial risk, a spend-analysis should be done. Part-groups are placed in one of the four possible quadrants, being (1) non-critical items; (2) leverage items; (3) strategic items; and (4) bottleneck items. Based on placement within this matrix, strategy, tactics and actions should be introduced. Suppliers responsible for the most important part-groups (strategic items) require the formation of partnerships.

### **6.3 Strengths and limitations**

The strength of this research is that the case-study results were verified and explored by several sources of information. Not only has triangulation been accomplished by the use of several research methods (interviews, documentation, quantitative data and cases), but also by the use of several sources of information, each with a different interest in mind (management, employees and suppliers).

Even though confidentiality of answers was emphasized, as well as the fact that the

research was carried out independent of the company, interviewees might have been hesitant to be fully honest. A research result that is quite negative of the current way of working might be taken personally, and management or employees might take a defensive attitude. Furthermore, suppliers might have been hesitant to be truthful in answering, afraid that their answers will affect business. However, the greatest effort has been made to emphasize confidentiality and independence of the company.

Furthermore, the generalizability of the research is limited, because the case-study focuses on one specific company and solving the company specific problem (the single-case study design).



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# **Appendix A**

## **Cases**

### **Case I**

Specifications were received by work-preparation. They were forwarded to the buyer, based on commodity. A pre-selection of suppliers was made in cooperation with engineering, project management and higher management. Based on price and delivery time, supplier was chosen. Together with engineering and project management, negotiations with the supplier, concerning price and technical details, took place. A penalty clause in case of late delivery was recorded in the contract. The decision was made based on judgement and past experiences of buyer.

After agreement, the customer requested variations. Processing these variations took several weeks. About a month after the first purchase order was sent, the third was confirmed. It showed no delivery date, because delivery times of the electric motors were still unknown. Soon after this confirmation, a delivery date was given via e-mail, which was several weeks later than the initial delivery date. This was accepted with activation of the penalty clause due to late delivery.

After modifications, a new confirmation was sent which mentioned the same delivery date. However, it mentioned the possibility of further delay, due to these modifications, which were confirmed less than a month before the initial date.

In the correspondence, supplier requested a single point of contact, since correspondence took place via the buyer, expediter, sales department, project management and QC-department. This request remained unanswered.

Eventually, the delivery was delayed eight weeks. However, delivery was inside the margin. No formal evaluation took place. Expediter has regular contact with the supplier, which is currently researching this case internally.

### **Case II**

Functional specifications were delivered by engineering, via work-preparation. Supplier selection was done together with engineering. Three suppliers were selected and sent

an request for quotation. Supplier was chosen, because the gearbox had to be certified according to a specific standard and this supplier could do this.

During negotiations about price and delivery time, a penalty clause for late delivery was not adopted. The order confirmation showed a delivery date, which was later than the agreed upon date. Several buyers of central procurement and after sales discussed this with supplier, which indicated problems with materials and late receipt of the drawings from engineering of the buying organization. Furthermore, several delivery addresses were recorded in one purchase order. However, delivery was done at one location. This remained unnoticed for some time. After noticing, the items were shipped with high priority to their right places.

Non-critical items had a delivery delay of approximately one month. Supplier visited some time later. No formal evaluation took place.

During a meeting with the supplier, supplier expressed concern about the number of orders having rapidly decreased (or the “lack of orders”). Furthermore, supplier expressed his discontent with the communication. Only negative feedback gets through to supplier, and it costs a lot of time and energy to solve problems. Once problems escalate, communication is immediately taken to higher levels of the organization. Finally, supplier stated that urgently needed items were often ordered without an approved purchase order, or even without one. This is done because of lack of time, and the time that is needed to create or approve a purchase order cannot be missed. However, one purchase on which supplier already started was cancelled, and the purchase order was deleted. However, supplier was requested to start without approved purchase order. Now it is unclear who is paying for costs already made.

## **Case III**

Specifications were received from engineering, via work-preparation. These were based on a previous project, and aimed at a specific supplier (supplier) because of the choice of material. Buyer approached several foundries. The foundry at which the specifications were aimed at, was among the most expensive. Because buyer was aiming at expansion of the suppliers at which he could buy hooks, the fact that supplier was considered financially unstable and the price made chosen supplier the obvious choice.

However, internal resistance evolved into a need for further testing. The order was still ongoing. After finalization of the contract, supplier indicated errors in drawings. These were corrected and were accepted after revision H, but resulted in longer lead times and price increases, because of unclear testing requirements. Further demands were posed and the supplier indicated these were impossible to meet. Due to this, and all the unclarity about testing and demands, the supplier wanted to cancel the order. The certification demands remained unclear for months. After these became clear, the demands were not met. However, supplier indicated not having these requirements at the time the purchase order was sent.

