

CHALMERS



Organising Procurement Operations - Evaluation of the Product Coordinator role

Master of Science Thesis in the Master Degree Program Supply Chain
Management

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CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden, 2014
Report No. E2014:058

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Abstract

In a constantly changing environment, organisations have to be able to adapt to changes in order to survive and be sustainable. Every industry entails its own inherent risks and uncertainties. In an environment characterised by global competition and high customer demands, the structure of the organisation is an essential component of organisational competitiveness. Due to the strategic importance of purchasing on the supply function and the entire organisation, the way that the purchasing function is designed and organised will ultimately enable the company to meet its goals towards the external environment. However, organisational design is a complex process, which involves the combination and coordination of many organisational elements and stakeholders.

In response to the challenges faced by NaroTech Engineering (NTE), its Procurement Department's Management identified the need to reorganise its procurement activities in order to leverage the company's purchasing performance. In order to achieve this goal, NTE's Procurement Department decided to introduce the Product Coordination concept within its procurement operations. The purpose of this concept is the centralisation of product competence through the introduction of a new role called the Product Coordinator (PC). The purpose of this thesis was to study and evaluate how the concept of centralised product competence through the Product Coordinator (PC) role had been implemented in NTE in order to improve the company's purchasing performance.

The chosen approach to perform such evaluation was the identification of the specific structural characteristics of NTE's purchasing organisation that showed to be factors affecting the PC role's performance. These factors were identified thanks to a literature review on purchasing organising and a number of semi-structured interviews conducted with representatives from all possible stakeholders of the PC role in NTE. In addition, the thesis also assesses the suitability of the Product Coordination concept taking into consideration NTE's context and requirements. Lastly, the thesis includes improvements to the current organising of the Product Coordination concept in order to achieve the institutionalisation of the PC role. These improvements were based on a small-scale survey conducted within NTE's Procurement Department as well as benchmarking to the centralised purchasing function of an Engineering Procurement and Construction company.

Key words: supply chain management; organisational design; purchasing organisation

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List of acronyms

BA	Business Area
BU	Business Unit
D.P.M.	Department Procurement Manager
DMU	Decision Making Unit
EP	Engineering Procurement
	Engineering Procurement
EPC	Construction
FA	Framework Agreement
HSE	Health, Safety and Environment
KSM	Key Supplier Manager
NTE	NaroTech Engineering
P.P.M.	Project Procurement Manager
PC	Product Coordinator
PC team	Product Coordination team
PCB	Product Coordinator Buyer
PCE	Product Coordinator Engineer
PO	Purchasing Organisation
PRB	Product Responsible Buyer
PRE	Product Responsible Engineer
PS	Product Specialist
S.C.M.	Supplier Chain Managers
SBITS	Supplier Base IT System
VPR	Vendor Performance Rating

1. INTRODUCTION

This thesis deals with the organising within the Purchasing Department of NaroTech Engineering, a major provider of Engineering, Procurement and Construction services (EPC contractor) for the Oil and Gas industry. According to Hessel (2014), organising the supply function is a broad term since it includes organising efforts both within the company as well as beyond the company borders. However, this thesis focuses on the internal component of supply side organising defined by that author. That is, the thesis revolves around the internal arrangements of the Procurement Department of the focal company and its connection to other internal departments. The chapter then will introduce the main challenges of organising in purchasing and describe the complexity of the EPC industry as the context determining how a company organises its supply function. Next follows a description of the focal company that covers the challenges stemming from its business model and its supply situation. Finally, the object of study is described, which leads to the problem description and the purpose of this thesis.

1.1 Background:

The strategic importance of purchasing and its potential contribution of the supply function is a topic in vogue nowadays (Johnson et al., 1998). As Tiersten (1986) points out, that 60% of the organisations' sales income is invested in purchasing of materials, while 50% on average of the cost of goods sold is generated from the purchasing activity. Thus, any improvement in the purchasing activity of organisations seems to have a direct positive impact on its business. Due to this importance, the way that the purchasing function is designed and organised is of crucial significance. That is to say that decisions associated with how the purchasing function is organised and staffed will influence how and where those potential positive impacts will take place (Johnson et al., 1998).

With that said, it is important to start by defining the concept of organisational design. In this sense, organisational design refers to the process of assessing and selecting the structure and formal system of communication, division of labour, coordination, control, authority and responsibility required to achieve an organisation's goals (Hamel and Prahalad, 1994). The combination and coordination of all those elements composing the term of organisational design indicate the complexity of this process. Silvestry (1997) describe organisational design as a complex web reflecting the pattern of interactions and coordination of technology, tasks and human components. Organisational design decisions within purchasing are a complex topic since purchasing activities are never limited to the purchasing department but rather include several departments (Hessel, 2014). As a matter of fact, purchasing activities not only cut across the entire organisation but also transcend company borders. As a result, it is not a task that is one-sidedly controlled and executed (Hessel, 2014), which increases the complexity that decision makers face organising the supply function of the organisation.

In addition, the environment changes constantly and organisations have to adapt on those changes in order to survive. Every industry entails its own inherent risks and uncertainties.

In an environment characterised by global competition and high customer demands, the structure of the organisation is an essential component of organisational competitiveness (Glock and Hochrein, 2011). This is the case in the organisational design of purchasing. As Trent (2004) suggests, the design of the purchasing function should support and enable the company to meet its goals towards its external environment. The challenge here is how to implement the necessary design changes in order to achieve such support. Moreover, the necessary design changes that will best suit a specific organisation depend on the specific context and environment within which it is embedded, as supported by Hessel (2014). Interestingly, this author suggests that there is no best way to organise. Rather, every organising effort has its advantages and disadvantages, which vary both in time and depending on the perspective taken.

In the case of the construction industry, supplier base organising is much more difficult than in other industries since buying firms are not as dominant (Holmen et al., 2003) with respect to their suppliers. In general, the construction industry is embedded in a high complexity stemming from the environment and the way operations are organised to cope with this environment. Supply organising should thus cope with such complexity and enable the company to overcome it.

First of all, companies in the construction industry (EPC contractors) are embedded in an environment where government regulations and industry standards make the system difficult to change (Dubois and Gadde, 2002a). Further, construction companies within the Oil and Gas business are faced with different sources of risk, which result in a highly uncertain environment. Cagno and Micheli (2007) suggest managerial, technical, competitive financial, project-related, legal risks and supplier related risks as typical risks faced by these companies, just to name a few. However, supply risks are of most concern for these companies according to Micheli et al. (2009). According to these authors the main way to tackle or mitigate supply risks is by setting a good system for overall supply risk management and for supplier selection management. The selection of the best-in-class suppliers, mitigate the potential supply risks that can affect the project's progress. In order for the supplier selection process to be considered as successful, in terms of less risk involved, information or better knowledge of the specific product's supplier market is required. Thus, EPC companies need to adapt their supply – purchasing – organisation, in order to enable such proper supplier selection process, which constitutes a major challenge for them.

Another element characterising the complexity faced by EPC companies is the interdependence between tasks and the many actors taking part within and beyond the company's boundaries, as supported by Dubois and Gadde (2002). Altogether, uncertainty and interdependence, favours the use of a decentralised approach to decision-making and local coordination through project-based operations (Dubois and Gadde, 2002a). However, this situation results in many challenges for these companies, which affect the potential

contributions of purchasing mentioned above. On the one hand, Dubois and Gadde (2002) observed that coordination and cooperation is tight within and in relation to the project. Beyond that, coordination between the project and the permanent network is weak. For example, coordination can be weak even between different entities within the firm if it is not for aspects related to the project. Consequences of this have been addressed in the literature such as the limited possibility that central authority has on intervening in local operations to get benefits such as economies of scale (Dubois and Gadde, 2002a). In addition, actors at the project level might take decisions that contradict the goals of the organisation as a whole (O'Dell and Grayson, 1998). On the other hand, the temporary and customised nature of a project, which focuses mainly on the deliverables, makes sharing of knowledge difficult between individuals (Linder and Wald, 2011). A problem with this is that learning is a slow and uncertain process that takes place at the individual level (Crichton, 1966) rather than at the organisational level (Björkegren, 1998). Not making use of the experiences gained creates particular cost inefficiencies for the client as a new learning curve is climbed on each new construction project (Cox and Thompson, 1997). In order to overcome this complexity Dubois and Gadde (2002) suggest that the key seems to lie on putting forth efforts to foster coordination among projects and inter-firm cooperation as well as placing less emphasis on the project boundary. Thus, EPC companies that are able to organise their supply function with design features that can overcome this complexity will ultimately enhance their firms' performance.

1.2 Company background

NaroTech provides oilfield products, systems and services for customers in the oil and gas industry worldwide. The company is divided into nine different business areas, depending on the type of service provided. This thesis focuses on NaroTech Engineering (NTE), which is the business area that specialises on building offshore Oil and Gas installations. The end customers of NTE are mainly international oil companies, national oil companies or smaller and independent operators. The oil and gas prices influence oil companies' priorities for developing new installations or upgrades to existing facilities. Consequently, oil prices affect the activity in NTE's markets. The vision of NTE is to be considered as the preferred partner for solutions in the specific global industry that the company operates in. In order to achieve that vision the company is structured under a regional matrix organisational model. This allows it to improve its knowledge about its markets, be closer to its clients and concentrate around client's relationship management. Further, it allows NTE having a better understanding of the regulated environment specific to the local area where it operates. Yet, cooperation between locations and business areas is somewhat limited. The oil and gas business is a highly regulated domain and is subject to a number of accepted standards of good practice that are mainly region specific. These regulations affect the design and construction of offshore oil and gas installations and give specific instructions regarding the award of licences, field development and infrastructure and health, safety, and environmental requirements, among others (Practical Law, 2013). As a

result, providers of products and services for the oil and gas industry such as NTE are bound to comply with these regulations in order to do business.

1.2.1 NTE's business model

Oil and gas installations building projects are commonly executed by engineering, procurement and construction (EPC) type of project delivery system. These are characterised by high cost levels and a long lead-time from exploration to production that spans several years, according to Olsen et al. (2005). In an EPC project, the engineering services, procurement of materials and construction is put in the hands of the contractor company, who is the main responsible for the project management and cost and risk control (Dai, 2009) until the entire product is delivered (Olsen et al, 2005). In the particular case of NTE, the company's core area involves EP projects where it specialises on doing the engineering and procurement on behalf of the client company.

According to Caniëls, Geldermana, Vermeulen, (2012), Oil and Gas companies generally spend around 80% to 90% of their costs on contractors, with whom they have a compensation format varying between fixed prices, profit-related rates and reimbursable elements (Olsen et al., 2005). In the case of NTE, regardless of the compensation format the company does not add any mark up to the products purchased. Rather, the client company pays NTE for the man-hours spent by its engineering and procurement staff on the project. This situation is different from other NaroTech business areas, whose earning model might include adding a mark up to the product provided, among other options.

In general, the EPC contractor holds greater responsibility in the carrying out of the project. Thus, oil operators will choose someone who has the right and proven qualifications for the job (Dai, 2009). Moreover, NTE competes with many similar companies that are equal in terms of size and there are high exit and entry barriers that intensify competition and price wars. Thus, NTE aims at differentiating itself from its competitors. NTE is a known contractor in the area where it operates. According to the company itself, NTE is not characterised by being the cheapest in the market. Rather, NTE is known and trusted for its project management and engineering design capabilities, which guarantee the recognised high quality of the final product delivered. NTE has built a good reputation in the business after years of work and experience, resulting in a large knowledge of its customers' operations and good relationships with them, necessary for achieving the goal of being the preferred contractor. However, even when knowledge transfer might increase the switching costs for the client companies, there is always the uncertainty for NTE of actually getting the next EP contract, hence it is vital to stay competitive.

Nevertheless, once the contract has been awarded to NTE, the client trusts the company for doing the engineering and procurement of all components in the installation. As pointed out by NTE's Supply Chain Manager, the buying company trusts NTE and leaves the decision making to be led by NTE. The buying company is consulted and must approve all relevant decisions in the project before receiving 'a green light'. However, according to NTE's Supply Chain Manager, the client company generally accepts the suggestions proposed by

NTE. After all, it is due to the company's expertise why the client has asked NTE to carry out the work in the first place. That is, there should be a good reason as a basis if the client company does not support a suggestion of NTE.

1.2.2 NTE's supply context

The large scale of EP projects call for the need of subcontractors and suppliers that are orchestrated by NTE as an intermediary between them and the buying company, i.e. the Oil and Gas operator. All suppliers in NTE are chosen through a tendering process where the scope of the supply relates to one product for a specific project, i.e. a package. Similar to the situation of traditional construction companies, being a project-based company, NTE places a high importance on the project. This entails a short-term perspective where competitive bidding is the main tool for supplier evaluation (Dubois and Gadde, 2000). Further, Micheli et al. (2009) describe that the EPC industry in general makes use of non-equity alliances in order to reduce the supply risk uncertainty at least for critical supplies in terms of value, quality and time. This is because in these industries the costs of opportunistic behaviour are generally perceived to be lesser than the costs of inadequate performance. In turn, the repeated change of supplier prevent every alliance from being a long-term buyer-supplier relationship (Micheli et al., 2009) and supplier relationships are typically of the arms-length type rather than partnerships. As a result, joint efforts are mainly present for solving project-specific problems, but beyond the project, interactions between customers and suppliers are apparently limited (Dubois and Gadde, 2000). As stated by the Procurement Department Manager, the company has preferred suppliers but they will always do competitive bidding in order to try to prevent falling in a single sourcing situation.

For a supplier to be eligible it is necessary that to have certification from the industry and comply with country requirements. These certifications are costly and require time to get, efforts that are only justified if the supplier has opportunity to benefit from business with the oil and gas companies and service providers. In addition, references of performance on previous overseas projects are considered of a very high importance when selecting suppliers. For all these reasons, the cost of entry to this business for a supplier is high. As a result, the supplier market is limited especially for some products, according to the company. Beyond this limited supplier base, the Procurement Department has observed a reduced number of suppliers to be considered and therefore invited to tender. Many reasons can explain this situation and will be discussed further in this thesis. Yet, this situation is an important area of focus in NTE and efforts are being made to prevent it to happen again in the future. Among all the reasons brought up during the interviews the main ones were that some suppliers were found not to meet the design specifications or capacity requirements, the project member's experience with certain suppliers or their preference to source from familiar and close countries, i.e. local or Northern Europe.

NTE relies mainly on the contract and its terms to manage the relationship with the suppliers. However, due to the situation described above the company has in some cases

found itself facing a monopolistic or oligopolistic situation with its suppliers. As a result NTE could face an unfavourable power balance towards the suppliers of some products that the company wants to avoid.

1.3 The Product Coordination concept

In response to the challenges faced by the company, a new management team has identified the need for reorganising its procurement activities to leverage NTE's purchasing performance. As an EPC contractor the company aims to have a procurement function that is able to select the best in class supplier existing in the market. This will ultimately enhance the value proposition towards its clients thus ensuring NTE's mission of becoming the preferred partner in the markets where it operates. In this sense, the company needed to actively enhance the knowledge it has about the external environment, i.e. market, supplier, clients, etc; as well as make better use of the valuable expertise that is contained within NTE. In order to do so, NTE procurement activities should be structured so that better coordination across the project boundaries is achieved. As a solution, the new management team in NTE decided to organise its procurement function to enable the centralisation of competence about each of the products in the portfolio. Such centralisation was materialised under the Product Coordination concept, which involves the creation of a new role called the Product Coordinator (PC). The PC is an individual belonging to the Procurement Department who will specialise on a certain product and will have all the expertise regarding the product and its corresponding supplier market. The PC does not belong to a project but rather provides support to the project by sharing his or her knowledge upon supplier selection. In addition, the PC will monitor the quality and performance of allocated products and suppliers in projects, which will then be transmitted to new projects. Through the product coordination role, the company can select the best supplier, leverage its buying power through new and appropriate supplier relations and foster organisational learning. Further, the PC facilitates the supplier market research that otherwise need to start from zero on every new project. Thus, the Product Coordination concept has also the potential to reduce administrative time and cost for the project. A more detailed description of the PC role will be covered in the Empirical Findings chapter.

1.4 Problem description

This master's thesis studies and evaluates the current organisational design of the Product Coordination concept through the introduction of the Product Coordinator (PC) role within NTE's Procurement Department. The Product Coordination concept was first introduced several years ago in the focal company, with a boost in 2013. After this time, fluctuations on the performance of its implementation have been observed. For the management team the potential benefits of introducing Product Coordination were numerous. However, the low responsiveness and support to the initiative from the rest of NTE's employees was a major concern for them. The authors were asked to dig into the organisation in order to understand the different perceptions and requirements of all possible stakeholders of the PC

role. Centralising product competence in the format of the Product Coordinator is not a typical approach within the Oil and Gas industry. Therefore, one of management's priorities at the start of this thesis was to confirm if the Product Coordination concept is indeed appropriate given the context and needs of NTE. Furthermore, it was of interest to the management team to identify and understand the reasons of such fluctuations in performance and the slow implementation of the PC role. This would enable them to redirect efforts towards the areas where focus should be invested in order to make the implementation successful. Lastly, it is important to mention that the PC concept is still under development with the goal of being finally institutionalised as an official role in NTE operations. As stated by the management team, there are aspects of the design of the PC role that have still not been determined. A further contribution of this thesis was therefore to provide input on how to materialise the Product Coordination concept within NTE in order to achieve the appropriate legitimacy and desired performance.

1.5 Purpose

In line with the introduction above, the purpose of the present master's thesis can be stated as follows:

The purpose of this thesis is to study and evaluate how the concept of centralised product competence through the role of the Product Coordinator (PC) has been implemented in NTE in order to improve its purchasing performance. To begin with, the research assesses the suitability of the Product Coordination concept taking into consideration the context and requirements of NTE. Furthermore, the aim is also to propose improvements to the current organising of the Product Coordination concept within NTE in order to institutionalise the PC role in the organisation.

More specifically, the following research questions will therefore be investigated to provide a basis for fulfilling the purpose of the report:

RQ1.- Is the concept of centralised product competence appropriately organised considering NTE's context?

RQ2.- What are the organisational factors determining the performance of the PC role in NTE?

RQ3.- What actions are needed in order to improve the implementation of Product Coordination and institutionalise the PC role in the organisation?

1.6 Outline

The outline of this thesis consists of eight main chapters, starting with Introduction and proceeding with the Analytical framework, Methodology, Empirical findings, Benchmarking case study, Analysis, Conclusion and Recommendations. A short explanation of the chapter follows:

Analytical framework – In this section the authors develop a theoretical framework based on the elements of organisational design. In addition, theoretical backgrounds upon specific organisational types are presented, giving attention in parallel upon the aspect of purchasing organisation's performance.

Methodology – The methodology is explained in chapter three together with a reflection on the quality and reliability of the study. A case study is built in this thesis, which uses a systematic combining approach that matches theory and empirical findings. This is complemented by a quantitative and qualitative research approach to data collection.

Empirical findings – This section describes in further detail the purchase situation of NTE as well as the Product Coordinator role. The core of this chapter presents the findings from the semi-structured interviews and questionnaire conducted by the authors to key individuals in the company. These findings cover the views upon the Product Coordination concept as well as the organisational type through which this had been implemented so far.

Benchmarking case study – The results of Skanska Nordic Procurement Unit's Benchmarking are presented. The Benchmarking is focused on the way that this centralised purchasing organisation has been designed.

Analysis – This chapter combines the empirical findings with the theoretical framework together with the benchmark. Firstly the necessity of centralised product competence within NTE, through the concept of Product Coordination is evaluated. Secondly, based on the elements of the organisational design process, the current organisational arrangement of Product Coordinator role is evaluated. Lastly, improvements upon the organisational design are suggested and the benefits from these improvements are presented.

Conclusions – The conclusions of the Thesis are comprehensively presented providing answers to the research questions, thereby answering the purpose of this thesis.

Recommendations – This chapter summarises the actions recommended by the authors to NTE towards the organisational design of the Product Coordination concept.

2. ANALYTICAL FRAMEWORK

This chapter presents a review of the relevant theory upon purchasing organising that has enabled the authors to provide answers to the research questions and thus fulfil the purpose of this thesis. The chapter starts by describing the factors affecting the purchasing organisation composition and behaviour. Then, different organisational arrangements used in purchasing are discussed, placing higher emphasis on sourcing teams and KSM arrangements. Furthermore, variables to measure performance of the purchasing organisations are presented. Lastly, the chapter ends with the managerial aspects to be considered when organising the purchasing function.

2.1 The purchasing organisation

‘Strategic purchasing’ is defined by some authors as the process of planning, implementing, evaluating, and controlling strategic and operative purchasing decisions for directing all activities of the purchasing function towards opportunities consistent with the firm's capabilities to achieve its long-term goals (Carr and Smeltzer 1997; Ellram and Carr 1994; Zheng, Knight, Harland, and James 2007). As support to strategic purchasing decisions, firms rely on organising their purchasing function and activities in a way that can best execute those decisions and ultimately achieve purchasing performance or the performance of the entire organisation (Glock and Hochrein, 2011). In general, organisational design refers to the process of assessing and selecting the structure of an organisation, including formal systems of communication, coordination, control, assignment of tasks, authority and responsibility as well as allocating resources (Hamel and Prahalad, 1994), in order to facilitate efficient task completion (Glock and Hochrein, 2011). In this particular thesis, organisational design analysis focuses on the structure of the buying centre, that is, all those members that are involved in the buying process for a particular product or service (Robinson et. al, 1967). This is also known as the decision-making unit (DMU) by some authors (Garrido-Samaniego and Gutiérrez-Cillán, 2004).

Review of the literature points to an agreement on that the structure of the buying centre, i.e. how this is organised, is directly or indirectly affected by the characteristics of the environment in which it is embedded. Moreover, the relationship between these two variables ultimately impacts the firm's performance. Thereby, the next sections are dedicated to present a conceptual framework that illustrates the relationships between environment, structure and performance of purchasing organisations. The framework takes as inspiration the conceptual model proposed by Glock and Hochrein (2011). However, the framework was complemented with additional literature as found relevant and adapted for a better understanding of the purchasing organisation in this case study. The conceptual framework is shown in figure 1. To begin with, the contextual factors that will determine the resulting purchasing organisational design are presented. These are divided into company-external factors, i.e. environmental, and internal factors to the company but outside the purchase organisation, i.e. organisation characteristics, product characteristics and the purchase situation, as proposed by Glock and Hochrein (2011). Secondly, the

structural characteristics of the purchasing function are located in the centre of the framework, which represent alternative variables of the Purchasing Organisation (PO) (Glock and Hochrein, 2011). Thirdly, the most common institutional types of POs used in the industry as a result of the relationship between the company's specific context and structural characteristics are discussed. Finally, the impact of the organisational design of the firm as a whole and the purchasing function's performance will be discussed.