Over a period of more than one year, extensive correspondence took place. There

was no expediter and the contact between supplier and the organization took place via buyer, engineering department, QC-department, work-preparation department, management and eventually legal department. Delivery was delayed, and the tests by the organization were not met. Two modified purchase orders were made. Eventually, after a notice of default, the legal department cancelled the order and took over the communication. The hooks are finished at supplier (half a year after the initial date), but are not going to be accepted.

## **Case IV**

The specification was received from work-preparation. Supplier was chosen based on long history and based on this, the expectation of an honest price. A not-approved purchase order was sent, and production started according to this non-approved version. The order was approved approximately six weeks later. Furthermore, for this product, there is no alternative supplier. Engineering was done by supplier. After approval, the goods were delivered, checked and released.

The order confirmation showed a delivery date later than requested. This date was processed into the system, as second confirmed date. The date processed as first confirmed date was the request date (which has not been confirmed). Shortly before the goods were needed, the delivery date was noticed. This was several months after confirmation. At that point in time, the project risked delay, because production had to be stopped if these items were not received. In consultation with expediter, work-preparation, project management and supplier, the production of the different goods were rescheduled, split for shipment partially via courier.

Supplier indicated being happy with the cooperation. It is honest and open, and cooperation when solving problems is good. Communication is pleasant. Supplier indicated that in about 25% of the orders, the requested delivery time is not feasible. The researched organization is responsible for approximately 60% of all orders.



# **Appendix B**

## **Interviews**

### **Interviewees**

Due to confidentiality, no names are shown.

- Manager Supply Chain and Procurement
- Assistant Manager Supply Chain
- Assistant Manager Procurement
- Supply Chain Coordinator
- Strategic buyers (3)
- Procurement officers (7)
- Expediter
- Manager Work Preparation and Subcontracting
- Manager Area Sales
- Quality Assurance Coordinator
- Process Analyst Engineering
- Contact persons at four suppliers (7)

### **Questions procurement department**

The questions vary between the interviewees. The content of the interview varied, because the interview was semi-structured. Confidentiality was emphasized.

- General introducing questions

- (1) Within your department, which tasks do you carry out?
- (2) How long have you been working for the organization?
- (3) How long have you been working in your current position?
- Procurement specific questions
  - (1) What kind of commodity or commodities do you procure?
  - (2) How does the procurement process start for you?
  - (3) Which steps do you take from receiving the specifications towards the receiving of the goods?
  - (4) From start to end, how do you procure commodity A (for example, the largest commodity)
  - (5) From start to end, how do you procure commodity B (for example, a critical commodity)
  - (6) How do you select suppliers?
  - (7) How do you assess supplier performance?
  - (8) How are supplier performances filed or managed?
  - (9) How do you secure supplier performance?
- Quality Assurance specific questions
  - (1) How do you decide which suppliers to audit?
  - (2) How is an audit being done?
  - (3) Do you present the results to the buyers?
- Data specific questions
  - (1) How is the data structured?
  - (2) How reliable is the data?
- General concluding questions
  - (1) Concerning the tasks you perform, can you name enabling or positive factors?
  - (2) Concerning the tasks you perform, can you name disabling or negative factors?
  - (3) Can you name improvement possibilities?

## Questions suppliers

Confidentiality was emphasized. Answers were given on a scale of 1 of 10.

- (1) How long have you been doing business with the researched organization?  
Approximately ...years

- (2) How frequently do you receive orders from with the researched organization?  
Sporadically ( 1-2-3-4-5-6-7-8-9-10 ) Frequently
- (3) How would you rate communication frequency with the researched organization?  
Bad ( 1-2-3-4-5-6-7-8-9-10 ) Good
- (4) Which aspects do you consider positive about communication with the researched organization?
- (5) Which aspects do you consider negative about communication with the researched organization?
- (6) How often do problems occur with orders received from the researched organization?  
Never ( 1-2-3-4-5-6-7-8-9-10 ) Often
- (7) Which problems occur with orders received from the researched organization?
- (8) Which aspects of how the researched organization deals with problems do you consider positive?
- (9) Which aspects of how the researched organization deals with problems do you consider negative?
- (10) How feasible are the requested delivery times by the researched organization?  
Not feasible ( 1-2-3-4-5-6-7-8-9-10 ) Feasible
- (11) How would you rate the image of the researched organization at your organization?  
Bad ( 1-2-3-4-5-6-7-8-9-10 ) Good
- (12) How would you rate your relationship with the researched organization?  
Bad ( 1-2-3-4-5-6-7-8-9-10 ) Good
- (13) Which aspects positively influence your relationship with the researched organization?
- (14) Which aspects negatively influence your relationship with the researched organization?
- (15) Could you name possibilities to improve your relationship with the researched organization?
- (16) Would you like to add something?