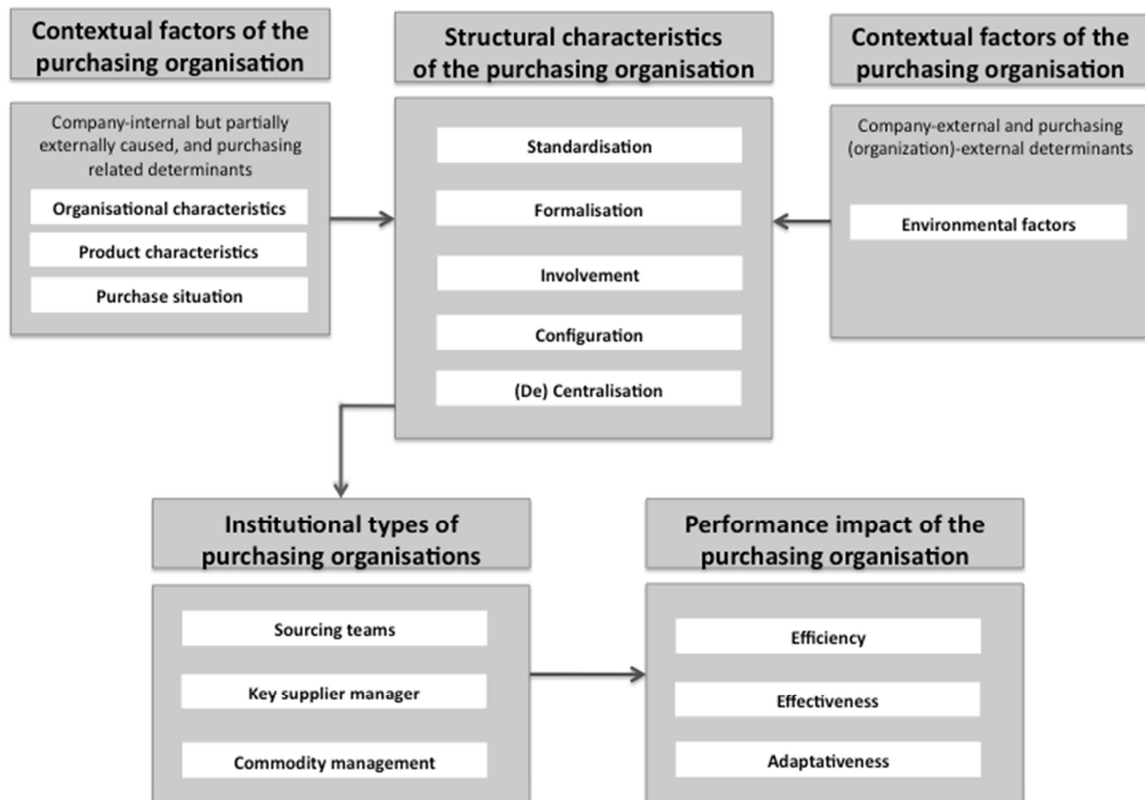


Figure 1 Factors affecting purchasing organising, inspired on the model by Glock and Hochrein (2011)

2.2 Contextual factors of the purchasing organisation

As Glock and Hochrein (2011) suggest, the context within which the organisation is embedded, and more specifically its purchasing function, affects how it will structure its purchasing operations. As mentioned above, these factors can stem from the external environment and or be related to the characteristics of the organisation, i.e. outside the purchasing function. This section then discusses each of the contextual factors that can explain the structure of the purchasing organisation.

2.2.1 Environmental factors

Uncertainty is one of the main external factors affecting the structure of the organisation. It stems from a lack of information and knowledge in decision-making (Duncan 1972;

Lawrence and Lorsch 1967), which is also perceived as interpretation of the external environment. Environmental uncertainty has two distinct and separate dimensions: environmental complexity and environmental variability (Boyd and Fulk, 1996; Duncan, 1972; Elite and Bridges, 1984) Environmental complexity refers to the diversity and interdependence of environmental factors that organisations have to cope with (Child, 1972; Dess and Beard, 1984; Duncan, 1972). Environmental variability is the rate and volume of changes in the environmental factors, which decreases the confidence in predicting outcomes (Daft et al., 1988). The more dynamic and complex environmental conditions are, the greater the intensity of uncertainty in the environment (Jabnoun et al., 2003). As a result, the need for greater flexibility and speed in coordination and control is increased, which in turn will enable the organisation to more effectively detect and respond to unforeseen problems and opportunities in the environment (Zammuto and O'Connor, 1992). The possible changes require greater amount of information to be processed by decision-makers during task performance. Environmental complexity and variability, thus, increase the amount and variety of information about the external environment that an organisation has to process (Jabnoun et al., 2003). Inevitably, they also increase the time and effort needed to collect and process this information (Goll and Rasheed, 1997; Nadler and Tushman, 1988). In order to confront these environmental factors, organisational arrangements are designed in order to increase the capacity of gathering and processing information, reduce the need to process information, and increase the flexibility to adapt to environmental changes (Galbraith, 1977). It would also require organisations to develop business intelligence through scanning extensively the range of environmental factors, such as emerging trends, their rivals, threats and opportunities that contributes to their complex environment (Efrain, 2011; Hambrick, 1982; Aguilar, 1967).

Fahey and Narayanan (1986) describe different dimensions of uncertainty, namely, macro-environmental uncertainty including political, regulatory, statutory, and economic conditions; competitive uncertainty as the inability of an organisation to compete within the industry in the future; market uncertainty including the unknown demand for a company's products; and technology uncertainty due to changes in the industry's technological resources and capabilities that can undermine an organisation's competitive base (Anderson and Tushman, 1990).

2.2.2 Organisational characteristics

The *organisational strategy* and *structure of the organisation* as a result is closely connected to how the purchasing function is organised. Not only because the purchasing structure should be aligned to support the organisational strategy but also because the structure of the organisation as a whole provides a physical frame within which the different purchasing organisation designs should fit.

2.2.3 Product Characteristics

The *technical complexity of the product* the buying decision becomes more challenging and

it is more likely that there is high necessity of knowledgeable experts and specialists with technical expertise in order for better evaluation and meaningful value comparisons of the available alternatives (Kotteaku et al., 1995; Glock and Hochrein, 2011). This complexity is determined by the number of alternatives available, the degree of differences among the alternatives, the level of difficulty of the alternatives' understanding and the ability to compare them (Campbell, 1988; Kutschker, 1985; Gronhaug and Bonoma, 1980; Ghingold and Wilson, 1985). In addition, the *type of product purchased*, that is, the level of influence this product or component has on the final product, is an important characteristic to consider since it increases the uncertainty on the impact of the product.

2.2.4 Purchase situation

The *perceived risks* by each of the members of the buying centre is important to be aware of since it varies depending on the decision maker's toleration of uncertainty and ambiguity (Pablo, 1994)(Juha and Pentti, 2008). The main parameter affecting the selection process of different alternatives is the trade-off between perceived risk and expected return. In this sense, different objective sources of risks have been identified regarding organisational purchasing such as supplier's financial stability (Krause and Handfield (1999), supplier's capacity constraints and its ability to be demand-responsive, quality risk in terms of ability to meet product specifications (Zsidisin et al., 2000), as well as supplier's ability to meet customer's changing product environment (Zsidisin et al., 2000), among others.

The *purchase's importance to the organisation* determines the degree of risk incorporated in the purchase decision for the organisation. This variable may be represented in terms of the relative importance of a purchase to others of a similar type (Johnston and Bonoma, 1981), the purchase's impact on organisational profitability and productivity (McQuinston, 1989; Dawes et al. 1992), the purchase price, project's length as well as the purchase's impact on the different functional areas and individuals (Dawes et al., 1992).

Novelty is considered as the lack of experience or familiarity of a buying organisation with a specific purchase (Aderson et al., 1987). The degree of novelty of the buying task, the need for information and the number of alternatives considered, are factors determining the buying situation (Garrido-Samantiego and Gutiérrez-Cillán, 2004). This will result in different types of risk incorporated in the task. According to Dawes et al. (1992) and Juha and Pentti (2008), new tasks situations have the most risk incorporated and therefore require gathering a large amount of information to make the decision.

Depending on the stage of the buying process faced, that is, the *buyphase*, the level of perceived risk and information needed varies. In this sense, Juha and Pentti (2008) suggest that the perceived level of risks increases in the latter phases of the purchasing process since the risks are becoming more concrete and evident. In contrast, it decreases during the initial phases where the lack of information cannot provide a clear picture of the anticipated risks. At the same time, the amount of information required is highest at the initial phases and decreases as the purchase evolves.

2.3 Structural characteristics of the purchasing organisation

Depending on the environment and the context of the organisation described above, the characteristics of the purchasing organisation will vary. That is, firms will characterise by different degrees of standardisation, formalisation, configuration, centralisation and involvement of the members in the buying centre. All of these characteristics are described below together with their relation to the contextual factors mentioned earlier.

2.3.1 Standardisation

This factor refers to the degree to which all organisational activities and routines are precisely defined or performed regularly, according to procedures, norms and regulations that are legitimised by the organisation (Garrido-Samaniego and Gutiérrez-Cillán, 2004). In the supply chain literature standardisation can be achieved on products, processes or personnel. In purchasing, the use of standards reduces the variability and thus lowers the uncertainty in purchasing activities since these allow for a routine execution of tasks (Glock and Hochrein, 2011). However, these authors also pointed out that standardisation can limit the capacity to process information, thereby it should be used if information processing requirements are not high. Further, Garrido-Samaniego and Gutiérrez-Cillán (2004) suggested that it could be assumed that a greater degree of standardisation results in more structured buying centres, which facilitated the participation and influence of the members in them.

2.3.2 Formalisation

This structural factor refers to the degree to which purchasing activities are rigidly prescribed by rules, policies and procedures (Johnston and Bonoma, 1981) and thus regulate decision processes and communication lines. Formalisation includes as well the definition of roles and authority relations (Glock and Hochrein, 2011) and is a common measure for reducing uncertainty in purchase situation. This variable supports standardisation, as it is the mechanism that ensures that tasks are performed equally throughout the organisation, facilitating predicting and further controlling of behaviours. Johnston and Bonoma (1981) observed that an increasing formalisation in organisations reduced effective communication among members of the buying centre since these relied more on written formal correspondence rather than on direct verbal communications. Further, a greater degree of formalisation resulted in larger buying centres involving many functional areas (lateral involvement) to participate in joint decisions in the buying process. However, even when increasing the level of participation foster participation of buying members (Garrido-Samaniego and Gutiérrez-Cillán, 2004), it has also been related with reduced levels of motivation among the organisation employees (Hartman, Trautmann, and Jans, 2008). On another note, Juha and Pentti (2008) found a positive correlation between the degree of novelty of the purchase and the degree of formalisation. In this sense, due to the high uncertainty characterising new buy situations companies tend to increase the need for cohesiveness and pressure for uniformity. Furthermore, as the complexity of products

increases, according to Kotteaku et al. (1995) management tends to identify the need for formalising the roles of buying participants and suppliers, since the uncertainty for more complex products is higher.

2.3.3 Size of the buying centre

This factor, also known as extensivity, indicates the number of people involved in the purchasing process (Johnston and Bonoma, 1981). The extensivity is determined by the level of lateral involvement, which is an indication of the number of separate departments, divisions or functional areas participating in the purchasing decision, as well as vertical involvement, which indicates the number of hierarchical levels involved in such decision. Johnston and Bonoma (1981) suggest that a certain level of extensivity gives the buying centre the capacity to process information quickly and accurately and make joint decisions, thus, increases the quality of purchasing decisions, thus reducing uncertainty and the level of perceived risk in purchasing (Garrido-Samaniego and Gutiérrez-Cillán, 2004) (Juha and Pentti, 2008). More specifically, in cases of high purchase importance, product complexity or novelty of the purchase task the level of lateral and vertical involvement is greater, hence resulting in extensive buying centres. In such cases, there is high risk incorporated, therefore it is necessary more individuals, departments or levels of management to be capable of providing all the required information (Dawes et al., 1992)(Garrido-Samaniego and Gutiérrez-Cillán, 2004). Nevertheless, if uncertainty is considered very high, decision authority might still be kept on a small group of people (Juha and Pentti, 2008) and not create diffusion of authority (McCabe, 1987). However, according to Mattson (1988), the more individuals exerting influence in the purchase decision, typically reduces the influence of the purchase department on the purchase. Thus, increasing the size of the buying centre has been observed to reduce the participation of individual members in the buying process.

On another note, Juha and Pentti (2008) point out that the dimensions of the buying centre are dynamic and change depending on the buying situation and buying phase, which affects the flow of the process. On the one hand, extensivity is higher in the beginning of the buying process and lower towards the end because at earlier stages the amount of information needed to make a decision is higher (Dawes et al., 1992). On the other hand, Garrido-Samaniego and Gutiérrez-Cillán (2004) found that the level of influence of different functional areas during the purchasing process varies. In the case of technically complex products such as capital equipment the engineering department has a strong influence throughout the whole buying process. In contrast, the purchasing department's influence is low in the first phases ("need recognition" and "establishment of specifications"), increases significantly on the phase of "supplier search" and then stabilises on the phases of "vendor evaluation" and "supplier selection".

Awareness of the degree of lateral and vertical involvement helps managers to identify the degree of diverse opinions and how possible it is to influence a decision through certain

functional areas involved (Johnston and Bonoma, 1981). These authors suggest that managers should find the optimal degree of involvement in order to guarantee the necessary information to be available during the buying process but to avoid conflicting interests and confusion due to extra loaded information. Involving too many functions and management levels in the buying process results in complex buying centre structures (Lau et al., 1999) that should be avoided if not necessary. Moreover, if high hierarchical positions are involved in the decision-making during the purchasing process, information and resources become readily available (Gronhaug, 1975, 1976). Thereby, knowing the levels of hierarchy involved in the purchasing decision can help purchasing managers and/or buyers create an effective communication strategy.

2.3.4 Specialisation

Garrido-Samaniego and Gutiérrez-Cillán, (2004) describe specialisation as the division of labour within the organisation. Further, these authors found that the characteristics of the purchase situation such as novelty, complexity and importance as well as the resulting perceived risk to the purchase organisation, the members of the decision making unit will sought for more information from specialists. Thereby, a greater degree of specialisation increases the participation and influence of these individuals in the purchasing decision process. Robbins (1990) distinguishes between functional-oriented specialisation and objected-oriented specialisation, depending on how tasks are divided. In the case of functional specialisation the work is broken down into simple and repetitive tasks, each one of them can be efficiently performed by a specialist. However, problems arise if tasks are interdependent since interfaces must be accounted for and making individual's performance interdependent as well (Glock and Hochrein, 2011). In the case of object specialisation each individual is responsible for different tasks that are logically interconnected, which reduced the interface-related problems. Juha and Pentti (2008) also point out that varying degrees of skills and expertise are found as required forms of specialisation in order to manage purchase-related risks, depending on the stage of the buying process and the type of purchase. On the one hand, these authors observed that specialists tend to be more skill-oriented in new buy situations while more general expertise is of interest in modified buy situations. On the other hand, buying centres required a higher presence of specialists at the initial and middle stages of the buying process while a more generalist knowledge is appreciated in the final stages.

Interestingly, Dawes et al. (1992) observed that individuals with high knowledge and confidence, are less likely to neither feel the need to include external people from other functional units into the buying centre nor require the active participation of more levels of management in the process. Thereby, a greater presence of specialists tends to turn into a reduced size of the buying centre (Garrido-Samantiego and Gutiérrez-Cillán, 2004).

2.3.5 Configuration

This factor describes the design of the authority structure in the organisation, including

vertical and lateral spans of control and numbers of positions in various segments (Pugh et al, 1963, 1968). A purchase organisation with a high degree of configuration is characterised by many and diverse design features such as positions, departments, formal communication channels or control structure, depending on the requirements of the purchase situation (Glock and Hochrein, 2011). *Connectedness* is another important variable that indicates the degree to which the members of the buying centre are linked with each other by direct lines of communication related to the purchase (Johnston and Bonoma, 1981). According to Glock and Hochrein (2011) the more communication channels there are in the buying centre, the easier it is for its members to influence the buying decision. For the purchasing department and its members, awareness of configuration issues is important since these will determine the hierarchical position that both of them have in the organisation. For example, the way that rewards and performance measures vary across different roles in the organisation, affect the type of procurement information and aspects of the procurement process an individual will be concerned about (Garrido-Samaniego and Gutiérrez-Cillán, 2004). In addition, the position of the purchasing organisation gives an understanding of the status this unit has within the organisation and the degree to which this one can influence decisions on the strategic and tactical level (Glock and Hochrein, 2011). For example, a CPO (Chief Procurement Officer) that has a high executive position and direct report to the CEO is critical to organisational design effectiveness since it gives this one the visibility, authority and resources to make supply strategies happen (Trent, 2004). This facilitates the involvement of the purchasing function in corporate activities and decisions (Johnson, Leenders and Fearon, 1998) and gives an indication of the increasing importance purchasing enjoys within the organisation (Johnson and Leenders, 2006). Similarly, the configuration of organisations is key to foster supply chain integration since it will determine the strategic connections across functions and organisational boundaries, necessary to make integration happen (Trent, 2004). In this sense, decisions to formally achieve working relationships between purchasing and other functional areas and meaningful collaboration efforts such as the purchasing professional being embedded into the planning systems of the other group, would enhance purchasing reputation (Trent, 2004).

2.3.6 (De) Centralisation

This factor refers to the degree to which the decision making authority, responsibility, and power is concentrated in a single organisational unit, i.e. centralisation, or on several, decentralisation regardless of the position of this unit within the organisation (Pugh et. al, 1963; McCabe, 1987; Glock and Hochrein, 2011).

Garrido-Samaniego and Gutiérrez-Cillán (2004) suggest that greater levels of decentralisation foster an active participation by a greater number of departments, i.e. higher lateral involvement, and as such a greater influence from them in the purchasing decision. In high-risk and high-uncertainty purchasing situations, organisations increase the participation of lower hierarchical levels in the buying process, in order to increase the

amount of information about the purchase as a risk mitigation mechanism (Juha and Pentti, 2008). Yet, in such environments the decision-making tends to remain centralised on a small group of individuals (McCabe, 1987) at higher hierarchical levels (Juha and Pentti, 2008). For example, products with high complexity may impose the need for higher managerial and organisational control, through the centralisation of buying structure (Lau et al., 1999). Moreover, Juha and Pentti (2008) found out that centralisation and hierarchical control of decision making increased at the end of the buying process because it is by then when the purchase-related risks become more concrete and evident. This is because information has already been gathered about the purchase.

The understanding of where the decision making power is concentrated is important for getting purchasing strategies executed. In this sense, Johnston and Bonoma (1981) suggested that in cases of high centralisation over the purchase manager it is enough to aim at persuade this manager for making decisions. Yet, if centrality is low, then it might be recommendable to bring more persons on board to the initiative in order to persuade them towards the decision.

In order to better exploit opportunities and fit to the dynamic environment and contribute effectively to companies goals, most firms chose organisational structures that range between pure centralisation to pure decentralisation, including a mix of both, i.e. hybrid structures (Narasimhan and Carter, 1990). For example, Narasimhan and Carter (1990) found that multinational companies tend to utilise a centralised structure when they require a procurement staff with a high level of technical expertise and global market knowledge and also get consolidation of purchasing volumes. In contrast, decentralised structures are used in companies where there is a low material commonality between divisions, where there is the need for direct interaction with suppliers, and which have frequent component design changes. In this cases, it is necessary a greater flexibility and to provide better service to local customers that is more optimally provided by decentralised structures (Glock and Hochrein, 2011). The hybrid organisation is typically adopted if it necessary to deal with a few powerful suppliers and there are several higher volume strategically important items and the bulk of purchasing items are non-sophisticated, according to Narasimhan and Carter (1990).

2.4 Organisational arrangements in purchasing

Due to the complex environment and context within which each organisation is embedded most of them do not rely on only one type of organisational type for meeting purchasing objectives. In the case of centralisation, Trent (2004) suggested that this can be operationalised in different forms and it is always present at least for certain purchasing activities. For example, even when some centralisation is present, it is observed that purchasing activities related to day-to-day materials and supplier management are to remain decentralised in order to maintain responsiveness to individual locations and sites. In addition, centralisation can also be seen at the business unit level rather than meaning

retaining the control at the corporate level. Trent (2004) points out that it is increasingly common to have organisational design features that enable the benefits from central coordination but also avoid the negative perception that internal users or sites could associate towards central control. In particular, features such as centrally coordinated commodity teams, formal positions that separate strategic and tactical supply responsibilities, lead buyers to manage non-centrally coordinated items, Strategy review and coordination sessions between functional groups and locations and Higher-level chief procurement officers; are seen by this author as good support structures for centrally coordinated purchasing decisions and activities. Furthermore, Johnson et al. (1998) suggest that a certain level of centralised control in the purchasing function also enabled it to have a more strategic role within the organisation, thus a higher involvement in corporate activities. Moreover, centralisation facilitated the coordination of purchasing activities, which allowed a higher presence of team-based purchasing techniques such as commodity teams, cross-functional teams as well as teams including the supplier and/or the client.

On another note, Trent (2004) found that the size of the buying firm affects the design features and the extent to which the firm relies on such structures. In this sense, larger and smaller firms have different scopes and varying levels of complexity and availability of resources. Larger firms, however, put forth effort to overcome inefficiencies and duplication, thus, these will emphasize design features that coordinate common activities or processes across business units or locations.

When comparing medium and large organisations, Trent (2004) found that these two reckon that the cross-functional or self-managed teams that manage some or all of the procurement and supply process and new product and/or process development teams that include suppliers as members or participants are important design features in order to achieve supply objectives. At the same time, the use of lead buyers or site-based experts designated to manage non-commodity or non-centrally coordinated items or services is also a recurrent tool in medium to large firms towards achieving supply effectiveness. Nevertheless, medium firms rely more on specific individuals assigned responsibility for managing key supplier relationships, including supply chain alliances as source of meeting supply objectives. In contrast, larger firms rely more on design features that seek coordination of supply chain activities between the firm and key suppliers driven mainly by executive positions; centrally coordinated commodity teams that develop and implement company-wide supply strategies and; organisation designed around procurement and supply processes rather than functions by the use of project teams that work on specific procurement and supply tasks help define an effective design. Regardless of the specific design feature, it can be seen the usage of some form of team for carrying out supply activities as well as the usage of specific individuals to perform such tasks. This is why the remaining part of this section is dedicated to a more detailed description of two typical organisational designs used in purchasing, namely cross functional sourcing teams and Key Supplier Managers.

2.4.1 Sourcing teams

Sourcing teams also referred in the literature as category or commodity teams (Driedonks et al., 2009) are an organisational mechanism where a team is formed to perform purchasing or material's related assignments (Trent and Monczka, 1994) and achieve superior performance. More specifically, according to Driedonks et al. (2009) and Driedonks (2011) sourcing teams have the task of finding, selecting and managing suppliers for a category of products or services across businesses and across functions and disciplines. In this context, sourcing teams are held responsible for varying purchasing assignments, either at the execution or strategic level (Trent, 2004). Yet, according to Driedonks (2011) these typically do not execute operational purchasing activities. That means that others external to the team executes and thus must comply with a sourcing team's recommendations by implementing agreements reached by team.

In addition, sourcing teams are typically cross-functional because they are composed by people from different business units, representing different functional backgrounds. Thus, sourcing teams fulfil a boundary-spanning role, dealing with several internal and external stakeholders (Driedonks et al., 2009). Organisations generally use this organisational mechanism at least to a certain extent (Trent, 1998) because there is agreement on that it can provide flexibility, multifunctional knowledge, and control and coordination mechanisms for fast responses to new competitive demands, that cannot be achieved by traditional structures (Trent and Monczka, 1994).

The same characteristics of cross-functional sourcing teams could be the ones hindering their potential performance (Trent and Monczka, 1994). If not managed correctly, teams can potentially waste the time and energy of members, enforce lower rather than higher performance norms, create patterns of destructive conflict within and between groups and make notoriously bad decisions, in addition to possibly exploit, stress and frustrate members (Trent, 2004)

One issue identified by Trent (1998) is that most firms have maintained their existing functional structure and added part-time cross-functional sourcing team responsibilities. Either due to a scarcity of non-purchasing resources or an unwillingness to organise the sourcing process permanently around teams has led to sourcing teams that do not enjoy of full-time membership (Trent, 1998). As a result, sourcing team members have more than one job responsibility and dual reporting relationships (Trent, 1998; Driedonks et al., 2009), which affects members' contribution and commitment to the team. Further, Trent (1998) points out that part-time members and particularly non-purchasing members face the greatest risk of not developing adequate member involvement and commitment.

Another aspect is the effect that cross functionality brings to sourcing decisions due to sometimes present functional interdependency and the usage of ad-hoc decisions (Moses and Ahlström, 2008). First, sourcing team members are interdependent since the output of one part is the input of the other and vice versa. Poor coordination among team members

and functions can result in participants in the sourcing process that are either overloaded with information or that do not get any information at all or too late. Second, in some sourcing cases decisions are made ad-hoc, that is, founded on previous experience and tacit knowledge, without documented follow-ups on the effect of previous decisions (Moses and Ahlström, 2008). This is especially a problem in interdependent teams such as sourcing teams, when each function makes assumptions on what makes the organisation successful or what it is more convenient, and uses such assumptions to make decisions (Lonsdale and Watson, 2005). According to Moses and Ahlström (2008), this could lead to a function making decisions in isolation and outside the joint sourcing process.

Historical convenience is another typical phenomenon observed by Moses and Ahlström (2008) affecting the sourcing decision. This is evidenced when keeping a sourcing alternative than to change is perceived as easier and more convenient for a certain function or functions, even if the new alternative may be cheaper or better. These authors explain that the reason for not changing is usually the need for heavy initial investments in a new supplier or good relations with the previous supplier.

The misalignment between the organisational strategy and functional goals can complicate the sourcing process by inadequate guiding decision-making within the sourcing teams is another problem proposed by Moses and Ahlström (2008). Firstly, an issue derives in cases when official goals cannot necessarily be the operative goals governing team member's activities or when manager's decisions aim to secure their personal advantage rather than the organisation's advantage. In such cases, decision sourcing team members have no consistent guide for decision-making and, in addition, the parties with less to gain most likely will oppose change (Lonsdale and Watson, 2005). Secondly, misalignment between goals of different functions can lead to dissipated resources, missed opportunities and, in cases when decisions need to be made faster, some function can act on their own initiative (Moses and Ahlström, 2008).

Success factors for sourcing team's performance

The problems discussed above show that managers have many aspects to consider in order to get sourcing teams to be successful. According to Trent and Monczka (1994) firms must plan and manage carefully the usage of cross-functional sourcing teams since the creation of the team itself does not guarantee this will achieve the expected performance. This section presents the common success factors that firms need to address or put in place in order to get the team to achieve the improved performance they are set to meet. Many researchers have identified the success factors for achieving team performance (Trent and Monczka, 1994; Trent, 1998; Driedonks et al., 2009; Driedonks, 2011). Yet, this thesis discusses those success factors by following the Input-Process-Output conceptual model for sourcing team effectiveness presented by Driedonks (2011). This author in particular identified that sourcing team effectiveness is dependent on a new dimension, which is the ability of the team members to effectively cooperate with other stakeholders within the

firm. The conceptual model provides insights on how performance on three dimensions of sourcing team effectiveness can be improved by management (Driedonks, 2011). That is, what are the aspects that management needs to provide to or enable in the sourcing team, i.e. the input and process variables, in order to get the team achieve the necessary performance, i.e. achieve the output. Furthermore, the author explains that this conceptual model is a three-staged process, which means that input factors affect the team processes that evolve over time and impact team outcomes. At the same time, process factors are enablers of the team input factors and thus can enhance or decrease team performance, i.e. output. The conceptual model presented by Driedonks (2011) is shown in figure 2.

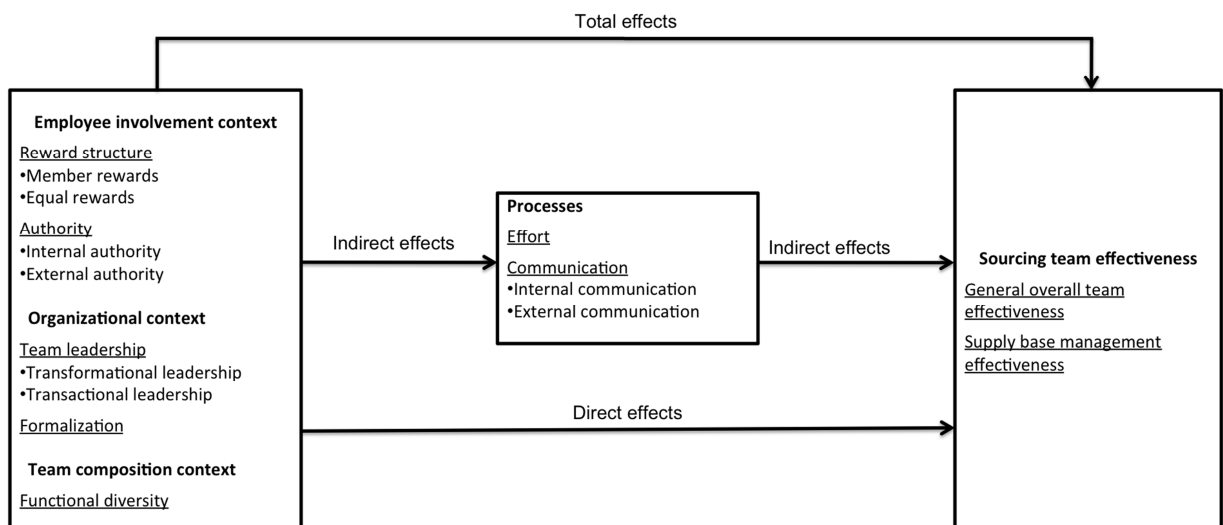


Figure 2 Input-Process-Output conceptual model for sourcing team effectiveness. Source: Driedonks (2011).

Team's Output:

The ultimate output of sourcing teams is the desired performance. This output is measured in terms the sourcing team effectiveness, according to Trent and Monczka (1994) and Driedonks (2011). Sourcing team effectiveness should be evaluated through two different dimensions:

- General overall team effectiveness, which measures how the team is performing in its work. Typical indicators are quality and quantity of work, efficiency, planning, and overall performance of the team.
- Supply base management effectiveness, which measures the outcome of teams tasks and decisions. Typical indicators are improved quality of purchased items, improved supply base responsiveness, relationship management, and support for innovation.

Team's Input:

According to Driedonks (2011), a team should be enabled with aspects on three main dimensions in order to enhance its performance. The first dimension relates to the employee involvement context, which aim to enable and support a sense of ownership and control by team members. The second dimension is the organisational context, which considers the actions needed to provide teams with guidance regarding task execution. Lastly, the team composition context refers to the necessary functional representation in the team to appropriately perform the sourcing tasks. The factors contained in each of the three dimensions are discussed below.

- Employee involvement context

Driedonks (2011) suggests that the two main factors determining the level of sourcing team member involvement are the empowerment, i.e. authority, and reward structure given to them. These two variables help employees to feel ownership and responsibility for their work, motivating them to outperform.

First of all, providing a team with *authority* is vital for ensuring member involvement (Driedonks, 2011). Trent and Monczka (1994) distinguished between the need for internal and external decision-making authority as factors affecting sourcing team's performance. Internal authority refers to the team's ability to control internal team processes and activities, which results in more accurate communication within the team, increased team effort, higher satisfaction with the methods of information exchange between team members and perceived formal team meetings as useful to a higher extent. In addition, Driedonks (2011) found that internal authority enhances external cooperation effectiveness through more external communication by team members. External authority refers to the ability of the team to make external sourcing decisions without the approval of others external to the team. Driedonks (2011) found that external authority did not affect significantly general team effectiveness. Nevertheless, external authority together with internal authority, do generate an increased member's effort that in turn leads to better quality of decision-making, i.e. supply base management effectiveness, (Trent and Monczka, 1994)(Driedonks, 2011).

Secondly, setting up a proper *reward* structure has proved to boost team member's effort and increase the time the member commits to team's activities (Trent, 1998). Thus, rewarding the team's members indirectly improves performance. In contrast, Driedonks (2011) found that rewards do not by itself have a significant impact sourcing team effectiveness unless all team members benefit from a reward. However, this might not be the case in sourcing teams with employees belonging to different functions.

- Organisational context

The presence of *leadership* is another aspect to be guaranteed in the sourcing team according to Driedonks (2011). This author found the importance of the existence of

transformational and transactional leadership within the team to enhance its performance. The presence of a transformational leader who characterises by his or her charisma and that gives consideration to team member's needs and interest ensures team effort (Trent and Monczka, 1994) and fosters effective internal communication, thus improving general team effectiveness. In addition, such leader enhances external communication that leads to better cooperation with those external to the team (Driedonks, 2011). Lastly, a transformational leader goes in line with the autonomous, cross-functional and flexible approach needed by sourcing teams, which this author observed to improve supply base management effectiveness. On the other hand, transactional leadership is materialized by the ability of the leader to define, direct, and structure the roles and activities of subordinates toward the attainment of a team's goals. In this way the leader can create a clear vision of sourcing tasks.

On another note, Driedonks (2011) suggest that a certain degree of formalisation fosters member's effort and communications within the team and with others external to the team. In this sense, formalisation refers to the extent a firm relies on following rules and procedures for performing a team's task. Thus, setting rules and procedures help to clarify team members' roles and responsibilities and thus result in increased accountability that ultimately leads to better team performance. At the same time, the presence of rules reduces the need for strong capabilities of a team leader to clearly define tasks and responsibilities. In addition, the author found that formalised sourcing processes are relevant when a team's recommendations must be implemented and followed up by other departments in the organisation since these support decision making and improves cross-functional relationships.

- Team composition context

A key for sourcing team success is to guarantee the necessary *functional diversity* that will allow it to perform the task it has been set to fulfil. According to Driedonks (2011) functional diversity is important for outcomes such as quality, innovation and flexibility, i.e. supply base effectiveness, due to the representation of knowledge and skills from different backgrounds. Indirectly, allocating resources from different functions gives a signal of the strategic importance for managers that the team and its tasks have, thus increasing team members' effort. Yet, Driedonks (2011) found that functional diversity is not perceived as improving overall team effectiveness since stakeholders may see the presence of many functions as complicating the process and hindering outcomes such as productivity, meeting schedules and meeting the expectations of purchasing managers.

Team's Process:

In a first layer, *team effort* is one of the factors acting as mediators between the input and the output, i.e. achieving the required team's performance (Driedonks, 2011). Team effort

refers to a team member participation and level of commitment to the sourcing team activities, without which tasks will not be executed in the first place.

Secondly, *communication* within the team, and between the team and external stakeholders, i.e. other firm's employees or the suppliers, is fundamental to guarantee gathering and sharing the relevant information and knowledge. Such communication is also vital for following up activities after team decisions (Driedonks, 2011). Moreover, communication with stakeholders outside the team enhances cooperation with these assuring a certain level of influence of the purchasing function on other key functions and creating alignment between these. These two factors are fostered by the presence of the abovementioned input factors and at the same time are fundamental for catalyzing team performance.

2.4.2 Key supplier manager

The concept of Key Supplier Manager (KSM) is sometimes defined in the literature as a symmetric approach to usual Key Account Manager (KAM) (Homburg et al., 2002; Ivens & Pardo, 2007). Pardo et al. (2011) define KSM as "a set of practices put in place by certain companies, that allow key suppliers to receive a specific and adapted treatment from the typical treatment used with other suppliers". That means that this role serves a new mission within the supply activities, which will be focused on coordinating the company's information and action in time and space in relation to an identified key supplier. The objective of KSM is to enable a company to generate an increased relational value, compared to the one that can be derived from the traditional way of managing suppliers (Henneberg et al., 2009; Pardo et al., 2006). The traditional approach of managing supplier relationships aims rather to exploit the firms' purchasing power towards the suppliers and reduce risks at a considerable minimum level, according to Dubois and Pedersen (2002).

In contrast, KSM aims at managing supplier relationships with the purpose of value co-creation. In addition, in these relationships other functions apart from purchasing are involved. For both of these reasons, the supplier management task may also take place outside of the purchasing department, as also supported by Dubois and Pedersen (2002). Further, Pardo et al. (2011) suggest that the KSM position should be distinguished from the purchasing department and promoted, as in the case of KAM structure, at a corporate level. These authors also distinguish that the purchasing focus is on categories of products and services bought while KSM focuses on relationships. Thus, they concluded that those two organisational entities should be considered as complementary to each other.

2.5 Performance of purchasing organisations

At an organisational level, performance according to Stanley (1993) and Ruekert et al. (1986) can be conceptualised under the perspectives of efficiency, effectiveness and adaptiveness. Efficiency refers to the relationship between the outputs and the inputs required to achieve those outputs. Effectiveness is defined as the degree to which organisational goals are reached, while adaptiveness refers to the organisation's ability of reacting to changes of its environment.

According to Chao et al. (1993), the overall performance of the organisation is strongly affected by the level of the purchasing function's contribution to the firm's strategies and goals. However, these authors reckoned that it is hard to define the level of purchasing performance, since not all the internal stakeholders use the same criteria for evaluating performance. Further in their research Chao et al. (1993) found that performance can be evaluated using both objective and subjective measures. Objective measures include criteria such as on-time delivery, accuracy, quality of purchased items, actual compared to target costs, purchasing order's cycle time. These items are measures of purchasing efficiency according to Hendrick and Ruch (1988). In contrast, subjective measures include criteria such as professionalism, commodity knowledge, cultivating qualified suppliers and teaming, which are measures of purchasing effectiveness (Hendrick and Ruch, 1988). In particular, commodity knowledge is defined as the buyers' level of knowledge about items, suppliers, and prices and so on for the products they are responsible for. Interestingly, Chao et al. (1993) found that commodity knowledge was ranked as the third most important measure of purchasing performance in the companies analysed in their research.

On another note, purchasing performance is mainly determined by the internal customers' perception. Thereby, integrating purchasing activities with the activities of the internal customers by using a team approach can lead to performance's improvement according to Chao et al. (1993). Further, these authors suggest that improvements in purchasing performance will be facilitated and derive from the communication and understanding of internal customers' operating conditions and requirements. Moreover, the performance of purchasing people will be optimum when it is evaluated in light of its impact on the internal customers' performance. However, since purchasing is generally considered as a supportive activity within a company's value chain (Porter, 1985), role conflicts between this and other disciplines might arise.

2.6 Managerial aspects of purchasing organisational design

The analytical framework intended to present the relation between a firm's environmental factors and the structure of the organisation as well as to why and how the purchasing function is organised in order to support firm's performance. This section rather aims at describing how organisational arrangements are operationalised within purchasing to guarantee achieving the desired performance. This has been used as a point of departure for the recommendations in this thesis.

Roynance (2008) proposes a stepwise model within a Buyer performance measurement program, which includes four consecutive pillars, namely, a dynamic job description, a key competency assessment, training need analysis and finally the setting of performance appraisals and objectives setting. Nevertheless, given the inherent usage of teams in the focal company purchasing operations, a new framework is here proposed. This framework takes Roynance (2008) model as point of departure but that emphasizes those components that are fundamental for achieving sourcing team success proposed by (Trent, 1998).

2.6.1 Dynamic job descriptions

The job descriptions are considered the foundation on which people's performance measurement programs can be built. According to Roylance (2008). A properly defined and managed job position, including tasks, responsibilities, outcomes, etc, is considered to be a tool of obtaining peoples commitment. In addition, a clearly defined job description makes people responsible for their actions, which are in turn judged based on mutually agreed criteria. This consultation of defining the tasks performed within a job position through the involvement and mutual agreement between the jobholders and management is the key of generating commitment (Roylance, 2008). Formalising this agreement, through signing off both parties is also essential. The information that should be typically included in job descriptions suggested by Roylance (2008) is found in table 1.

Table 1 Guidelines to creating a clearly defined job description, according to Roylance (2008)

Items to include in job descriptions
Job title
Location – business unit, department, section, etc
Reporting line including links and direct accountability
Direct reports – jobs reporting directly to the job holder
The primary purpose of job
Key responsibilities, tasks and accountabilities
Dimensions – job content, position's scope, secondary duties
Working arrangements – such as need for overtime working or call-outs)
Decision-making responsibilities and procedures to be followed
Individuals essential and desirable qualifications, knowledge and experience
Ethical guidelines
Job contacts and business relationships

In the specific case of sourcing teams, the most important evaluation to be considered is whether if the assignment to be fulfilled by the sourcing team is meaningful (Trent and Monczka, 1994). That is, the assignment is important enough so that the best decision will be yield only by team interaction and the benefits of such decision outweigh the cost of using the team. Trent (1998) suggests that cross-functional sourcing teams are recommended in cases of complex business decisions that require the effort and talents of more than one individual where the outcome of it might directly affect the organisation's competitive position; the buy-in of different internal and external stakeholders if required to make a decision; or when no single function has the resources or expertise to accomplish the assignment adequately. As agreed by this author, only important assignments will justify the resources required and thus make them available.

Secondly, in contrast to the need for commitment mentioned above, Trent (1998) stresses that sourcing team tasks should rather be motivating for team members in order to ensure

their effort. In this sense, Trent and Monczka (1994) suggested that team members will be likely motivated when performing tasks that require them to use a variety of higher level skills, have visible performance outcomes, provides the team with autonomy and ownership and their outcome has significant positive consequences on others within the organisation. Selecting tasks having these criteria in mind will help create an understanding by the team on how well they are performing (Trent, 1998).

2.6.2 Key competencies needed

After the job having been described and its tasks and responsibilities defined, the next stage concerns the competencies and qualities that should be possessed by the current jobholders or candidates in order to be able to carry out the work. A list of the key competencies required for the specific role, or else a job competency profile, will be able to assess a person's ability to perform the job effectively, an individual's personal qualities required for the job and a person's way of performing the job as well as its suitability not only for the job but also for the organisation. In a second level, Roylance (2008) suggests that skills within the Competency Framework should be segregated into two main perspectives; the non-technical competencies and the technical competencies.

In the case of creating sourcing teams, the next step is to know then what functions and members are needed to be involved based on the required competencies. According to Trent (1998), the functional diversity of the team should be determined by only those functions that critically need to provide continuous support to the team's task. Further, if a function or member is only required for occasional support, such support should then be provided on an as-needed basis. Secondly, the team size should be designed large enough so that it is possible to fulfil the assignment but small enough for members to be able to influence team decisions and outcomes. Being able to participate generates personal satisfaction for the team and results in an increased member's effort.

In addition, Trent (1998) suggests that members' selection should be based on the several criteria. Individuals should have the right experience and knowledge about the task, which in turn helps them understand why they have been selected, what their role is and what is expected from them accordingly. Moreover, having good interpersonal skills and willingness to work in a team are important in order to facilitate collaboration efforts. Team members should also be individuals with a broad organisational perspective so they are able to evaluate whether an idea is better for the whole organisation beyond the benefits it can or not have to their corresponding functions. Ultimately, all members must have the willingness and enough time available for the team tasks, which has been previously agreed by their functional managers

2.6.3 Performance appraisals and objective setting

Both management and staff can be benefited by appraisals by improving job performance and by strengths and weaknesses objective identification (Roylance, 2008). These appraisals have typically the form of a fairly formal interview/discussion, between each

staff member with its direct manager. These are suggested to take place at least twice a year and be supplemented by regular key performance monitoring in between.

Royslance (2008) mentions that purchasing is an ideal area for management by objectives. A comprehensive performance system for successful sourcing teams distinguishes the difference between who should establish performance targets and who should evaluate performance as well as the different type of performance targets that should be defined (Trent, 1998). Moreover, when it comes to setting performance targets, Trent (1998) suggests that the role of the “team sponsor” or management is to assign a specific commodity to a team depending on this one’s qualifications, provide a team budget, and the setting of broader targets such as overall cost and quality improvement targets. Yet, it is necessary that the team breaks down such targets by establishing its own goals and objectives and coordinates its activities accordingly. In this way, team members will have an understanding of what the team is trying to achieve, they can evaluate their progress against specific performance metrics and will guide the individual and collective effort accordingly.

Furthermore, performance systems should have clear objectives and monitor this. Royslance (2008) suggests agreeing upon five or six key objectives that are clear, achievable, measurable, regularly monitored and supported by the management. An appraisal in a purchasing environment is used to monitor the actual job performance and rate it against agreed objectives. In order to do this, an appropriate performance rating scale should be used, ranging from “unacceptable” to “meet requirements” and finally “outstanding”. Finally, commitment is required by all the parties, because if the appraisal scheme will not be taken seriously can be motivationally disastrous and damage the morale.

On another note, there is agreement in literature on the importance of the existence of rewards as a driver of member effort and performance. As stated by Trent (1998), what gets rewarded gets done. Nevertheless, rewards should be carefully designed as a system including both measurements and reward structures. In the case of sourcing teams, the primary variable that should be evaluated is team performance rather than individual contribution (Trent and Monczka, 1994)(Trent, 1998)(Driedonks, 2011). In this sense, evaluating and rewarding superior team effort and performance encourages members to work together as a team rather than individuals assembled as a group (Trent, 1998). Secondly, individual member contribution can be used to complement team-based evaluation in order to show that team success requires all member’s participation and not only the purchasing representative. Yet, if members are to be evaluated individually, managers should make sure that all team members are rewarded accordingly to avoid fear of reward inequities among members that negatively affect their commitment to the tasks (Trent and Monczka, 1994). In addition, Driedonks (2011) found that those departments that rewarded their staff by acknowledging team membership were more open to external cooperation between the teams and such departments. Thirdly, the system should encourage

periodic feedback to keep track of sourcing team progress and it should present with a clear measurement scale that allows for both member's self-evaluation and evaluation from external stakeholders and agree upon corrective actions as required (Trent, 1998). Lastly, organisations should provide rewards and recognition that are unique to sourcing team involvement according to Trent (1998). Further this author mentions there are four ways typically used by organisations to award sourcing team effort and performance, which are described in table 2.

Table 2 Possible ways of rewarding sourcing team effort and performance according to Trent (1998)

Reward types
Bonuses or other cash rewards for meeting or exceeding team performance targets
Executive recognitions, e.g. public thanks and acknowledgement in a certain event, mention in the corporate newsletter or a certificate
Non-monetary rewards, e.g. company sponsored tickets to events, airline travels, gift certificates, etc
Establish each member's merit raise based on the sourcing team's ability to attain or exceed established performance targets

2.6.4 Proper organisational resources

As mentioned earlier, the availability of key resources promotes team effort and affects sourcing task success as much as the lack of those resources hinders such positive outcomes. For this reason, this variable is included in this thesis as it is thought to be a key factor in successful sourcing teams (Trent and Monczka, 1994) (Trent, 1998)(Driedonks, 2011). Further, Trent (1998) mentions that providing resources to sourcing teams has shown to influence team's belief that it can be effective. At the same time, depriving a team of resources sends a negative message about the importance and criticality of cross-functional sourcing teams.

The most critical resource affecting individual and collective team effort and success is time availability, particularly with part-time team assignments (Trent and Monczka, 1994) (Trent, 1998). In this sense, Trent (1998) mentions several suggestions for reducing the impact of time constraint on part time member effort. Some of these have already been mentioned above such as making team involvement part of the employee's formal evaluation, have members establishing team performance objectives as well as determining if each task requires the use of a sourcing team. In addition, the author suggests to continuously identifying those teams and members that have time constraints and address this specifically, review teams' assignments to identify opportunities for consolidation or elimination as well as make teams report periodically to functional executive management. Secondly, support from others external to the team is important. On the one hand, support from executive management will make the right resources available (Johnson et al., 1998)

and signal the importance of the sourcing team assignment to the team members, thus fostering motivation (Trent, 1998). The support from non-purchasing executive functional management was found particularly important by Trent (1998). On the other hand, sourcing teams may require additional support such as information and knowledge from other functions or members that are not part of the team (Trent, 1998). Moses and Ahlström (2008) point out that not all functions are aware of being an information agent and can thus not provide the information on time. These authors recommend managers to be explicit about the effect certain decisions have on specific functions to create awareness.

2.6.5 Proper decision-making authority

Given the proved improvement that internal and external authority of sourcing teams has on member's effort and team's performance (Trent and Monczka, 1994) (Trent, 1998) (Driedonks et al, 2009) (Driedonks, 2011), managers should empower sourcing teams with the mandate to develop and execute sourcing strategies (Driedonks, 2011). Nevertheless, higher levels of authority requires the presence of competent team members for which managers should empower sourcing teams only to the level they deserve based on their qualifications (Trent, 1998). In addition, higher levels of authority are required for teams that are assigned more complex assignments that require innovative and organic decision-making (Marmgren and Ragnarsson, 2001).

3. METHODOLOGY

This chapter describes how this thesis has been conducted. It starts by discussing how the study was designed including the different research approaches taken. Then, the chapter describes how the literature was gathered in relation to each of the research questions. This is followed by a discussion upon the methods used for data collection; touching upon how the different sources of data were extracted and further analysed. Lastly, the chapter finishes by examining the reliability and validity of the research study.

3.1. Study design

A case study methodology was chosen to examine the implementation of the Product Coordination role within Naro Tech Engineering (NTE). The aim of this case study was to provide a profound understanding of the object of interest, i.e. Product Coordination, and enable the authors to divide the problem into smaller parts. This case study is normative since it not only involves collecting and analysing data but also aims at improving the object of study and thus promoting future development (Cohen et al, 2007).

An initial aspect was to define the research approach to be used in the case study of the present master's thesis. In this sense, two research approaches are typically used when conducting research projects closely tied with industry (Saunders et al., 2009; Dubois and Gadde, 2002b), i.e. the deductive or inductive approach. The deductive approach implies that the research study starts with the creation of a theoretical framework after which the research for empirical findings is started (Saunders et al., 2009; Dubois and Gadde, 2002b). In contrast, the inductive approach implies the reverse process where theory emerges from the empirical findings (Saunders et al., 2009; Dubois and Gadde, 2002b). In the present thesis a combination of both approaches has been used resulting in what is known as systematic combining, as Dubois and Gadde (2002b) proposes. The reason being that throughout the project, the authors have moved back and forth between theory, data gathering and analysis, revising each one of them as found necessary in order to answer the emerging research questions. Such approach enables triangulation (Yin, 2003) and has shown to secure the quality and relevance of the study (Dubois and Gadde, 2002b). Another decision in the study design was whether to follow a quantitative or a qualitative research approach for gathering the empirical findings in this thesis. In this sense, the quantitative method emphasizes numerical data and has an objective orientation, while the qualitative method emphasize words and meanings (Bryman & Bell, 2007). In this master's thesis both qualitative and quantitative approaches were used as a complement to one another. Qualitative data was collected through interviews to company associates and the benchmarking company to get a deeper understanding of the problem before, and in order to, devise possible suggestions. Quantitative data was collected through a short self-completion questionnaire that allowed confirming the issues identified in initial stages and evaluate suggestions to improve the object of study.

3.2 Research literature review

The literature review started once the authors together with the company supervisor established the purpose and scope of the thesis. Initially, literature on purchasing organising was gathered on a higher level and then narrowed down into more specific topics in the focus area. The literature review allowed building up a framework to analyse the suitability of Product Coordination in NTE and its implementation, thus helping answer RQ1 and RQ2. Yet, being a normative case study, the literature gathered allowed proposing recommendations to the company based on the situation and needs observed, thus answering to RQ3. The theoretical framework was constructed based on literature that were mainly obtained through the academic search engine provided by the Chalmers University of Technology Library. It comprises multiple databases and thousands e-journals although the authors focused on the following databases; Books 24x7, Emerald, Science Direct and ProQuest. In line with the systematic combining approach mentioned earlier, the analytical framework was continuously revised and changed throughout the thesis, as relevant topics emerged or previous ones lacked applicability.

3.3 Data collection

Patel & Davidson (2011) point out that there are particularly two types of data that can be collected in a case study, namely primary data and secondary data. Primary data refers to undocumented sources, which includes for example interviews of various types. The core of the empirical data gathered in this thesis was from primary sources with the help of open, semi-structured and self-completion questionnaires conducted to subject matter experts. Furthermore, secondary data refers to documented sources such as articles and books. This type of empirical data was used to complement the previous one. This data was gathered through company reports, NTE confidential documents and presentations, trusted industry specific web pages and other means of public information available to the authors. The data that is included in this report is related to the defined research questions and thus allowed to fulfil the purpose of the thesis. During the project additional data was collected that provided the authors with a better understanding of the company's operations. Such additional data has been excluded from the report since it did not directly relate to the research questions established.

3.3.1. Interviews:

In line with the qualitative nature of this research interviews were conducted as a way of obtaining qualitative empirical information. Descombe (2010) and Yin (2003) suggest this type of approach for projects that are set to explore a more complex and subtle phenomenon such as is the object of study. In this sense, Product Coordination is embedded in a complex environment where its implementation is affected by and affects stakeholders and areas of the company within and outside the boundaries of the PC role. Thus, qualitative data would allow providing a description of the many angles of the case. Moreover, the exploratory nature of qualitative data enabled the authors to specialise in

areas that have proved relevant to the study (Denscombe, 2010) and meet the thesis' purpose. In this sense, qualitative data gathering allowed the authors to begin with getting the big picture of the situation and the level of progress that had been obtained on the implementation of the PC role. Further, it led to the identification of the problems faced by the company representatives regarding the implementation of the PC role. In this way it was possible to go deep into the specific areas of special attention. The specific usage of the interviews conducted is explained below.

The initial interviews conducted were of an open nature. As described by Dunn (2005) open interviews are similar to an open discussion upon a topic of interest. In this way it was possible for the interviewee to elaborate freely upon matters that were found relevant throughout the discussion. Follow-up questions were neither standardised nor prepared but entirely based on how the respondent's answer led the interview (Yin, 2003). Open interviews with the Procurement Manager of NTE were carried out at the early stages of this Master's Thesis in order to identify the need that the thesis project would serve and to define the research purpose. This type of interviews also gave the authors a general understanding of the NTE's situation and how the Procurement Function operates within the whole NaroTech. These interviews also allowed the interviewees to suggest other individuals as potential interviewing candidates or additional sources of evidence.

In the second stage of the interview process the authors focused on semi-structured interviews, that is, guided by open-ended questions. In this sense, all interviewees covered a set series of questions but further questions were added during the interviews in response to what the authors saw to be significant issues to the research emerging, as Bryman and Bell (2003) and Yin (2003) suggest. Semi-structured interviews were used to direct the gathering of the empirical data towards answering the research questions set in this project. That is, the interviews aimed at covering two main areas, i.e. the understanding of the problem and the potential solutions to this. In this sense, semi-structured interviews with key stakeholders to the Product Coordination initiative allowed the authors to qualitatively evaluate the general understanding of the project as well as the level of acceptance of it within the company, thus helping answer RQ1 and RQ2. Yet, the open-ended nature of these questions allowed the interviewees to provide their own input and opinion of the matters addressed. In turn, this helped coming up with recommendations suitable given the company's context and structure, associated with RQ3. However, a negative aspect of these interviews is the risk of bias through poorly formulated questions that could direct the interviewee towards specific answers (Yin, 2003). All interviews were transcribed within a day in order not to lose the content of them during the process. Interviews were conducted either personally or via teleconferencing. In addition, communication also took place via email in order to provide the authors with specific information or to respond to further questions that needed clarification.

Design and data analysis

To acquire the empirical data, the authors conducted semi-structured interviews with representatives of all stakeholders of the PC role. Since this case study is based on NTE's Procurement Department, the majority of the interviews were conducted with individuals belonging to this department. Two types of semi-structured interviews were conducted. These interviews shared major points to be addressed but adaptations were made depending on the relation that the interviewee had towards Product Coordination.

The first type of interviews was conducted with Product Coordinators (PC) or Product Specialists (PS). The major areas covered during these interviews were related to the overall perception that the interviewees had towards Product Coordination. More specifically the topics addressed covered the interviewee understanding about the PC role, the advantages and disadvantages of the Product Coordination and the factors determining their performance as Product Coordinators. Lastly, the interviews tried to brainstorm about possible improvements that can be included to the Product Coordination role. It is important to mention that given the fact that buyers are fulfilling a dual role as PC or PS and PRB, they are able to provide insight both as users and providers of Product Coordination. New individuals were interviewed until the authors found that the interviews were not bringing up additional aspects to those already covered.

The second type of semi-structured interviews was conducted to stakeholders of Product Coordination that were either affected by or affected the implementation of the PC role. The interviews provided the authors with an understanding of the different relations taking place within and across the organisation. The choice of individuals originated from the interviews conducted with the PC/PSs. The interviews were conducted with representatives from different levels of management and the Engineering Department. Moreover, the authors also interviewed an individual performing only as PRB to include the point of view of a buyer that is not affected by the problems stemming from the Product Coordination role design. In this way, it was ensured that the data collection included a representation from employees at different levels and roles within the company as sources of data. In some cases the interviewee had a very little understanding upon the Product Coordination concept for which the authors had to provide him or her with a brief explanation about it. Similar to the interviews described above, these interviews focused on the perception of the interviewee about the PC role. In addition, suggestions for improvements from the interviewee's point of view were discussed.

Table 3 below shows a complete list covering all the qualitative data sources used in the thesis. The preliminary structure for the two types of semi-structured interviews is presented in appendix A. From the interviews the authors were able to identify that it was sensible to distinguish between the perception about PC as a concept and the perception about how the PC role has been designed and organised. This distinction is followed in chapter 4 to present the empirical findings.

Tabla 3: List of qualitative empirical data gathered with anonymous structure

Function	Object	Characteristics	Duration	Date
Procurement	Department Manager	Personal	8 hours	Continuous
Procurement	Product Specialist	Teleconference	1 hour	29/01/14
Procurement	Product Specialist	Teleconference	1 hour	29/01/14
Procurement	Product Specialist	Personal	1 hour	13/02/14
Procurement	Product Specialist	Personal	1 hour	17/02/14
Procurement	Product Specialist	Personal	1 hour	17/02/14
Procurement	Product Coordinator	Personal	2 hours	18/02/14
Procurement	Project Manager	Teleconference	1 hour	18/02/14
Procurement	Project Manager	Personal	1 hour	19/02/14
Procurement	PRB	Teleconference	1 hour	19/02/14
Engineering	Lead	Personal	1 hour	18/03/14
Engineering	PRE	Teleconference	1 hour	21/03/14
Corporate	SCM/Supplier relationships manager	Teleconference	1 hour	30/04/14
Corporate	Head Category Management	Teleconference	1 hour	05/05/14

3.3.2 Questionnaire

A small-scale survey was conducted in order to complement the semi-structured interviews and channel the findings towards more concrete statements and suggestions. In this sense, the survey covered two main areas and was administered through a self-completion questionnaire. One part of the series of questions aimed at confirming the overall perception of Product Coordination as well as those aspects affecting the role execution. The other part of the questionnaire involved questions that explored the suitability and feasibility of possible changes and improvements to the role. Given the time and distance constraints in this project, the survey allowed efficient data collection on specific aspects in a quicker and more convenient way for both the authors and NTE's personnel (Bryman and Bell, 2003). The input deriving from the survey was taken into consideration in the thesis's analysis as well as in its recommendations.

Design and data analysis

The questionnaire was designed to be comprehensive but yet short enough in order to avoid prospective responses from answering, as Bryman and Bell (2003) suggest. It included a total of fifteen questions that involved closed answers. Yet, respondents were given the possibility to add further input in written text in order to enrich the data collection without

compromising the logic followed in the questionnaire. Most of the questions aimed at capturing the intensity of the respondents' attitudes towards a series of statements by using a Likert scale. That is, respondents specified their level of agreement or disagreement on a symmetric agree-disagree scale for a series of options (Upton and Cook, 2008). Such scale facilitated the processing of data for computer analysis (Bryman and Bell, 2003). The questions as well as the options provided originated exclusively from the information obtained during the semi-structured interviews. In order to ensure that the questions were relevant, clear and unambiguous, the Procurement Department Manager reviewed the questionnaire before it was administered.

This small-scale survey was conducted only within the NTE's Procurement Department and sent to buyers (acting as PC and PRBs) as well as Project Procurement Managers and Procurement Leads. Nevertheless, the quantitative estimations have been performed only for the buyer's answers since the other members represent a very small sample. Further, it was considered that these answers were not possible to combine since the position towards Product Coordination is different between these two types of respondents. As regards the level of response; 11 buyers responded, who represent the 61% of the total number of people, while the 4 managers that responded to the questionnaire represent the 57%.

The intention of the questionnaire is not to provide a thorough statistical analysis since the sample is by default too small. Nevertheless, the estimated percentages allowed the authors to identify certain trends in the answers that can provide enough basis to guide decision making in NTE's management team.

3.3.3 Benchmarking

In order to get inspiration for the recommendations given to the company, benchmarking was used as a tool in the project. The specific areas studied for comparison were those related to the organising of the purchasing function of the benchmarking company. In order for the benchmarking to be meaningful the authors wanted to choose a company embedded in a similar context to the focal company where drivers and decisions upon organising could be of a similar nature. The company studied is a large organisation in the construction industry, which had also faced the need of reorganising its purchasing function into a centralised structure. Analogous to NTE, this is an EPC organisation and with a similar supply context, who has successfully achieved benefits from centralising part of its purchasing function supporting a project organisation. Thus, comparisons between the organisations can result in ideas that are easily applicable in the context of the focal company. These comparisons are discussed throughout the analysis chapter where those aspects where the companies converge or diverge are addressed. The benchmarking has taken place by building a case study based on the information gathered during an hour and a half semi-structured interview with the Head of the Central Purchasing Unit of this company.

3.4 Research accuracy

In order to demonstrate the trustworthiness of the research findings it has been imperative for the authors to reflect upon the validity and reliability of the gathered data (Robert et al., 2006) throughout the project. First of all, validity refers to doing research and observations in the right type of research area (Patel and Davidson, 2011). That is to say, to certify that the collected data is appropriate and in accordance to answer the defined research questions (Denscombe, 2010). Therefore, the authors have continuously spent time on reviewing incorporated data and discarding the empirical findings that are irrelevant to the study. Further, the authors have had monthly follow-up meetings with both supervisors at Chalmers University of Technology and NTE in order to discuss findings as well as the direction and focus of the data gathering in subsequent stages. In addition, the authors have held a mid-term presentation in NTE to verify that the project was directed in alignment with the interests of the company's stakeholders.

On another end, reliability is about how consistent the data is as well as trustworthy towards random influences (Patel and Davidson, 2011). This thesis has had interviews as one major source of data collection whose qualitative nature is argued to be difficult to replicate and generalize, lack transparency and overall subjectivity (Bryman and Bell, 2003). At the same time, the quantitative part of the data gathering in the form of a survey has the characteristic limitation of low response rates (Bryman and Bell, 2003). Having this in mind, the authors have employed a multistrategy research design and sought the confidence of the findings through different types of triangulation methods. This has been done according to the classification proposed by Bryman and Bell (2003). First, data triangulation has been ensured by gathering data at different points in time, personally and via teleconferencing as well as through the stratified sampling approach mentioned earlier. Second of all, having two different researchers carrying out the project reduced bias when interviewing and further interpreting data. Thirdly, the usage of two major methods for data collection, i.e. interviews and questionnaire, has allowed the limitations of each method to complement each other. As it was discussed before, the questionnaire confirmed the findings from the interviews and the same trends were observed. This could be a positive indication that the answers from those who did not participate in the questionnaire would have not changed these trends considerably.

4. EMPIRICAL FINDINGS

This chapter starts by presenting NTE Procurement Operations as well as a detailed description of the organising of the Product Coordination concept. Further on, the findings from the semi-structured interviews and questionnaire conducted by the authors to key individuals in the company upon Product Coordination are presented. These findings begin with a description of the overall perception there is in the company about Product Coordination as a concept. The following sections include all aspects that have shown to affect the Product Coordination implementation and performance. These have been divided into the aspects related to the design of the role, i.e. internal aspects, and the aspects originating from NTE's context, i.e. external aspects. Finally, the chapter ends by addressing the possible different ways to organise the PC role suggested during the data collection process.

4.1 Procurement Operations within NTE

NTE's area of expertise is to provide the engineering and procurement of those products in the oil and gas facility that consist of equipments and its accessories that fulfil an important functionality within the installation. Hence, NTE deals with products that are either engineered or assembled to order for the specific characteristics of the facility, and thus have a medium to high level of complexity. Each of the product or product groups that composes a typical EPC project is called a package. Within the portfolio of packages handled in NTE projects, these can be classified into different priorities, from the highest to the lowest level of impact that the package has on the design of the whole installation. Since all the packages are customised equipments and products these are characterised by being of high cost but bought in low volumes. That is, the majority of these packages are a one-time buy that can be a project on its own for the supplier itself, involving detailed design and engineering. The next sections describe the project operations and how these packages are managed within the projects among others.

4.1.1 Package management

NTE has a matrix structure, where personnel belonging to the different departments in this Business Unit are assigned to a project to meet the role of managing a specific package with regards to each employee area of expertise. Each package is mainly managed by the Package Responsible Buyer (PRB) and the Package Responsible Engineer (PRE). The PRB is responsible for all commercial-related aspects of the package while the PRE takes care of the primary technical aspects. Depending on the type of package, e.g. mechanical, electrical, instruments, etc, the PRE will be an engineer from the corresponding discipline. In addition, given the complexity of all products handled by NTE, each package has allocated to it an engineer from each of the other relevant engineering disciplines. That means that when a decision needs to be made that affects or generates changes in aspects such as materials, instruments, architecture, among others, then the responsible engineer from the corresponding discipline for such package will be the one analysing and taking

actions on the decision.

Operationally, the PRE and PRB are responsible for managing the day-to-day issues of the package and are in constant contact with each other. In this sense, the PRB is the single point of contact with the supplier representative and, in principle, all communications between NTE and the supplier goes through him or her. In contrast, the PRE is in contact with each of the other engineering disciplines on an as-needed basis for tackling the issues that come up. At the same time, many of these decisions are also evaluated by the discipline leads or the procurement leads that are the people that the engineers and PRBs report to, respectively, who in turn report to the project managers. In addition, every package has a representative from the client allocated to it who will evaluate and decides approval of all aspects related to the package. The client engineer is mainly in contact with both the PRB and PRE. The managing on the package results in a complex network of actors that are in contact either directly or indirectly.

For every package in a project there is a contact list naming the PRB, PRE and each of the discipline engineers responsible for the package. This list is accessible by anyone at the company in order to facilitate reaching to the right person at the time a certain decision needs to be made about the package. Typically, once the product is delivered, the package team is broken and each member is allocated to a new product package either within the same or another project.

The tasks of both PRB and PRE vary depending on the buying phase of the package from the early stage of the purchasing process until the delivery of the product and further supplier evaluation, which are discussed further in this chapter. The PRB is in charge of overall schedule and delivery control from the supplier. At the initial stage the PRB is responsible for issuing the inquiry, evaluating the bid with regards to best price and delivery time, negotiating the contract conditions and issuing the purchase order. After the order is placed, the PRB will follow-up supplier document submittal, general expediting of the package as well as handling and negotiating all deviations from the initially agreed budget and schedule. Lastly, once the package is delivered the PRB is the one doing the close out of the package towards the supplier. Before the Product Coordinators, the main responsibilities of the buyers belonging to the Procurement Department of NTE were those related to the work at the project level. That is to say that in addition to the PRB role, buyers did very little functional work related to the Procurement Department.

The PRE is basically in charge of reviewing all technical documents from the supplier and decide the trade-off between interface information from the supplier and the quality of this one's documents. In addition, the PRE is responsible for ensuring the product complies with all technical specifications, including doing the necessary inspections of the components during fabrication and during the required testing.

4.1.2 Project organisational structure

According to the Procurement Department Manager at NTE, the company has aimed at diversifying the job of the buyers by fostering that no buyer is always assigned with a specific type of product package. Rather, buyers are held responsible of diverse types of packages on each project in order for them to get a comprehensive expertise and thus, the versatility required by the company. NTE increases its capacity by hiring temporary buyers to act as PRBs. The amount of packages managed by a PRB depends on the workload and the buyer's competence and preference. In contrast, the engineering disciplines aim at the specialisation of its staff on a certain package, according to one of the discipline leads interviewed. Thereby, engineers are typically assigned the same type of package on every new project.

The company has observed that cooperation between projects and even between Procurement Departments or Business Areas is limited. Furthermore, the purchasing experience gained by a buyer during a project is sometimes not efficiently documented or this information could be scattered within the different databases used by the company. Thus, the competence for specific products and suppliers achieved during a project is not properly communicated across the organisation.

4.1.3 Supplier selection process

The process of selecting a supplier in a project is overall the same for all packages. The process starts with the PRB creating the long list of suppliers by searching for suppliers' performance through different sources of information. This information comes from ratings of previous suppliers' performance in former NTE projects, known industry databases such as Aquilles, among others. Furthermore, all PRBs interviewed stressed the importance of the experience factor when considering suppliers for the long list. This is why, contacting previous PREs/PRBs to get further information about the supplier is highly important to create the supplier's long list.

The PRB sets up a preliminary long list of suppliers after which the PRE assesses these suppliers from a technical perspective. Once the suppliers' long list is agreed upon it is sent to the client for approval. On the next stage, the request for information process takes place where those suppliers in the long list provide information technical competence, capacity and delivery times. This process allows the package team to create the purchasing strategy of the package and choose those suppliers that qualify to be invited to bid. Each of the bids submitted are evaluated by the different engineering disciplines, the PRE and PRB. In addition, the client company also provides its opinion about those suppliers being evaluated. The client company considering the recommendation provided by the package team makes the final decision about supplier selection. Once the supplier is selected, the PRB establishes the contract and places the purchase order.

Ideally, all terms as well as compromises between the engineering requirements and what

the supplier is able to provide are negotiated, agreed and included in the contract and purchase order. Yet, once the package starts being designed and/or built, it can happen that the supplier cannot comply with some of the requirements initially agreed. In this case, the supplier must issue a deviation to the purchase order, which will be evaluated by the package team. The process of handling deviations takes time and effort since there are many actors that should evaluate and approve such change, including the client representative engineer.

4.1.4 Project uncertainty and risk

The characteristics of the products purchased by NTE bring about a high level of complexity and supply risks that the package team needs to handle. Therefore, EPC companies rely to a great extent in their supplier selection management capabilities (Micheli et al., 2008). First of all, it is important to ensure that the supplier complies with the industry and company technical requirements and specifications. For this reason, the technical quality is given a high weight during supplier evaluation. The supplier's technical capability should be known beforehand before committing to a supplier. However, the risk of potential complications with the supplier or the product during the expediting phase is always present. Therefore, a package could have several deviations to the purchase order. Some of the deviations cannot be foreseen but the amount of them could be reduced if the supplier has experience from similar projects both with NTE and in the industry. However, the Procurement Department has observed that this has resulted in an informal preference towards certain suppliers that are considered to supply an excellent product from a quality point of view, i.e. technical requirements compliance. As a consequence, for some packages the company has ended up in an unfavourable monopolistic or oligopolistic situation.

Another aspect brought up during the interviews is that there is a general history of leaning towards the sourcing from local and European suppliers. This could be explained by the need of co-design in the complex items managed by EPC contractors, as found by Micheli et al. (2008). These authors suggest that supplier incapability in co-design is seen as difficult to overcome by EPC companies once the supplier has been selected. Co-design of complex items requires continuous and quick interaction with the supplier that seems to lead to necessary close proximity to the supplier. Thus, favouring the use of local suppliers. In the case of NTE, the managing of the package characterises by a close communication between the package team and the supplier even on a daily basis. Sometimes this contact must take place through meetings to discuss progress, solve outstanding issues, inspections of the equipment, etc. Suppliers' proximity to the company facilitates the face-to-face contact and reduces the costs associated to it. Another explanation is that European suppliers have a history of supplying for overseas oil and gas installations in the area where NTE operates. Thus, these suppliers are able to acquire the references and experience needed more easily.

On another note, the harsh weather conditions that offshore installations will be subjected to are also considered. More specifically, the time window where the installation can be finished and sail to the overseas area where it will be is just a few months. That means that if the entire project gets delayed and is not finished during this time window, the time when the facility can start operations could also be delayed for months. Project schedule management capabilities can reduce this risk but also it is necessary to ensure that the supplier selected has the capacity to truly meet the delivery requirements.

4.1.5 The Product Coordinator role in NTE

As mentioned in the introduction, a new management team in NTE's Procurement Department identified the need for centralising the product competence in order to enhance the value proposition towards its clients. This will allow the company to further increase the quality of the procurement services offered to its clients. Furthermore, concentrating product knowledge into one entity has additional benefits for NTE operations. In this sense, it is possible to reduce double work that translates to administrative time and cost savings; increase product market knowledge leading to new and appropriate supplier relations and finally; foster organisational learning. This idea was materialised under the Product Coordination concept. The concept involves the creation of a new role belonging to the Procurement Department at the Base Organisation level called the Product Coordinator (PC). This section describes the PC role as the management team initially conceived it as well as the different efforts done towards its implementation.

In contrast to the buyer's role, the PC specialises on a certain product and has all the expertise regarding this and its corresponding supplier market. Moreover, the PC is responsible for his or her product over the long term, that is, decoupled and beyond the life span of a project. This means that the PC provides the knowledge and expertise about the product to all projects where a package containing this product is used. The idea is that when a PRB is assigned a new package, the PC is actively involved in aspects such as providing input during the bidding phase when starting-up projects. Thus, potentially reducing time-consuming research that the PRB would have had to spend looking in existing databases or networking with other resource people. Further the PC is responsible for monitoring the quality and performance of allocated products and suppliers in projects.

The Procurement Department has established some guidelines on the specific responsibilities demanded to the PC in order to be the centre of excellence. First, the PC is responsible for the strategic analysis of the supplier base situation for his or her product, considering manufacturing priority and supply side market complexity. That is to say that if there are areas where the product's supply side portfolio needs to be further developed, the PC should find new strategic suppliers for the product. If this is the case, the Procurement Department Manager should be informed in order for such initiative to be initiated.

Second of all, the PC needs to be aware of the product market by managing the most updated supplier market knowledge including delivery times, price levels of the product

and related materials, forecasts, market condition, fluctuations and so on. Third, if the PC identifies new potential suppliers or new suppliers contact NTE for offering their products, the PC is the point of contact between the supplier and NTE. Therefore, the PC is also responsible for organising the necessary meetings where discussions between the supplier and the relevant NTE decision makers about possible future collaborations can take place. Fourthly, the PC has the responsibility to initiate the qualification process of new suppliers and make sure the company databases of qualified suppliers (SBITS) are up to date. Finally, the PC should be entirely aware of supplier's past performance on previous NTE or NaroTech products. That is, the PC should manage information about previous Vendor Performance ratings, and discuss supplier's strengths and weaknesses with the those that have worked with the supplier, e.g. PRB, PRE, etc, providing information about lessons learned to the new package team. In addition, introducing the PC potentially allows NTE to build and sustain supplier relationships apart from the project as opposed to the typical arms-length relationships kept.

The main deliverable currently being demanded from the PC is to provide the package team in a new project with an updated suggestion of long list of suppliers that these can use for decision making during the supplier selection phase. In addition, the PC should be able to be contacted for providing further product expertise if needed. According to the Product Coordination's guidelines, the objective is to provide generic information that can be used repetitively over the projects. This in turn prevents repetition of time consuming tasks and duplication of effort, especially from the PRBs' side.

The abovementioned tasks are the tasks stated in the official Product Coordination's guidelines created by the Procurement Department. Nevertheless, in practice, the management team decided to distinguish between two roles within Product Coordination. That is, the Product Coordinator (PC) and the Product Specialist (PS). The difference between these two roles is that all buyers start as PC and then, if they show to be proactive and prove results the person is promoted to being PS.

In addition, the PS is typically responsible for products of high priority for the project or those for which the Department has identified as requiring special attention. The later are for example products where the supplier portfolio is rather limited. As stated in the interviews, PC's responsibilities are rather focusing on the preparation of the product's long list, become the contact point from NTE towards the suppliers and in general initiating the process of entering new suppliers in the system. The PS is in contrast more actively involved in the strategic management of the product. Nevertheless, this change is somewhat new and there is no difference formally stated for the distinction between the two roles.

The PC role is designed in such a way that it is the buyers belonging to the Procurement Department of NTE who should fulfil the role of PC or PS. That means that a buyer has a dual role responsibility where he or she will be a PRB for a certain project as well as a PC/PS for the base organisation. This implies that the funding is carried by the project

where the PC works as a PRB. For this reason the time a buyer allocates to PC tasks is not fixed. Rather, the amount of time spent on Product Coordination depends on the buyers and their workload as PRBs.

The programme started several years ago, presenting a boost on 2013, time after which fluctuations in its implementation and effectiveness have been observed so far. Initially, product coordination work received very low receptivity by the buyers. This is probably mostly due to the conflict in roles and time allocation between the PRB and PC/PS for a certain buyer. However, from a management perspective, the benefits from Product Coordination are easily evidenced and efforts are being made towards making the PC role inherent to the tasks and responsibilities of a buyer from NTE's Procurement Department.

In order for the Procurement Department's management team to promote and actively facilitate the deployment of the PC role within NTE, a number of initiatives had been carried out before the start of this thesis. These are summarised below.

- Meetings between the Department and the Project Procurement Managers where the later agreed on the role's significance and to allow PRBs to perform PC tasks during the projects.
- The PRBs bonuses and annual salary raises stemming from the project, which are handled by the Procurement Department Manager, will be determined up to a greater point based on the buyers' performance as PC/PS.
- Deadline for all PC/PS to deliver a "Best Practice Bidders List" for each priority package assigned, by the April 2014.
- Formal inclusion of PC/PS in the contact list of the packages in one of the recently started projects in order to strengthen and communicate the notion of Product Coordination in the organisation. Furthermore, PRBs were encouraged to actively include and communicate with the relevant PC during the supplier selection process.
- Include the signature of the PC/PS in the suggestion for long list of suppliers given to the client company, as one of the necessary approval signatures besides the PRB, PRE, procurement leads and discipline leads.

The performance of the PC/PS is more actively monitored at the moment, which is basically done by the Procurement Department Manager. There are currently two main ways of monitoring the PC role's performance. First, the relevant PREs and PRBs are contacted to check if they have been in contact with the PC, what kind of input the PC provided as well as the quality of that input. Secondly, the Manager also checks and keeps track of NaroTech's central supplier database, checking if new suppliers have been incorporated to the system.

4.1.6 NaroTech's purchasing organising

The need to benefit from the synergies generated within procurement across the different Business Areas of NaroTech led the firm to the introduction of Category Managers. The Category Managers are responsible for key material/service groups as those defined based on NaroTech's spends upon those groups. The main aim of the Category Manager is to achieve the maximum benefits for NaroTech from the agreements with the suppliers. Valves, fasteners, nuts and bolts, technical services, cables, EIT (electro, instrument and telecom) are examples of categories, which are managed by the Category Managers. Those categories are mainly company-wide (across the NaroTech's Business Areas). However, there are few categories within some specific Business Areas.

The main task of the Category Manager is to develop the strategy for the specific product category. More particular, this person has to optimize the procurement of these categories taking into consideration several parameters, such as logistics, suppliers' capacity, each Business Area's needs, the suppliers' performance and opportunities to source from other areas around the world in case of high benefit included. In addition, one of Category Manager's tasks is to try to limit the number of suppliers within the category, in order to reduce the costs related with the following up process as well as to secure quality. This supplier base reduction is carried out in order to be secured that only the most competitive and best-class-suppliers are included in NaroTech's portfolio or lists.

In the frame of creating good relationships with specific suppliers included in the category's portfolio, the Category Manager is also responsible to assign a Key Supplier Manager (KSM) to every key supplier. The KSM is responsible to manage the relationship with the specific supplier. Finally, the Category Manager is responsible to explore opportunities of product's standardization in order to facilitate the procurement as well as to achieve better prices from the suppliers.

4.2 Overall perception about the Product Coordination concept

The previous section presented a description of NTE's procurement and project operations, which is the environment within which the PC role is embedded. Further the PC role was described together with the progress obtained so far. In order to meet the purpose of this thesis the authors dug into the organisation in order to understand the different perceptions and requirements of all possible stakeholders of the PC role. This section then gathers and presents all those perceptions collected throughout the interviews and survey conducted.

A main aim of this thesis was to evaluate the suitability of Product Coordination within NTE. In order to fulfil that aim it was necessary to start by evaluating what is the overall perception that there is in the company about Product Coordination as a concept. In this sense, it can be said that the concept of PC is unanimously considered as an idea that is appropriate and needed in the company by all buyers, levels of management and engineer representatives interviewed. It is believed that the PC concept will add value to the

company's proposition, since the benefits stemming from that role can be high for the company as well as its clients.

More specifically, the survey allowed exploring what areas the role is considered to contribute the most. Figure 3 show the degree of contribution that each area potentially has according to the respondents.

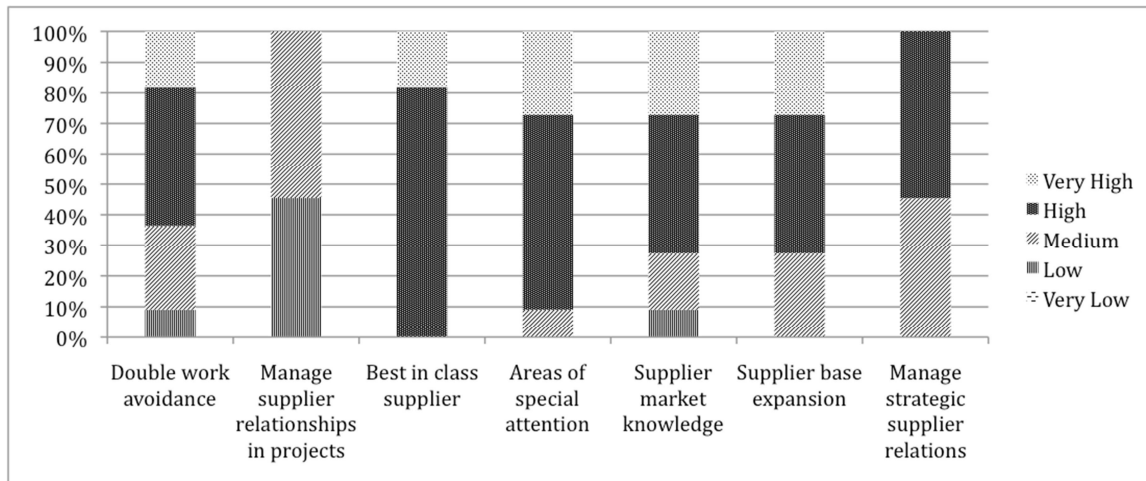


Figure 3: Degree of PC/PS role's contribution upon the specific areas mentioned.

In this sense, the results from the questionnaire show that the highest contribution from the role is to be able to select the best in class supplier, as agreed by 100% of the respondents. Furthermore, this role will positively contribute on providing information about supplier's areas of special attention, providing valuable supplier market knowledge as well as expanding the supplier base. Then, it is believed that the PC/PS role will positively contribute avoiding double work in an overall percentage of 64%. Lastly, the benefits where the respondents see least potential is on the contribution to manage supplier relationships. More specifically, 55% of respondents believe that Product Coordination will help manage strategic supplier relations while all of them consider the potential for managing supplier relationships during the project as medium to low. A detailed distribution of the results from the questionnaire is presented in appendix C.

The different areas of contribution at the same time are the ones covering the needs that currently NTE faces. As also expressed during the interviews, being able to introduce new qualified, will help NTE reduce the risk of falling into monopolistic purchasing situations that have been faced in some opportunities. Also, the market knowledge stemming from the PC role secures that the suppliers invited to tender are the best in market. These benefits are in line with the objectives set for the role and the rationale behind initiating Product Coordination. Yet, an additional area emphasised during the interviews is the positive contribution of knowing supplier's areas of special attention, i.e. strengths and weaknesses. This is one of the information that PRB and PREs seek after the most when building up the list of suppliers and that is more difficult to find. This is not only relevant for the supplier

selection but for allowing buyers to know where they should invest more focus in order to guarantee that the supplier delivers the product according to the specifications and agreed terms.

In addition, ideally Product Coordination provides with great timesaving potential to the package team at the initial stages of the buying process. Particularly, this comes from the PC having gathered information from previous PRB and PREs, checked for previous long list of suppliers used in past projects and for previous vendor performance ratings together with the further scanning of the market, work that would otherwise have had to be done by the package team. Yet, this variable has been explored separately since it is understood that time savings are indirectly gained by the contribution on each of the abovementioned areas. The results from the survey show, however, that timesaving contribution from the PC to the project is considered to be medium to high (45% of the sample stated medium and 55% high). This could be explained by the fact expressed during the interviews where timesaving potential will definitely come once Product Coordination concept is properly implemented and executed.

Another aspect appreciated by one of the PRBs is the value of having a person where the knowledge is concentrated. This is especially relevant since one of the sources of most value for building the long lists of suppliers is the personal input from previous projects for information that cannot be found in the databases. Thus, having all this knowledge concentrated into one person rather than spread over several will not only save time but would also enhance the confidence on the long list for the buyers.

In addition to the perception of the buyers towards the role, it was also observed some positive perceptions from others external to this. On the client's side, a potential positive position was observed when one of the client companies showed to be open to involving new suppliers presented by a PC in the purchasing process. Considering the limited base of suppliers that are traditionally considered as trustworthy in the industry as explained previously in this thesis this case was expressed by the management team as a positive indicator that the role can indeed enhance the company's status towards its customers. Secondly, the engineers interviewed reckoned a potential contribution from this initiative for them and the company. In particular, they emphasized the benefit of concentrating the knowledge about lessons learned into one person as well as knowing supplier's areas of special attention. More specifically, one of them suggested that this information could actually be translated into tangible benefits by making adjustments to the bidding price if extra-hours are required for expediting a supplier or in documentation assistance given the known poor performance of the supplier in these areas.

In order to know how to better achieve those contributions, it was considered important to get an understanding about the specific information that would be of value for the users of the PC, i.e. the package team members. For this reason the degree of importance of the information that the PC should manage and provide was evaluated in the questionnaire. The

results are presented on table 4. The table also includes additional information that respondents found important to obtain from PC.

Table 4: Type of information that the PC should manage and provide. The different types of information have been enumerated according to their degree of importance stated by the buyers, being 1 the information of highest importance.

Important information about the supplier	Other important information
1. Type of products	Market knowledge
2. Lead-times	Quality and HSE management systems
3. Accuracy	Supplier's flexibility to changes
4. Capability to meet engineering requirements	VPR from previous projects
4. Capacity	Supplier's references
5. Materials requirements	References to relevant PRB/PRE

4.3 Internal aspects affecting the implementation

As mentioned earlier, this section focuses on addressing the different areas about the design of the role that affect the execution of the work by the PCs.

4.3.1 Job description

Perhaps the main aspect brought up during the interviews and then reflected in the questionnaire is the fact that there is an overall lack of clear understanding about the role and what it entails. There is a procedure describing Product Coordination, yet, the perception is that the role has not been described detailed enough according to the buyers. It was indeed pointed out by the PCs that lately the concept and the role have become clearer than it was before but there are still many gaps to fill in.

In order to find out the particular aspects where the role needs further development the level of clarity between the Product Coordinator and Product Specialist roles with regards to different areas was explored in the questionnaire. The results are found in figures 4-5.

Overall difference PC-PS

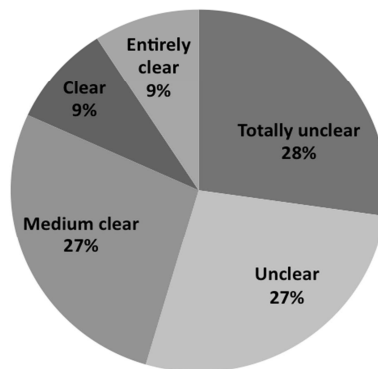


Figure 4: Overall level of clarity about the difference between the PC and PS roles according to NTE buyers.

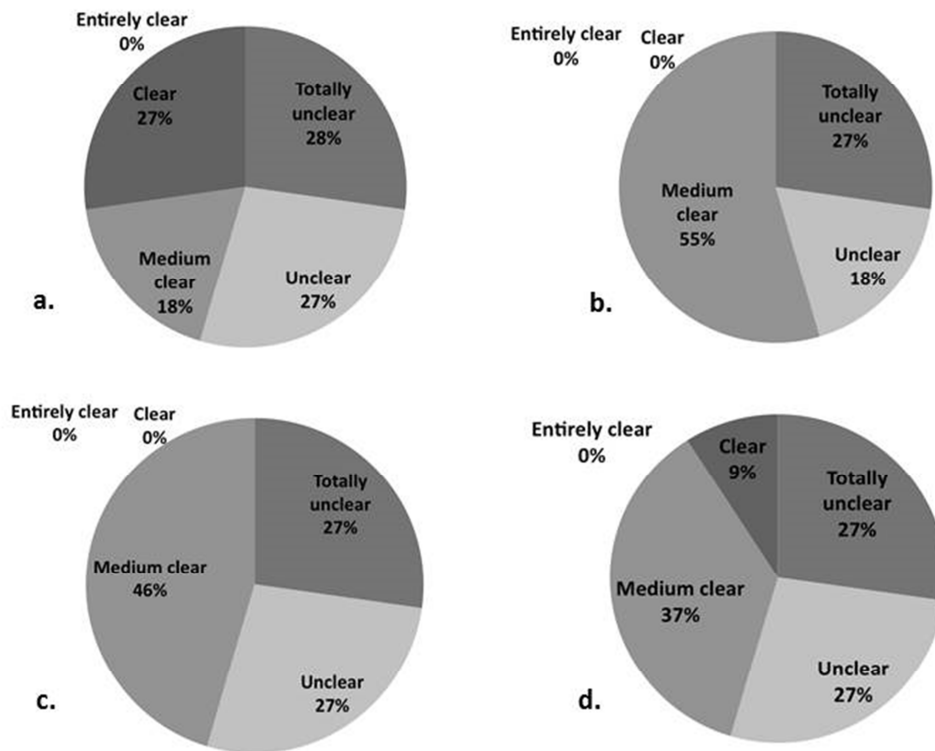


Figure 5: a. Level of clarity upon PC/PS role's purpose, b. Level of clarity upon PC/PS role's tasks, c. Level of clarity upon the way that the PC/PS role's tasks have to be performed, d. Level of clarity upon PC/PS role's output/deliverables. Source: Questionnaire survey in the frame of the present master thesis.

It can be seen that in all aspects approximately half of the respondents have an unclear view about the PC and PS roles. In addition, a high degree of clarity with regards to the overall difference and the purpose of each role are only shown by 18% and 27% of the respondents, respectively. However, for the specific areas of the tasks of each role, how to perform such tasks and the ultimate deliverables are of medium clarity by approximately the other half of the respondents in each case. As regards the Procurement Manager's view upon all the aspects of the topic of PC-PS's clarity, a general unclear view was expressed by the majority of the managers.

From the interviews PCs stated the need of a more concrete and defined job description of the PC/PS role should be presented. That is, to clearly state the inputs –what they should do–, the processes –by what means–, and the outputs –what they should deliver–. It is believed that a clearly defined job description would facilitate to great degree the performance of the PC/PS, will add validity and also will enable PRBs to utilise appropriately the PC's output.

One tool that would help according to the respondents is the use of standardised templates, as expressed in the questionnaire by 73% of the people. At the moment, the main deliverable of the PC role is the long list of suppliers who is presented in a spreadsheet that

the user can adapt as he or she finds it suitable. As was expressed by the interviewees, results in having to invest a longer time in creating this sheet, since they have to figure out by themselves what would be of importance and be appreciated, as well as on the quality of the material provided to the PRB. From the PRB's perspective this was actually a concern shown since it led to an evident difference in the quality and type of information provided among PCs.

Further, the questionnaire also explored what would be the most important outputs, i.e. deliverables, that the PC should produce. In this sense, respondents consider that providing suppliers' long lists and the introduction of new qualified suppliers are unanimously the role's most important outputs. These are followed by a list of risks per supplier, knowledge about the market situation and with the least degree of importance, a list of risks per product.

4.3.2 Communication channels

On another note, the need for having dedicated communication channels among the relevant stakeholders for the PC role to be performed appropriately was stated by 91% of the respondents in the questionnaire. Currently, PCs expressed that it is difficult to know whom exactly they should contact, especially from the engineering department side, in order to receive the appropriate information required. This also adds an extra time that should be invested for searching for these people. From the interviews it was observed that depending on the product the person with the most expertise in engineering about such product varied. Generally, a PRE is the most relevant person with whom the PC should have contact, but also the discipline and group leads were expressed as important individuals to contact for information or evaluation of suppliers.

In addition to this, stronger communication with all relevant stakeholders to Product Coordination was expressed as necessary for improving the performance of the role. More specifically, the survey showed that continuous progress/follow-up meetings are considered important means of communication by 73% of the respondents. Moreover, communication and information interchange should take place more often. Currently, communication between the PC and the PRB takes place depending on the proactivity and interest of both parties. Further, a more frequent communication with the Department for PC progress was expressed as necessary.

Another topic that emerged from the interviewees was the support of IT systems. From the questionnaires, 55% of the respondents considered that IT support through dedicated systems in order to retain the knowledge should be encouraged. As further suggested, such system where knowledge is saved centrally and with live access to everyone would help the role sustain the knowledge if a PC leaves or is changed to another role.

4.3.3 Formalisation

A statement that was repeated by the majority of the people in the interviews was that the role is not visible within the organisation and that its validity or formality should be enhanced through several ways. They reckoned that progress towards this direction has taken place by for example introducing the signature of the PC in the long list as one of the signatures needed for its approval. However people believe that there is place for further initiatives. One of the causes of the role invisibility pointed out by some buyers could be the fact that that PC is currently not recognised as a formal role within the organisation besides within the Procurement Department. Furthermore, the role's vagueness and lack of formality within the organisation has shown to contribute to the disinterest from other colleagues to answer the PCs questions and requests. Especially since these people have also a big workload with the project and it is hard for them to respond to something they do not know about or could consider less important.

4.3.4 Performance evaluation

Regarding the performance evaluation of the role, PCs expressed that the financial incentive system that has recently been implemented is not entirely clear for them. It is known that such system contemplates adjusting the annual bonuses and salary rises based on the performance as PC in addition to the PRB's performance. Nevertheless, the specific aspects that are going to be evaluated and how these will be evaluated is not clear according to them. In addition, it was also expressed the concern that different products have different levels of complexity and thus require more time to provide good quality of work, which should be taken into account when evaluating the PC's performance. Both issues are currently resulting in a feeling of frustration among buyers to a certain extent.

To contribute to this point, the PCs were asked in the survey to choose appropriate metrics upon which their work could be evaluated. The most popular metric, chosen by all the respondents was the quality of information provided, while the second most popular metric is the time that can be saved by the PRBs. These are followed by new suppliers entries and the number of international suppliers introduced into the system.

4.4 External aspects affecting the implementation

The factors addressed in this section are those related to or originated by the context of the company within which the Product Coordination is embedded and thus have shown to have an impact on the role's performance.

4.4.1 Organisational resources

Maybe one of aspects having the strongest impact on the performance of the role is the time availability to perform the PC tasks, deriving from the dual role that buyers have to fulfil as PC and PRB working for the project. This way of organising is due to the fact that there is currently no budget allocated for the Product Coordination initiative. As a result PC is being financed by the projects by making the PRBs take over the role as PCs in parallel to

their project's responsibility. That is, since project's man-hours are the ones generating profit for NTE it is not possible to officially allocate time from the project to Product Coordination, as stated by the Department Procurement Manager. As a consequence, all interviewees expressed a conflict about the time allocation for performing each of the roles' tasks. This is according to them preventing them to properly carry out and accomplish PC' tasks as they would actually want to. The time availability has two dimensions for the interviewees, i.e. the amount of time to be allocated and when to allocate time during the work time available.

First of all, it is believed that the role itself requires a reasonable amount of time, which in turn comes in conflict with the workload there already is in the project. Based on the survey's results, the respondents invest on average 1 hour on PC tasks on a weekly basis while they believe approximately 2 hours should be invested weekly for the role. It is worth mentioning that the variation among answers is great, where responses ranged from 15 minutes to 4 hours a week, especially for the time they believe should be invested. This variation can be explained, from what was observed during the open-ended interviews, by different aspects. Some of them were the buyers' level of experience on the product they are responsible for or the difference between the level of responsibilities between PC and PS. Another cause could be the personal perception that buyers have about how comprehensive the knowledge that they have to build about the product should be. Interestingly, it was observed that there seems to be a co-variation between the time demand perception and the level of clarity about the PC role of the respondents. In this sense, figure 6 shows that those people who state being clear about the role consider that a higher amount of time is needed on average to perform PC work. Moreover, these individuals present the highest difference between the actual time spent and the ideal time to be spent on Product Coordination. The opposite was observed for people that are unclear about PC.

On another note, an interesting result was revealed from the responses of leading positions at the project level to the questionnaire, i.e. Procurement Managers and Supervisors. More particularly, these expressed to be willing to allow PCs to perform PC tasks 4,5 hours a week on average. This is a longer average time than that the time that PC actually invest. Furthermore, 4,5 hours on average is the time that the Managers believe that should be invested for PC tasks on a weekly basis, which again is longer than the average time that the product coordinators expressed.

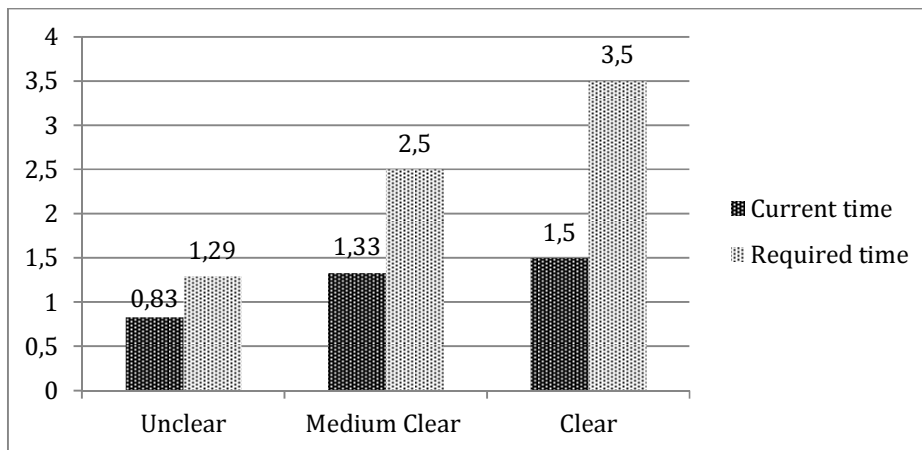


Figure 6: The current time that the PC/PSs invest for Product Coordination tasks and according to them, the appropriate required time that should be invested for those tasks. The answers have been classified according to respondents' (PCs/PSs) level of overall clarity upon the PC – PS roles.

Secondly, the moment to perform PC tasks is left to the buyers' discretion contributing to the vagueness of the role that according to them is confusing and counterproductive. In this sense, PCs were asked if there is a certain period during the project length where it could be more convenient for them to perform product coordination tasks. The answers were diverse among all respondents. In this sense, 3 of the respondents consider that the interval time between the end and the beginning of different projects is the most appropriate one, while 2 of the people found it difficult to say due to the product's and projects specific requirements. Other opinions expressed by individuals were the pre-RFQ (Request for Quotation) period, before the long list and later during the project, during the FEED phase and finally during the long list stage.

As a solution to this issue, 73% of questionnaire respondents believe that there should be a fixed amount of time allocated on a weekly basis for performing PC/PS tasks. Further, this time should be agreed and recognized by the Project Procurement Managers. Otherwise, it becomes really hard to set aside time for product coordination and buyers would inevitably prioritize project tasks. Another suggestion proposed during one of the interviews was to add a cost code to which buyers can allocate the time they spend in PC work or better market the role to the clients and include this as a service for which NTE could charge for. A more extreme opinion about this topic is that for some people, the possibility of having the PC role as a dedicated position should definitely be evaluated. Otherwise it is believed that the conflict from the dual responsibilities will always be present. Interestingly, some of the buyers expressed concern by the fact that it is not understandable for them that a task that is considered to be really important and necessary by management, as well as by them, does not have any budget allocated to it. The management team is of the opinion, however, that PC should be seen as role that complements the PRB position and potentially makes the job more attractive.

4.4.2 The PC as an individual

Another factor affecting the Product Coordination concept success stated by many interviewees is the individual buyer itself. One side of this aspect is the individual skills and competences for performing the job. For example, indirectly it was observed by the authors that this person should have the ability to find his or her way within the organisation as well as be able to handle the possible conflict of interests between the commercial side and the technical side (PREs) when it comes to supplier's preference. Nevertheless, when asked in the questionnaire if additional training is needed by them to perform the PC tasks their opinions varied. None of them opposed to the idea but respondents considered training as of medium necessity (37%), necessary (36%) and very necessary (27%). More specifically, the skills that should be enhanced according to the respondents is acquiring skills upon specific areas such as basic technical knowledge of products in order to be able to know what is of interest and make a long list that meets technical requirements. Also, training about the PC role itself was specially highlighted, i.e. what is expected from them. For example, having a kick-off meeting is considered necessary for 73% of the respondents.

Another side of this factor is the personal motivation aspect, in terms of the personal push that the individual has on performing the PC role. Motivation showed to be affected by multiple external aspects. For example, it was the opinion of Project Procurement Managers that the history of past efforts trying to implement this initiative without real success makes people sceptical about putting forth an effort now. Yet, it is overall recognized that the effort invested by the current management towards that goal is certainly going better than before. Another example was the lack of motivation to actually introduce new suppliers emanating from the fact that those suppliers will not be included since there is no willingness to invest money for auditing them.

4.4.3 External involvement

Another major aspect expressed to affect the execution of Product Coordination is the low involvement of others external to the Procurement Department on the implementation. This aspect seems to be related to and primarily affecting the individual effort aspect mentioned earlier. This involvement can be further broken down into managerial involvement and engineering department involvement.

In this sense, the level of management involvement towards the implementation of Product Coordination was evaluated during the questionnaire. The findings are shown on figure 7. This result is also confirmed by the Procurement Managers response in the questionnaire, since the majority considers the management involvement as low.

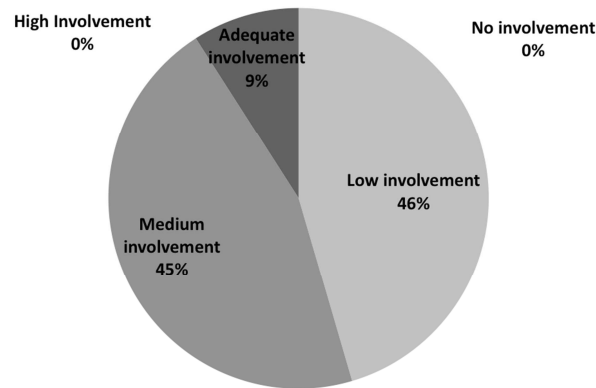


Figure 7: Level of management involvement according to NTE buyers. Source: Questionnaire survey to NTE's Procurement Department during the present master thesis.

Respondents were also asked to mention the particular actions that are needed from management. The answers related mainly to having clear directions in order to perform the role. More specifically, suggestions were; to have a clear description of expectations since different products have different characteristics; formalisation of the role; to formalise the time for performing Product Coordination tasks; follow up meetings concerning PC's activities and assessment, where also the tasks can be continuously clarified and focus can be given on improving the role; meetings for sharing experience of suppliers on previous projects; and having deadlines set for the tasks. In addition to this, respondents also pointed out the need for management to motivate higher involvement from the Engineering Department and keeping in mind individual's previous experience with products before assigning responsibility to them.

In addition to this, during the open-ended interviews it was also observed that individuals presented different requirements depending on the managerial position. For example, it was stressed the importance of higher management, i.e. corporate, not only for providing budget but for being engaged in the effort and "push the initiative from the top". This was believed would add legitimacy to the PC role and in turn will make it visible in the organisation, which would help people getting operational levels to be open, participate and/or collaborate in the initiative. In general, it was pointed out the overall need for communicating the role throughout the organisation, marketing it better and sell it as much as possible. Interestingly, when representatives from corporate management were interviewed, it was observed that these have a very low awareness of the Product Coordination initiative and the status of its implementation. On the other end, it was also emphasized the need of Project Procurement managers to be on board and agree on giving time to the buyers to perform product coordination time.

On another note, increasing the level of involvement of Engineering was considered by most of the people interviewed as a factor that would positively affect the initiative. To begin with, there was almost an overall agreement of all individuals interviewed, regardless

of the position, that the Engineering Department is currently not properly aware of Product Coordination. For the buyers this was considered as a drawback since Engineering represents such a big share in the purchase decision so efforts should be made towards fostering a stronger collaboration between PC and Engineering. The specific view from the whole Engineering Department towards Product Coordination at the moment is difficult to grasp. In this sense, some PCs said that in some opportunities they have faced resistance from PREs towards the long lists suggested by them or low receptivity to help evaluating possible new suppliers. Some other buyers were of the opinion that when presented in more detail, PREs showed interest in the initiative. To add to this point, the representatives from the Engineering Department interviewed in this thesis reckoned that they have indirectly heard of Product Coordination before but have no idea about how, when or where it is being implemented. Nevertheless, these were presented with the concept during the interviews to which they expressed that it would actually be of value and interest for them, provided that technical aspects are taken in consideration.

4.4.4 The type of product

The type of product is a factor that was expressed should be taken into consideration when taking decisions about the implementation of Product Coordination. In this sense, interviewees pointed out that the PC concept could be very beneficial for a specific group of products where the supplier base expansion has a significant benefit. Yet, for other products it might not add so much value. Furthermore, the workload of the products for the PC varies depending on these ones' complexity, which should be taken into account when allocating responsibilities as well as measuring the performance, as mentioned earlier.

4.4.5 The client's preferences

Although not a major key point affecting the execution, the client's preferences was also brought in during the interviews as a factor that limits the extent to which Product Coordination can have an impact or be of value. In this sense, any decision about suppliers stemming from Product Coordination is limited to the acceptance of the client company. This, together with the client's requirement of using its own framework agreements in a project, limits the introduction and usage of new suppliers for some products and could reduce the beneficial impact of the PC/PS role.

4.5 Possible ways of organising

Due to the expressed conflict with the PC/PRB role and the need for incorporating Engineering during the initial interviews, the authors explored the suitability of different ways of organising the PC in the survey. The results are shown in figure 8.

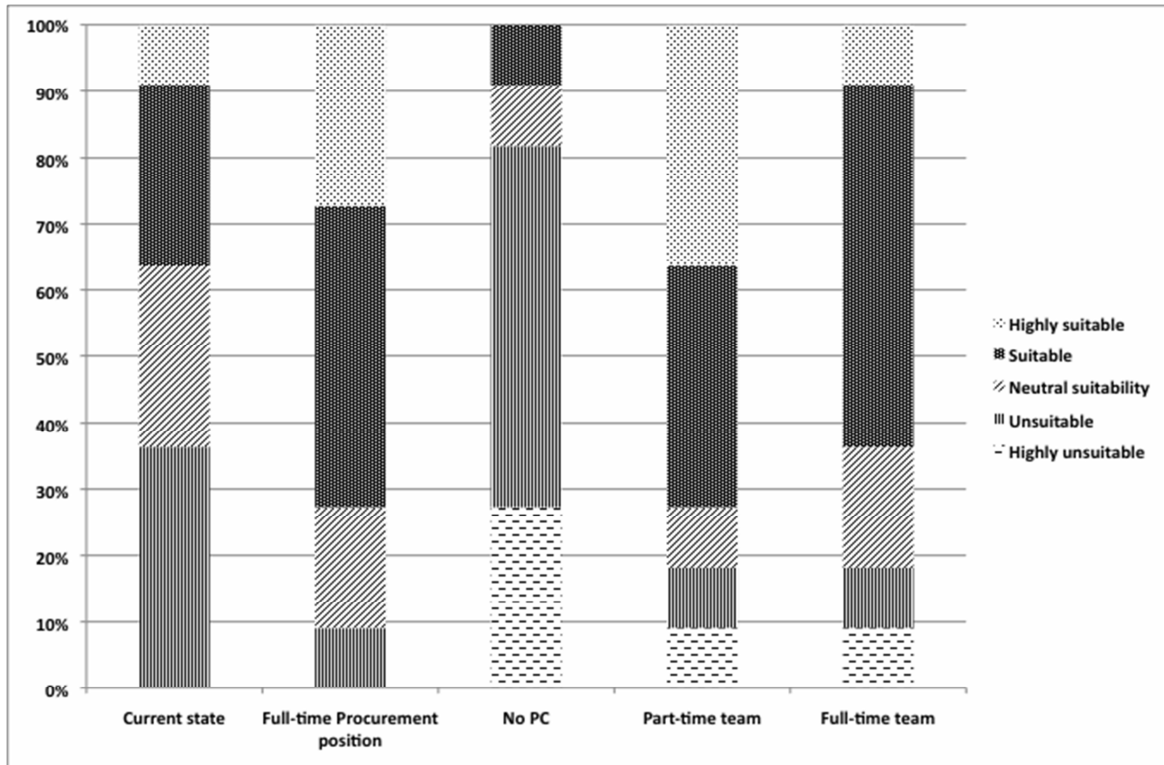


Figure 8: Degree of suitability of different ways of organising the PC role. Source: Questionnaire survey to NTE’s Procurement Department during the present master thesis.

Considering all the options, it is observed that the preferred structures are equally adding a counterpart from engineering to the current setting and a dedicated position belonging to the Procurement Department. However, the former can be considered to be the most suitable among the two if taking into consideration that such arrangement was evaluated as highly suitable by a higher extent than the later. This result is also confirmed by Procurement Managers’ responses, based on which all of them agree that the team format (product coordinator to have a counterpart in the Engineering department) is the most suitable organisation arrangement. Interestingly, the idea of not having PC at all and letting the PRB to build and manage all product knowledge was in overall found unsuitable by 82% of the respondents, while only a 9% believes that this could be suitable for the organisation.

5. BENCHMARKING

Skanska's Nordic Procurement Unit (NPU) is the purchasing function involving the Nordic countries Sweden, Norway and Finland. The information presented in this section from Skanska comes from primary data collected from a telephone interview with the Head of the NPU as well as from secondary data found from the company.

The NPU is a centralised purchasing organisation where all procurement processes on the nordic markets are designed and coordinated centrally through this entity (Bohlin and Palmgren, 2011). Previously, each of the Nordic countries had its own centralised purchasing organisation (Bohlin and Palmgren, 2011). According to the Head of the NPU, the drivers to changing to the new arrangement was, first, having identified the presence of big volumes bought of similar products throughout all projects in the Nordic countries where there is a potential of economies of scale if consolidating. Secondly, the company observed that the prices for the same product varied greatly among projects, even when sourced from the same supplier. Thereby, it was necessary to strengthen the company's position towards its suppliers and ensure a fair and convenient price that all projects can benefit from. The company saw the potential of organising in terms of reducing costs and increase their value proposition towards its customers.

The organisational change was carried out progressively through trial and error and, according to the Head of the NPU, the company tried at least ten different forms before getting to where it is at the moment. The whole initiative started may be more than ten years ago but it was approximately five years ago where they reached the high part of how it is organised today. Yet improvements are always happening.

Organising of procurement operations

In total, there are approximately 230 people working for the NPU, which are organised in the following way. First, all product portfolio at Skanska is divided into four to five main big packages that overall are necessary to construct the building. Furthermore, each of these main packages are composed by different categories, which are the products, e.g. steel, windows, plaster boards, etc. Secondly, all these categories are classified in such a way that they will be managed under the strategic sourcing arena or under the operative procurement arena. This is basically a division of the procurement that is done or managed centrally because of its strategic importance and the procurement that is managed at the project level. The category classification is made using the Kraljic (1983) portfolio analysis where the evaluation criteria are the volumes bought and the critically of the product to production. For those products that are considered strategic the company has a more detailed analysis and monitoring including cost breakdowns, market analysis, cost follow ups, etc. In addition, these are typically managed by long-term agreements with suppliers.

In the NPU, there are four main roles: generalist purchasers, specialist purchasers, category managers and strategic category teams. Generalist purchasers are located locally (project,

district, region). They do short term purchase agreements for projects and they cover several categories and purchasing packages. Their main purpose besides beneficial purchasing agreements is to make sure that the various purchase packages are well integrated together on a construction project. They have normally a strong construction engineering background.

The specialist purchaser are located either locally or nationally depending on the spend, the geographic coverage and number of specialists. If located locally these buyers will be under the supervision of the regional purchasing manager and if nationally they report to the category managers. The specialist purchasers are responsible to make short-term agreements for projects for a certain category. These categories are products that enclose technical challenges and tend to be highly customised for the projects; such as facades, steel structures, concrete elements etc. Their main responsibility is to identify opportunities together or without the suppliers upon design details as well as to propose more cost-efficient design solutions or alternative materials. As the generalist purchasers, they also tend to have strong technical background.

The category managers are located nationally and they report to the portfolio managers who in turn report to the country's head of procurement. Based on a matrix reporting line they report also to head of Nordic sourcing. The main responsibility of the Category managers is to place long-term framework agreements. Beside this, they are also responsible to create and maintain a competitive supplier base and work with suppliers' development. These persons, in contrast to the aforementioned professionals, have a strong commercial background.

Strategic category teams are cross-functional teams where production, procurement and people from other functions, work on the most important categories to create competitive advantage through redesigning the relevant supply chains or changing Skanska Nordic's buying behaviour. These projects are of strategic nature and their duration can last up to few years.

All the heads of procurement, in every Nordic country, report to the head of Nordic Procurement Unit. In addition, they also have a dotted matrix reporting line to each country's EVP (Executive Vice President in line) who belongs to the management team of the country. Similarly the regional and district procurement managers are connected through a dotted (indirect) matrix line to the regional/district (line) manager and a straight line to the head of procurement or business stream procurement of the country.

Category planning process

The coordination of all the purchasing operations is done by what the company calls the category planning process, which takes place every year. In this process Skanska goes through every region in the Nordic countries and does an analysis on aspects such as how competitive it has been on such region, if the right purchasing techniques are being used for

each category, if they have the right suppliers or not, etc. Also, in this process it is decided which categories will be bought using strategic sourcing and which ones will be managed under operative procurement. After this decision is made there is no much change during the year. For the Framework Agreements (FA) it can also be decided if for some categories it is mandatory to source from these or if it is not mandatory but only recommended. In contrast, it is decided those categories that will not be dealt under FA because for example the company is not able to lock the prices from suppliers. This means that for every project the project purchasers will buy these products separately.

Nevertheless, the project purchasers will still check all information from the system of previous prices etc, as a reference. Basically, the category planning process decides who is doing what. The coordination of this process is responsibility of a few persons, although all relevant stakeholders are involved to a certain extent. In this sense, the feedback from all regions provided by the category managers is consolidated ahead in time. Then several forums are held nationally and at Nordic level where it is decided where the company and hence the category managers should put more focus on a certain product, etc. During these forums not only the procurement is involved but also the production people is involved in order to guarantee product functionality and building. Moreover, a product can be strategic so the analysis is done centrally on the strategy sourcing process because of the importance of close monitoring the product. Yet, the product itself is sourced differently for every project. This is the case of steel structures, which are highly customized for every project.

According to the Head of the NPU, the key to orchestrate all the work at the centralised purchasing organisation is standardisation. In this sense, Skanska has put a lot of thought and effort on standardising the category structure as well as the processes throughout the company. On the one hand, the category breakdown is the same across all regions on the Nordic countries. On the other, standardisation of processes means to have clearly defined steps and templates for the information that is needed. In the case of the category planning process there is a standard template that the category manager updates and uses to document his or her knowledge about the supplier market. In addition, information such as all performance data of suppliers or spend data is standardised in a template that everyone can see, which is what the company calls the business intelligence process.

Usage of Framework Agreements within Skanska

As it has been mentioned before, the company relies on the usage of Framework Agreements (FA) to the extent that is possible in the form of long term agreements with suppliers and subcontractors. FA are per supplier so there is a FA for a supplier who has multiple products like for example a window supplier who has different types of windows. The relation between FA and project specific purchases varies between every project and how customised or standardised the construction will be.

The usage of FA derived from the need of improving Skanska's purchasing performance. Having FA has helped improving supplier's performance considerably since, according to

the company, it is very hard for a supplier to perform well and have the right quality, meet the schedule and prioritise Skanska as a buyer, if they know that after the project they will not be there any more. Single sourcing is always a risk, especially in the construction industry and project procurement, because the supplier market is very local but if you want to break monopolies it is necessary to have to work long term with the supplier.

Nevertheless, having FA does not mean that Skanska is bound to a specific supplier, according to the Head of the NPU. In this sense, for every category typically there are several suppliers with which the company has a framework agreement. Hence, the category manager or project purchaser is able to choose one of them for a certain project since the company is not 100% committed to the suppliers. Skanska relies in open communication with the supplier to inform them why they have not been chosen this time. Sometimes it can happen that the client wants a certain supplier and Skanska must comply with this requirement but the supplier will be informed. In general, the supplier understands this situation because they have been in the industry for a long time. It can also happen that they realize that the agreement is not good enough, which will lead to a rearrangement of the contract for future opportunities and that is how the FA and the relationship evolves. Moreover, the company tries to make these FA as flexible as possible to match its purchasing situation. For example, for some products the company has identified that the right competence and technology is held in a close cluster of suppliers or one supplier. Therefore, the agreement focused on buying the capacity, i.e. make sure it is available, and guarantee the right technology from the supplier while the agreement itself does not include prices. In addition, for some strategic products the company fosters joint product development initiatives with a supplier if it sees the benefit for both of them.

KPIs (Key Performance Indexes)

In order to measure the overall purchasing performance the company has set four major performance indicators. Namely these are, winning work, international spend, Supply Chain compliance and Contract compliance. First, winning work aims to measure how effective the company is on actually getting the contracts from the client by having a high valuable purchasing process. International spend tries to monitor the extent to which the company has been successful on breaking down the local sourcing tradition and include more suppliers from other countries in their portfolio. Contract compliance is basically measuring how much the terms agreed under the framework agreements are actually sustained when doing the specific sourcing for a project. At the personnel level, category managers are measured as well in aspects such as spend savings as well as how well the suppliers have performed, among others.

6. ANALYSIS

This chapter will discuss and evaluate the current organisational design of the Product Coordination concept through the PC role and its implementation within NTE operations. The theoretical framework together with the benchmark case of Skanka's NPU will function as a baseline for the analysis. The chapter begins by evaluating the suitability of the way that the PC role has been organised, considering NTE's context and needs. Further, the authors present the problems identified in the current implementation of the PC role stemming from a lack of fit between the organising of the role and the characteristics of the organisation. This is followed by an evaluation of the suitability of possible ways to reorganise the PC role. The last section is dedicated to a discussion upon the author's suggestions to the focal company regarding the actions needed to improve the implementation of the PC role and institutionalise it in the organisation.

6.1 Suitability of the organising of Product Coordination

Product coordination is a design feature that was introduced in NTE with the intent to professionalise its purchasing function. The mission of the present thesis is to evaluate how the concept of Product Coordination has been implemented in NTE, given the context of the company and the objectives set for the PC role. In this sense, the first step in making such analysis is to start by understanding if the concept of centralised product competence in the format of the Product Coordinator is suitable given the context and requirements of NTE. In this analysis, it was important to distinguish what are the needs of NTE and those of NaroTech as a whole, which were observed to be different but complementary in some key points. In the case of NTE, what plays the highest importance is the needs of the project since this is the business model present in this business unit and defines its context.

To begin with, the three elements of uncertainty, i.e. competition, market and technology (Fahey and Narayanan, 1986), are determining the current needs that the company is facing. On the one hand, demand of NTE's products and services is dependent on a competitive environment composed by fewer clients than the amount of contractors of different sizes, expertise and origin from which those clients can choose from. NTE differentiates itself in such competitive environment due to its reputation of building high quality installations. Yet, there are threatening competitors that are, as stated by managers during the interview process, able to bid with lower prices because they are bigger in size or use low cost country suppliers, among others. This situation in combination with the usage of tendering to award projects in the Oil and Gas business results in uncertainty about securing a stable and known amount of projects. Therefore, NTE must be proactively prepared in order to be able to deliver the most attractive quotation in terms of quality and price during the tender process.

At the same time, the high responsibility placed on NTE as a contractor for the EPC project makes the company place an extremely high importance on mitigating risks in the project (Dai, 2009). In particular, supply risks are of the most concern for this type of companies, which thus rely on a good supplier selection process to mitigate quality risk (Micheli et al.,

2009). In the case of NTE supply risks are high due to the regulated environment imposing standards and requirements for all providers to the Oil and Gas industry together with the complex products procured by this company. This has resulted in an apparently limited base of known qualified suppliers for some products. Consequently, NTE sees itself in an unfavourable situation towards the supplier that the company wants to avoid, as was described earlier in chapter 1. Such situation of course varies among the different products of the company. Yet, in some cases the problem becomes worse when the usage of the same supplier base has led to the company and the clients adapting its design so that it basically fits these suppliers.

In addition to the effect of the external environment, the structure of the organisation and its decentralised project-based strategy is also impacting NTE's situation (Glock and Hochrein, 2011). The project complexity is managed by the use of large buying centres for every package (Garrido-Samaniego and Gutiérrez-Cillán, 2004; Juha and Pentti, 2008) where members are allocated temporarily to the package team and in the best-case scenario stay for entire length of the project. As a result, the valuable knowledge acquired during the project is spread out within so many individuals and databases that, as stated by the PRBs, take a lot of time and effort to gather once needed at the start of a new project. Thus, there is the need for gathering all that knowledge in such a way that it is possible to build upon it rather than starting from zero on every project. This is perhaps the need that was mostly expressed by PRBs and engineers interviewed who reckoned it was difficult to actually find who has the information or where is it placed.

In this context, it is necessary for the company to organise its procurement activities in a way that its supplier selection process is able to better respond to these uncertainties and makes the best use of lessons learned contained within the company. More specifically, this organisation must enable NTE to master the supplier market knowledge, identify the most qualified suppliers that are able to deliver according to the standards and specifications, but also suppliers with the less risks included. Altogether, this will secure the projects quality as well as a smooth construction progress. That is, the company needs to master all relevant knowledge about each one of its products to better support its supplier selection process. As a matter of fact, commodity, i.e. product, knowledge has shown to be one of the three most relevant measures of an organisation's purchasing performance (Hendrick and Ruch, 1988; Chao et al., 1993). In addition to the product knowledge, it is fundamental for the company to build up a strategy for each of its products and evaluate what areas that need further development depending on the corresponding supply situation. Ideally, as done in the benchmarking company, this product strategy should leverage the purchasing position of the company as a whole and be aligned with its purchasing strategy. In this way NTE can take actions that will be meaningful if these are proactively taken in advance and decoupled from the lifespan of the project since such actions are not operational in nature.

The needs discussed above, namely; increasing market knowledge, leveraging buying power and gathering of internal knowledge, potentially motivate the use of a form of centralisation in NTE's purchasing activities. Centralisation that the current set up of procurement activities is not providing. For this purpose, the company has introduced Product Coordination in order to gain the benefits of centralised competence about the products. This seems to be also a driver in multinational organisations such as is NTE. In this type of companies Narasimhan and Carter (1990) observed that one of the typical reasons for using centralised purchasing structures was the need of a procurement staff with high level of technical expertise and global market knowledge. Further, centralisation of purchasing activities has shown to be not only beneficial but also necessary in project-based organisations such as the construction company as a way to cope with the issues stemming from having decentralised operations. Having NTE's a matrix structure, centralising product market competence is one way of transferring internally the knowledge gained in previous projects throughout the organisation. Thus, it is the author's opinion that centralising product competence is indeed a sensible solution to the problems currently faced by the company. The next question is then if such centralisation has been structured in the best way considering NTE's context so that the benefits of centralising are truly reached.

6.1.1 Organising from a project perspective

As spotted by the management team the current package team set up is not able to support the proactive work needed. To begin with, a high degree of specialisation is evident in the management of the package, as each individual in the package team belongs to different disciplines and particular areas of expertise (Garrido-Samaniego and Gutiérrez-Cillán, 2004). However, all of their tasks are operational and project-specific. Without Product Coordination, the analysis of the supply base is currently done for the sake of the package and actions such as finding new suppliers are responding immediate needs. For example, a reason could be that the PRB identifies that the preferred suppliers do not have the capacity to deliver for the project and hence new suppliers are needed, etc. Moreover, let us say that two different projects are conducted at the same time. Then it is likely that analysis of the supply situation of similar packages is done by the corresponding PRBs in isolation. In addition to this problem, proper scanning of the market and evaluation of suppliers are lengthy processes that do not go in line with the tight schedule of the projects. Further, such activities require direct contact and communication with the supplier for information, which the PRB is not allowed to do by law during the quotation phase. Therefore, product coordination can enable centrally coordinated actions for the product that are not project-specific but are aligned towards the benefit of all projects. This in turn will enhance NTE's performance and value proposition.

On another note, it could be argued that if PRBs became specialists on their packages by repeatedly being responsible for the same type of equipment similar to the structure in

engineering perhaps building up on lessons learned, which is one of the present needs, would be facilitated. Nevertheless, even in this case it is not guaranteed that the PRB will try or be able to develop the product' supply situation further to the project's interest, as it is not within the responsibilities of the PRB to do so. This would potentially lead to ad-hoc decisions problems (Moses and Ahlström, 2008) resulting on decisions being founded on previous experience and tacit knowledge without taking into account the effect such decisions had in the past. Actually, ad-hoc decisions about supplier selection for example could be especially unfavourable in the case of NTE. Here, projects are so lengthy that after the package has been delivered the issues that took place during the project tend to be forgotten. Nevertheless, such issues should be taken into account during supplier selection, as reckoned by some of the buyers and engineers interviewed. For example, an engineer representative interviewed suggested that new suppliers could certainly be considered for selection only if comprehensive information is provided well in advance to bidding. Otherwise, the package team will end up selecting those suppliers that are known by them to work in order to reduce risk.

Hence, the clear need for having the overall knowledge about the product and the market, which is not included in the areas of expertise of any of the package team members, potentially justifies the introduction of an additional specialist. This is confirmed by the questionnaire results where 82% of the respondents agreed that letting the PRB concentrate and manage all product knowledge is not a suitable solution. From the project point of view, represented by the PCs interviewed and surveyed, this specialist would definitely contribute to select the best in class supplier as agreed by 100% of respondents.

6.1.2 Organising from an NTE's perspective

As presented in chapter 4, NaroTech has introduced two roles at a corporate level, i.e. the Key Supplier Manager (KSM) and Category Managers, in order to better support the purchasing strategy of the entire organisation. Thereby, one of the tasks of this thesis was to shed some lights about which of the three arrangements -PC, Category Manager, KSM- could be the most suitable concept to support the particular needs of NTE.

In contrast to the situation of NTE described above, the need from a corporate point of view is to consolidate purchasing volumes across all business units and leverage power of NaroTech. As found by Trent (2004), being NaroTech a large firm its interest is to overcome inefficiencies and duplication that resulted in a large spend and broad supplier base. Thus, the company will seek organisational design features that enable coordination of activities and processes across business units and locations. For this reason, the role of category manager has been introduced. This person is an expert on the products' category and responsible for their purchasing strategies across the entire organisation. In addition, the role of KSM has been introduced in order for relations with strategic suppliers to be managed.

These reasons; namely consolidating purchasing volumes and leverage buying power are also drivers of the use of centralised purchasing structures, as Narasimhan and Carter (1990) suggest. Both NTE and the corporate organisation have in common the need for leveraging its buying position towards their suppliers. However, it is observed that overall the corporate objective is satisfying more strategic needs while the needs from NTE aim at serving the project and are thus on a tactical/operational level. As a result, since each of the three roles satisfies different purchasing objectives it makes sense for the company to use a combination of different organisational types, as Trent (2004) point out.

On the one hand, when it comes to product expertise the low commonality between the projects and products of NTE compared to the rest of the other business units in NaroTech calls for a different approach in the focal company. The design specificity of each of the packages requires to be managed in a decentralised form (Narasimhan and Carter, 1990). That is, managing knowledge and purchasing strategies absolutely at a corporate level by a category manager would not suit this business unit's reality. In this case, centralised control is possible to be introduced but at a business unit level, as suggested by Trent (2004). Given the fact that NTE manages non-commodity items product knowledge is specific and thereby it is necessary that the coordinator is familiar with the product and project needs so that suppliers evaluated are compatible with these requirements. In this sense, having a PC belonging to NTE has the potential for enabling centralised coordination and at the same time avoiding the negative perception that internal users can have towards central control. This is actually a characteristic concern in multinational organisations (Trent, 2004). In contrast, category teams and KSM in NaroTech do not have this knowledge and neither is it included within their direct responsibilities, which rather involve having a perspective of the organisation as a whole. In these cases, letting non-commodity items to be managed by lead buyers or experts instead of coordinating them centrally corporate-wide is a typical tool that contributes to supply chain effectiveness (Trent, 2004). Thereby it makes sense for NTE to have such an expert concerning the product portfolio of this business unit in particular and this is why having a product coordinator would be of more value for its purchasing performance.

A similar situation is faced by the benchmarking company who also makes use of category managers for its corporate-wide commodities while those products that are more project-specific are procured by its project specialised purchasers. Nevertheless, one takeaway from the benchmarking case that could be of use in NTE is the strong linkage and alignment between the two different roles existing in the benchmarking company. For example, in that company there are products that belong to a certain category but are procured at the project level due to the degree of customization they require. In this case, the project-specialised purchaser has a strong communication with the category manager and will source the product in alignment to the existing strategy for the corresponding category. In the case of NTE, if there is product coordination of a product for which there is already a category at the corporate level, it is wise that the PC actively tries to exploit

possible synergies rather than treating products differently. For example, a supplier for which NaroTech is a major customer on a certain product could be willing to adapt to produce such type of product so that it meets the customized needs of NTE.

On the other hand, the connection between Product Coordination and KSM is different. What should be understood is that both organising ways have different purposes and cover different needs. By definition KSM is a strategic role used in companies when these want to allow key suppliers to receive a specific and adapted treatment from the one given to other suppliers (Pardo et al., 2011). This could be of interest for other business units in NaroTech as a way to exploit purchasing power towards suppliers and reduce supply risks. Yet, this approach is not applicable in the case of NTE where all suppliers are managed by arms-length relationships and competitive bidding is used to avoid the risk of monopolistic situations. This is also why respondents stated there is a low potential contribution for the PC regarding managing strategic supplier relationships. Thus, in those cases where NTE allows nominating a PC as a KSM for NaroTech it means to add further responsibilities to the PC. Responsibilities that have different scope and thus imply different workloads, deliverables, knowledge, interfaces to manage, etc, which should be considered.

6.2 The implementation of the Product Coordination concept

The discussions above suggest that centralising product competence is indeed a suitable solution for the company in order to tackle the challenges faced. Furthermore, organising through the PC role in order to achieve the necessary product competence seems to be the design that better adapts to NTE's context and brings the highest value for the company. Nevertheless, it was observed that the design of the role must be enhanced in order to make its execution effective.

This section uses the structural factors of the purchasing organisation described by Glock and Hochrein (2011) to identify and evaluate the problems currently existing in the implementation of the PC role. In chapter 4 all aspects having an impact on the performance of the PC role and its implementation were classified into aspects that are internal or external to the design of the role. That is, the internal aspects relate to the characteristics of the design and description of the PC role. In contrast, the external aspects are not directly linked to the role design but to the characteristics of the context within which Product Coordination is embedded, thus have an impact on its performance and implementation. Thereby, the authors have further classified the structural factors as internal or external to the PC role depending on the aspects they are related to. Figure 9 below intends to summarise the problems that were identified to be negatively affecting the success of the implementation of the PC role and the desired performance. It is worth mentioning that all aspects are interrelated and to an extent interdependent. However, the classification has been made to facilitate an understanding of the situation faced considering the broad array of issues brought up during the empirical collection process.

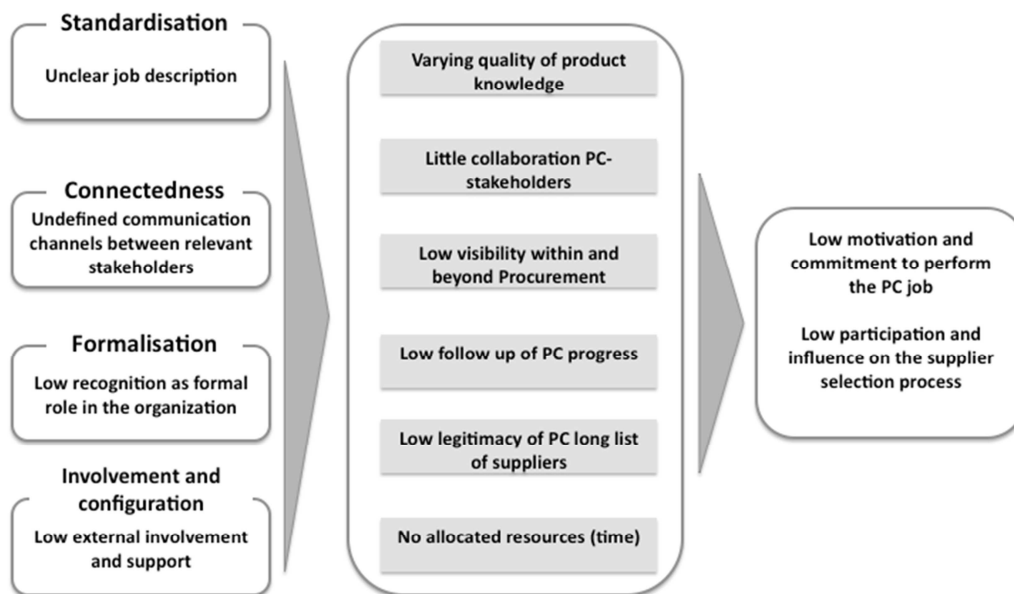


Figure 9: Problems identified on the implementation of PC resulting from a low fit between the design of the PC role and the structural characteristics of NTE’s purchasing organisation. These problems result in an array of consequences that ultimately impact the PCs’ motivation and commitment to the PC role as well as their participation and influence in the supplier selection.

6.2.1 Internal factors

The first factor identified to be affecting the execution of Product Coordination is the lack of a clearly defined and standardised job description for the role that can guide the work of the product coordinators. This is thought to be a cause of the overall lack of clarity about the role, as evidenced from the interviews and questionnaire. It is indeed true that Product Coordination is still a concept and that is starting to develop as it evolves, after which time the role by itself will become clearer. The role is well described in the procedure and this is probably why, when it comes to the concept and purpose of the role, some participants are able to be clear on these items by 18% and 27% clarity respectively. However, since Product Coordination is still a concept the demands from the job are not entirely clear for the PCs. That is, the specific tasks to be performed, what should be delivered and in what terms as well as how to perform those tasks and by what means. The lack of clear demands of PC seems to be one of the major causes hindering people’s commitment to the PC role until now. As suggested by Roylance (2008) a properly defined job position including tasks and responsibilities is a known enabler of people’s commitment and allows making people effectively responsible for the actions expected from them.

Furthermore, emphasising on getting the role clear among the buyers could perhaps be even more necessary for the PC initiative than what it is for other initiatives driven in the organisation in order to finally get it up and running. A reason to believe this is because

buyers are allocated to the role on a part time basis, which is by default a known major cause of low employee effort to the job, as found by Trent (1998). Moreover, the management of project, which is the main responsibility for everyone in NTE, characterises by a high degree of standardisation. In this sense, roles and processes are standardised, starting from the Project Execution Model going through the package responsibilities and down to lines of authorities, among others. However, if specific tasks are not totally defined in the project it is perhaps not as difficult for people to identify what to do and how to do it since there is overall clearness about the roles and purposes. Now, for Product Coordination putting forth additional effort on defining the role by standardisation of the processes, deliverables and requirements might be pivotal. By doing so the routine execution of the tasks will be facilitated (Glock and Hochrein, 2011) and performance outcomes made visible, which will increase the buyer's effort (Trent and Monczka, 1994).

From the questionnaire, the most evident form of standardisation required was the need of standardised templates for the deliverables of the PC, as expressed by 73% of the people. This was stated despite of the fact that there is a template in place where the PCs are to fill in the information about the long list of suppliers. This also leads to think that such list could be revised and expanded in a way that it gives more guidance to the PC of what to include. Not only this would help increase member effort as mentioned above but will certainly reduce the variability of performance among buyers experienced so far (Glock and Hochrein, 2011), which is not beneficial for the role. For example, the freedom allowed at the moment regarding the content of the PC templates, resulted in varying quality of information obtained by an interviewed PRB from different PCs. This fact in turn made the specific PRB to further search for information in order to complement the information of given by PC, resulting in double work. Hence, it could be good to get to an agreement of those aspects that are of importance to include when designing the new template, especially since the information that seems to be of value is rather qualitative, e.g. risks per supplier.

In addition, the definition of the PC role could further consider how the required tasks can better fit the context of the package in order to truly avoid double work, which is one of the original goals but is currently perceived as certain by 64% of the people. It has been observed that the package is managed by object-oriented specialisation (Robbins, 1990), where the PRE and PRB take care of all tasks throughout the buying process that can logically be divided as technical and commercial respectively. For example, both share the responsibility of supplier selection and the output of such process is the long list of suppliers and ultimately the choice of supplier. Thereby, incorporating the role of the product coordinator should fit this approach to avoid interface-related problems as Robbins (1990) suggests. As it is conceived at the moment the product coordinator will also provide long list of suppliers resulting in the need for clearly dividing the tasks between him or her and the package team during this process. In the ideal scenario the suggestions of suppliers of the PC are built so that there is no need for the PRE or PRB to further search for information and proceed directly to creating the purchasing strategy. However, since the

performance of the PRE and PRB will be dependent on the PC's input (Glock and Hochrein, 2011), it is necessary to make sure this input is perceived as valid by the team. Otherwise, the package team will again further search for information themselves just to reaffirm their decision, resulting in double work.

On another note, the high degree of configuration present at NTE operations is certainly a factor affecting the execution of Product Coordination. It is the authors' opinion that any changes in the organisation of the PC role should aim to best fit such configuration. A first variable of importance is the high degree of connectedness (Johnston and Bonoma, 1981) between people working in the project in comparison to the low degree between these and the base organisation. That is, communication channels, lines of communication and frequency of communication among "clusters" of individuals were observed to vary depending on whether they belong to one side of the organisation or the other. As a result, not only the level of influence of individuals in the buying decision (Johnston and Bonoma, 1981; Glock and Hochrein, 2011) varies, but also in the entire purchasing function.

Figure 10 shows the patterns of communication between the product coordinator and those actors with whom he or she needs to communicate and interact to build up the role. To begin with, most of the people with whom the product coordinator must communicate in order to build up the knowledge are placed at the project and, at the moment, there are no direct communication channels for establishing contact with them. Communication can take place by email or face-to-face if the PC approaches them. However, in most of the cases people are allocated to different projects to where the product coordinator is working as PRB, thereby they might not even be placed at the same office. All this is hindering the communication flow and, at the same time, the willingness that these people have to prioritise providing input or making evaluations that are of no evident benefit to the project. In addition, the communication between the Procurement Department and the product coordinators for aspects related to the PC work is low and infrequent. Buyers have a higher degree of connectedness with the project as PRBs than the one they have with the Department as product coordinator. This is the situation even when the Procurement Department has the same formal authority as the project. This could be one of the reasons why buyers expressed in the interviews that for them who are so immersed in the project, it feels that PC is very distant to their daily realities. This is evidenced by the results of the questionnaire where 73% of the respondents consider necessary to increase communication with the Procurement Department. More specifically, actions suggested by the respondents were having continuous progress or follow up meetings to guide and assess the performance of the product coordinators.

Furthermore, another cluster is between the PC and the package team, which is shown on figure 11. Currently, the extent to which communication takes place between these two is dependent on the frequency and means that the PRB wants them to meet, as stated by one of the PRBs interviewed. This is natural since the PC and PRB belong to the same

department. Yet, it is also thought that having established and direct communication channels, especially with the engineering side, would facilitate the PC being able to influence the selection decision, as Glock and Hochrein (2011) suggest.

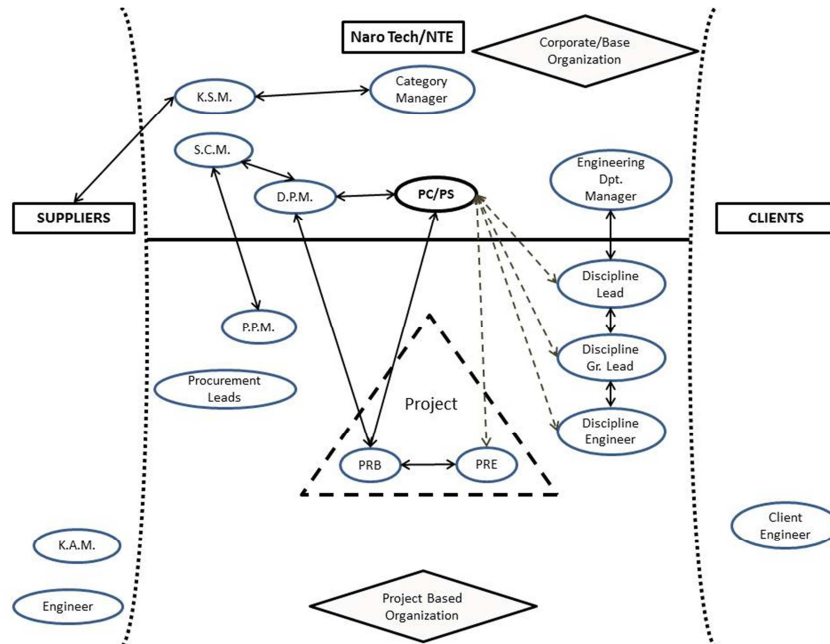


Figure 10: Network of connections between the PC team and those actors with whom the team needs to communicate and interact in order to build up the product competence. Solid and dotted arrows denote direct and indirect communication lines respectively.

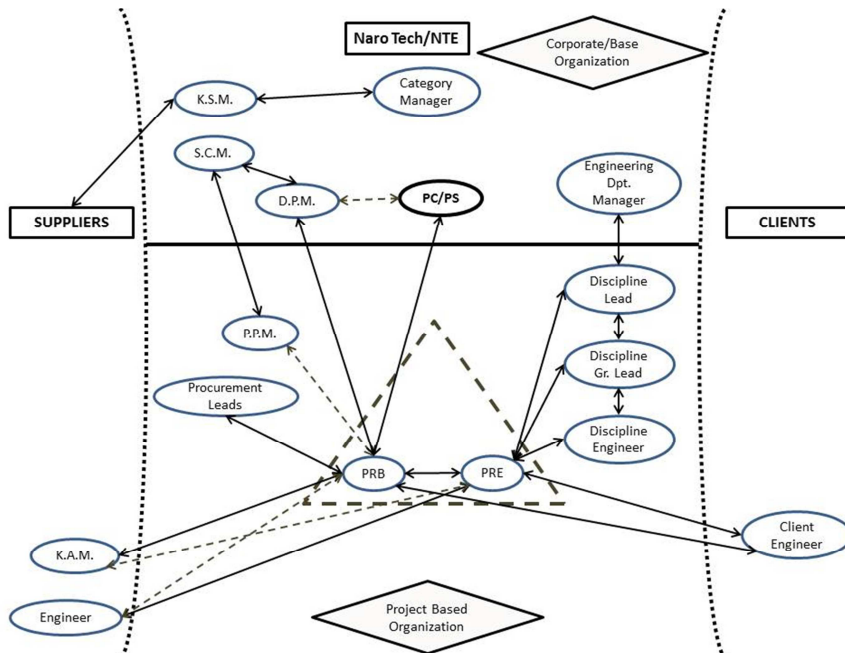


Figure 11: Network of connections between the PC team and the Package team during the PC team's involvement. Solid and dotted arrows denote direct and indirect communication lines respectively.

A second factor of importance is the degree of formalisation of roles and authority present in the organisation. In order to overcome complexity, the company uses a high degree of formalisation and standardisation on its project operations (Kotteaku et al., 1995; Glock and Hochrein, 2011). For example, in the package team those functions to be involved are standardised for all projects. Further, the roles of each and every person responsible for decisions in the package is formalised and stated in the responsibility matrix to facilitate contacting these should their expertise be required. This formalisation and standardisation result in a structured buying centre and legitimise its members, which facilitates the participation and influence of each of them in it (Garrido-Samaniego and Gutierrez-Cillan, 2004). Moreover, there is a high degree of connectedness in the team where direct communication lines are formalised such as between PRE and PRB and between these two and their corresponding leads or supervisors. Further, indirect communication lines might arise within the team and other actors due to the need of solving specific issues that come up that require the evaluation of those roles that are recognised as formal. This is the context within which the product coordinator has to fit and in order to do it is necessary for the PC to have the same legitimacy than the rest of the decision makers. Otherwise the PC will not have the same level of participation and influence in the buying decisions (Garrido-Samaniego and Gutiérrez-Cillán, 2004). Some of the initiatives have contributed to formalising the role such as the requirement of having the long list of suppliers formally approved by the PC or including it in the responsibility matrix on new projects. As mentioned by some of the PRBs this increased the visibility of the role for the procurement side of the project and encouraged the PRBs to seek collaboration with the PC. However, the role is still not visible enough throughout the organisation. This is noted by the fact that none of the individuals interviewed outside the Procurement Department had an idea of the existence of this initiative in NTE. Hence, there is still a higher degree of formalisation needed so that the PC changes from being only a concept to be a legitimate position within NaroTech.

6.2.2 External factors

The product coordinator is a role whose main purpose is to serve the buying decision process, thus him or her indirectly becomes a member of the existent buying centre. In NTE the buying centre is certainly dynamic, where several buying centres can coexist, decision authority is spread and the boundaries as to who belongs or not to such centre are somewhat grey areas. In this sense, the technical complexity and novelty of the products bought in NTE has made this one rely on a buying centre with high lateral involvement, present by the amount of disciplines that exert decision-making power in their area of expertise throughout the project length. Each of the package teams is a buying centre on its own within the big buying centre that the project is. This is the way that complexity is overcome during the project to increase the quality of the decision and reduce the potential risks present (Garrido-Samaniego and Gutiérrez-Cillán, 2004)(Juha and Pentti, 2008). It is of

importance then that the PC is able to fit in such environment and adapt, as the situation requires.

First of all, the product coordinator is as discussed previously a specialist that is immersed into each of the package teams, as it is needed. However, this specialisation needs to be evident enough so that its contribution is sought after by the rest of the package members in order to guarantee the participation and influence of this role in the purchasing decision process (Garrido-Samaniego and Gutierrez-Cillán, 2004). The participation of the product coordinator is somehow limited and so is the influence him or her has on the final long list of suppliers. The lack of visibility and understanding of the role throughout the organisation discussed above can of course affect the influence of the product coordinator but it is not the only cause. Another reasonable explanation is the observed fact that the members of the buying centre do not currently perceive the specialised knowledge provided by the product coordinator as valuable enough. In this sense, the product coordinator's main objective is to be a consolidator of knowledge and expertise. The experts that are sought after by other members are those that allow a better evaluation and enable valuable comparisons of the available alternatives (Kotteaku et al.1995; Glock and Hochrein, 2011). Hence, it is necessary that the information provided by the PC covers the risks, interests and concerns of all people in the buying centre. However, since the buying centre is characterised by high lateral involvement, what is perceived as a risk vary among decision makers (Pablo, 1994; Juha and Pentti, 2008). Therefore, the PC's input should accordingly be comprehensive enough to cover the perceived risks of all package team members. Thus, an evaluation should be made about what efforts or changes are needed in order to ensure that the role builds up such comprehensive knowledge about the product. Being the PC a buyer it is possible for him or her to build up the commercial knowledge about the product, including the risks of concern from a commercial point of view. Yet, it is difficult for the PC to know what are the aspects of a supplier other than commercial aspects that he or she should focus on when scanning the market. Thus making it difficult to provide information that is of value for all members in the package team. A suggestion to this problem brought up during the questionnaire is to provide the buyers with training on basic technical knowledge about the products so they can suggest meaningful suppliers. However, such training might not be enough. Management's decision of assigning products to the product coordinators on which they have previous experience as PRBs might enable buyers to build up the required expertise more easily. Yet, it is not always possible to allocate buyers with the suitable expertise to a product and thus more guidance if needed for these.

To tackle the abovementioned situation is important to have in mind that the types of products procured by NTE are those equipments that actually give the functionality of the facility. Thus, supplier's compliance with technical requirements (Zsidisin et al., 2000) is given high weight as evaluation criteria if not the highest for many products. Consequently, the engineering side has an extremely important relevance that should not be neglected in order to make sure the Product Coordination role succeeds in the long run. In this sense, as

Mattson (1988) point out, the more individuals exerting influence in purchase decisions typically reduces the influence that the Procurement Department has on the purchase. Moreover, at present PC is an initiative driven by the Procurement Department and the product coordinators are thus the buyers belonging to this department. Such design guarantees that commercial concerns depending on the supply situation of the products are tackled, which is what triggered the need for having Product Coordination in the first place. The product coordinators of course seek for opinion from the Engineering Department when considering of including a new supplier. However, engineering has a high importance and intrinsic influence in the organisation and in addition the packages in the projects are equally managed by both procurement and engineering. Thus, it is convenient that such an important task as Product Coordination is structured in a way that the Engineering Department is actively included. This is evidenced by the high acceptance towards formally including engineering as part of the product coordination team, where 73% of the respondents were in favour of design features where engineering shared part of the responsibility. So far, not only is engineering not involved but also it has been very little introduced about the product coordination and what this entails. This could explain why in some past opportunities there has been resistance in the suggestions of the PC, or why new suppliers being evaluated for qualification are not even invited for discussion since they are considered not to meet preliminary technical criteria.

Then again, actively including the Engineering side is of course easier said than done especially since the driver of the initiative is the Procurement Department and it is not within this one's control to make adjustments in the counterpart Department. Yet, a good sign that management should draw upon is the potential positive perception from engineering towards Product Coordination observed during the interviews. Both the engineers interviewed and the perception of some buyers is that Engineering actually agrees on the importance and usefulness of having a centralised product competence and is overall positive about the initiative. Hence, it is thought that actively involving the Engineering Department in Product Coordination is not only vital for securing technical acceptance but also for increasing the influence that this role has in the organisation as well as the perception of it. For example, if responsibility is shared then the Procurement Department can have a higher influence in the earliest phases of the buying process such as the need recognition or establishing product specifications. This is important in the case of procuring technically complex products since the influence of procurement is generally low at these stages as observed by Garrido-Samaniego and Gutiérrez-Cillán (2004). This should help towards one of NTE's needs, which is expanding the supplier base of some products to leverage the company's buying power towards certain suppliers. This aim cannot only be supported by trying to find new suppliers in the market but also sometimes is necessary to make earlier adjustments to the products that will allow more qualified suppliers to be able to meet the required specifications. This has shown to be successful already within NaroTech where corporate category teams have a Category Responsible Engineer, which

allows the team to take actions such as evaluating potential standardisation of the products to better adapt these to the supplier base.

On another note, so far the configuration within the project has guided the discussion of how the role can better fit within NTE operations. However, a look at a higher layer of configuration between the main organisational divisions, i.e. the project and base organisation, could help understand how PC could better fit within NaroTech as a whole. In this sense, given the requirements of the purchase situation (Glock and Hochrein, 2011), NTE is configured in a way that the project enjoys a very high status within the organisation (Dubois and Gadde, 2002a). The culture within the company is to prioritise the project and resources are available for the project since these come from the client. At the same time, corporate is by essence the highest authority within the base organisation at NaroTech. That is, both the project and corporate have the highest hierarchical position within the organisation. In contrast, Product Coordination is an initiative driven by the Procurement Department that is part of the base organisation and belongs to one business unit, i.e. NTE. Moreover, Procurement is only one of the important functions within the company and as large or smaller than its counterpart engineering. Hence, it can be difficult for this Department to be in the position to influence tactical decisions (Glock and Hochrein, 2011) such as introducing a new role within the organisation without full acceptance and involvement from those entities of high influence (Johnson, Leenders and Fearon, 1998; Johnson and Leenders, 2006; Trent, 2004). This is certainly proven by the low perception of management involvement expressed in the questionnaire. Product Coordination serves an important need that is aligned with the corporate supply chain strategy and its execution creates changes within the organisation. Hence, this initiative is of a tactical level, which requires the push from higher levels of management. This will ultimately give the concept the visibility, authority and resources needed to make this organisational design effective, as agreed by Trent (2004) and suggested in the interviews. Moreover, it will give an indication of the increasing importance that purchasing has in the organisation (Johnson and Leenders, 2006) and facilitate its influence in decisions on an operational level, i.e. at the project.

The way product coordination is described in the procedures and presented together with the initiatives of bringing the Project Procurement Managers or other key stakeholders onboard show that configuration issues have been considered to a certain extent. Nevertheless, since Product Coordination inevitably requires making changes in the organisation to achieve the right fit for the role, it is necessary to identify the strategic connections across functions and organisational boundaries necessary to better integrate this role in the company operations (Trent, 2004).

6.3 Options for reorganising Product Coordination

Several options for organising Product Coordination were evaluated in the questionnaire but each one of them vary in terms of suitability, feasibility and effectiveness for NTE. It is

difficult to draw any conclusions as for why participants consider equally suitable what seem to be completely opposite arrangements, i.e. a dedicated procurement position or a part-time team composed by commercial and technical members. An explanation could be, however, that both arrangements are perceived as having the necessary formality, visibility and resources to be immersed and generate authority in the complex buying centre of NTE. Or also, the workload that buyers consider necessary for properly performing the role could be perceived as equally overcome by either having dedicated commitment or a counterpart with whom such workload could be shared.

Those arrangements that involve Product Coordination being a fulltime position would allow the individual(s) certainly commit the necessary effort to the task (Trent, 1998). Individuals will have only one job responsibility and problems originating from dual reporting relationships would be eliminated (Trent, 1998; Driedonks et al., 2009). However, the benefits of using such arrangements should definitely compensate the costs of investing the resources required by a dedicated position. In the present case, since Product Coordination is only taking place at the headquarters of NTE the tangible benefits, in terms of impact to the bottom line, are difficult to see in order to justify having a dedicated role for it. In contrast to the category managers used in the benchmarking company, the big volumes and higher frequency of purchases managed by centralising on a Nordic level justify having a dedicated position. Similarly, the category managers and KSM in NaroTech also manage bigger volumes since the type of products managed enables them to aggregate volumes across business units. Even so, the position for these is filled under an approximately 50% time commitment. In the case of NTE, the long length of the projects and low frequency of purchases perhaps makes less evident the need for a dedicated person whose main contribution takes place sporadically. One of the ways through which the right volumes would be obtained in NTE is by arranging Product Coordination across several NTE offices since the same procurement conditions will only be found under its own business unit. For example, having PC of products across European offices or projects since these will probably have similar supplier base and synergies could potentially be obtained. Nevertheless, this is something for the company to consider in the long term if the initiative proves to be successful. Thus, having a part time arrangement seems to be the most feasible way for the company to implement the role with the least resources invested. This does not mean that the role should not have any resources at all, especially in terms of time, given the importance of the PC mission in the organisation (Trent, 1998).

On another note, the necessary involvement of engineering discussed suggested that potential benefits could be gained by organising PC in a team format composed by procurement and engineering members. More specifically, a part-time team where both technical and commercial counterparts shared responsibilities was suggested as highly suitable by 73% of the survey respondents. Cross-functional sourcing teams are a typical mechanism used in organisations (Trent and Monczka, 1994; Trent, 2004) for tasks such as finding, selecting and managing supplier relationships for a category of products

(Driedonks et al., 2009; Driedonks, 2011). In the case of NTE, this arrangement would provide the flexibility, cross-functional knowledge and coordination mechanisms for fast responses to competitive demands of the product that cannot be achieved by traditional structures (Trent and Monczka, 1994). Thus, using a cross-functional sourcing team seems to provide an ideal fit for carrying Product Coordination and enable this to better meet its goals. However, this would introduce an additional complexity since it will require allocating resources from the engineering side and escalate the part-time membership issue already present in the current set up. Thus, in the case of NTE having a team for all of the products in the portfolio might not be feasible and even appropriate. As Trent and Monczka (1994) suggest, the selection should be limited to those products where the best decision will only be yield by a team and the benefits of this one outweigh the cost of using the team. This could be the case for those products already classified as strategic in Product Coordination and being managed by the PS. The rest of the products where technical expertise is required occasionally, such support should then be provided on an as-needed basis (Trent, 1998). This is similar to what the situation is at the moment. Yet, the company should make sure that the person that is responsible for such support is aware of his or her responsibility and what is expected from them accordingly (Trent, 1998).

6.4 Suggested improvements for organising the PC role

The previous sections focused on discussing the different factors where the company should focus its attention. Further, it ended up in a major conclusion where the benefits from integrating other actors justify organising Product Coordination in a cross-functional team approach. This section takes those discussions as an entry point to discuss the changes and rearrangements that could help the company to improve the implementation of the PC role and achieve the right fit in the organisation. The discussion below is guided using the Input-Process-Output model for sourcing team effectiveness presented by Driedonks (2011).

To begin with, the mission of the Product Coordination (PC) team should be the centralisation of the relevant product market knowledge and the establishment of the product supply strategy in alignment with the supply needs of NTE and the entire NaroTech. The focus should mainly be on suppliers' capabilities and capacity as well as to introduce and qualify new appropriate suppliers that will be used and be taken actively into consideration in the long lists of supplier selection process. In the frame of the team's mission, its responsibilities will be to produce and maintain a best-in-class supplier portfolio for the relevant product as well as to contribute into project's purchasing function through the delivery of a comprehensive and of "high-value" draft of suppliers' long list.

By carrying out this supplier base and market research, the PC team may point out suppliers that can have the potential to meet the Oil and Gas industry and NTE's standards as well as benefits will arise in the case of future possible cooperation. If so, they can initiate the process of building a channel with the specific supplier, by setting the relevant meetings

where the possibility of future cooperation can be further discussed. As has been indirectly mentioned, PC team will not have the responsibility of managing but instead building supplier relationships in the case that the supplier worth NTE'S and Naro Tech's in respect attention and resources to be invested. In turn, the entity that is responsible to manage relationships with suppliers in NTE is the Key Supplier Manager (KSM).

6.4.1 Improving the factors affecting PC team's input

Composition of the Product Coordination team

The composition of the PC team with a representative from procurement and from engineering is the factor that will provide the cross-functionality required in order for the quality of product knowledge or competence to be enhanced. That is, the PC team will consist of a product coordinator buyer (PCB) and a product coordinator engineer (PCE). Thanks to combining the PCB and PCE's knowledge, the supplier's will be evaluated both commercially and technically beforehand, in order to be introduced into the product's supplier portfolio. Further, each supplier's commercial as well as technical risks will be identified and can then be communicated to the package team combined with the product's market knowledge. All of these are the information that is currently perceived as needed, according to the interviews. Therefore, the final output of the team will be considered as valuable and meaningful for the package team's operations.

In addition, it is thought that the cross-functionality in the team will increase its performance in terms of adaptiveness (Stanley, 1993; Ruckert et al., 1986) to changes in the market and in project needs. In the new arrangement, both PCB and PCE will share the responsibility of evaluating new suppliers and developing the product supplier strategy. Thus, the team will have the required flexibility to more easily adapt the information to be provided to the package team according to the project's requirements, as well as to adapt the supplier portfolio based on changes in the market.

In order to understand how the members' expertise will be merged under the PC team's format, the PCE and PCB roles are discussed more in detail below. It is important to mention, that for both members the Product Coordination role will be a part time position in parallel to their responsibilities towards the project.

Regarding the PCE role, it is important to first find the appropriate candidate to participate as the engineering representation in the PC team. To contribute to this decision, the survey findings showed that 57% of the respondents believe that the most appropriate person to provide valuable information to carry out PC tasks is the PRE. In the second place, 15% of the respondents believe this person is the Discipline Lead. Therefore, based on samples majority, it is suggested that a PRE or Engineer with previous experience on a specific product should be the one to hold the role of the PCE. The important aspect to consider when selecting the PCE is that this person has the knowledge and expertise on the specific

product. In turn, this will facilitate that the PCEs have a clear understanding of what their role is in their teams and what is expected from them, as suggested by Trent (1998).

The PC engineering counterpart will be responsible for examining the supplier's technical suitability as regards to specifications, standards and related areas. Their input will be the one securing the technical suitability of the supplier, which in turn will add validity on the long list draft developed. Furthermore, the PCE should define and provide the information that is of interest regarding supplier's technical requirements for the product in order to guide the PCB in the search of new suppliers. Moreover, the PCE should drive all technical initiatives set for the product stemming from the supplier strategy decided.

The specific responsibilities that the PCB will have are in essence the same responsibilities currently contemplated for the product coordinator. However, the main knowledge that should be managed and presented by the PCB to the package team is the product market situation and each supplier's related risks, as suggested by 82% and 91% of the survey respondents. One big part of those risks are related with the specific aspects of suppliers' capacity, lead times as well as accuracy of meeting the pre-determined agreements on deliveries. All of this information should be discussed and agreed together with the PCE, which will result in the holistic product knowledge or commodity knowledge (Chao et al., 1993) that the PC concept aims for. Further, this information should be included into the content in the draft of long list suppliers as a physical way to present it to the package team.

Reward system

For Product Coordination, setting up a properly designed reward system based on team's performance rather than individual contribution will be highly beneficial. This has shown to encourage team members to work together as a team (Trent and Monczka, 1994; Trent, 1998; Driedronks, 2011). Furthermore it will result in the desired PC team member's participation (effort), commitment and enhanced performance. A challenge for management on this regard could be how to measure team's performance and ultimately reward it. At the same time, setting a reward system is necessary since a role or arrangement cannot be considered formal if is not possible to evaluate and further improve it, according to Roylance (2008).

The first factor to consider when setting up the performance evaluation system is that every product has its own characteristics and its supply market is different among all the rest. Thus, the level and performance measurements cannot be the same for all the PC teams. In turn, a suggestion that would facilitate the following up of the team's progress is that every PC team define its own clear goals and objectives together with the management team, based on which it will be evaluated (Trent, 1998). These goals will directly relate to the actions that need to be executed regarding the PC team's product. According to Roylance (2008), those objectives should be no more than five or six as well as to be achievable, measurable and clear. This suggestion will allow the management to monitor and evaluate the PC team's performance on standards relevant to product and its market nature. The

evaluation should take place twice or once every year (Roylance, 2008). Making the PC team members part of their own evaluation will foster commitment and allow them to develop clearer understanding of the team's purpose and deliverables (Trent, 2008). All of which is not currently present.

In addition, following the model of Driedronks (2011) for sourcing team success, the PC team's performance can be measured upon team's effectiveness. More specifically, the parameter that can be used to measure team effectiveness is the quality of the output, that is the quality of the information provided. The majority of the survey's respondents also suggested this parameter as a suitable aspect to measure PC performance. Quality however, is a difficult parameter to define and measure.

A feasible solution to this issue could be derived from taking the approach of internal costumers highlighted by Chao et al. (1993) as inspiration. In this sense, the main deliverable of the PC team, as suggested by 100% of the survey respondents, is a valuable draft of suppliers' long list. This list will be provided to the package team through a standardised template during the supplier selection process. The package team can then be considered as the internal costumer of the PC team, based on Chao et al.'s (1993) approach. The PRB can add suppliers to the list if he or she believes that it is needed. Yet, it is suggested not to erase the suppliers suggested by the PC team in the draft. This is because, those suppliers in the PC list have been proved to have the required commercial as well as engineering capability by the PC team. Furthermore, the PC list is also aligned with NaroTech's corporate strategy (see below discussion in the process part), since suppliers with already established relationship will be involved in the list as much as possible.

If the PRB is not able to find any additional suppliers, it will mean that the PC team has performed a very valuable work, which in turn will save time during the purchase function process of building the long list. This fact can be considered an indication of quality when it comes to team's output, which in turn can be monitored by the management team and confirmed by the respective PRB as well. Figure 12 below shows the process of final long list's creation with all the stakeholders participating.

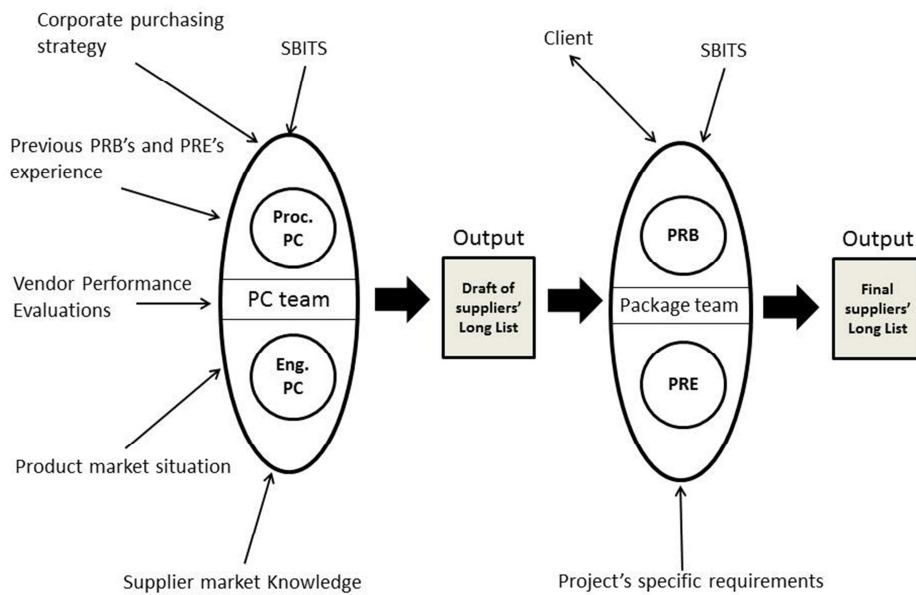


Figure 12: New approach of building the long list of suppliers provided by the PC team to the package team.

In parallel to the performance evaluation related to the reward systems described above, support and guidance upon the PC team's progress and operations are necessary. Setting up a process for following up the PC team's progress is vital, as suggested by Trent (1998). This progress evaluation process will have as base of origin the objectives that the team has set and will follow up team's activities in the frame of reaching those goals and objectives. The idea is to discuss any difficulties faced and provide further guidance in order to achieve the objectives set, among others. This in turn will foster the PCB and PCE participation and commitment to PC while in addition management's involvement will increase on people's eyes, since it is currently considered as medium to low.

Authority

In order for the members of the PC team to be actively involved and engaged, it is important to provide the right authority to the team, as Driedonks (2011) suggests. One of the conclusions earlier in this analysis was the benefit that NTE could enjoy from a better alignment between its purchasing strategy and that of NaroTech's. In light with this idea, the PC team will be the point of contact with the Category Manager (if this, for the specific product, exists), connecting NTE's procurement operational level with the strategic level.

The linkage will be achieved through the joint development of the supplier base strategy for the product based on an annual assessment of the existent supplier portfolio, which will be performed by applying a supplier matrix portfolio analysis. Such assessment should be performed by the PC team together with NTE procurement management and the relevant category manager on an annual basis. It is thought that providing decision-making authority to the team by allowing it to define aspects of strategic importance (Driedonks, 2011)

would enhance the legitimacy of PC. Further, the PC team role would become more recognizable in the entire organisation.

Furthermore, requiring the PC team's signatures as mandatory in order to approve the final long list of suppliers before it is handed in to the client company will also provide authority to the PC team. This action will on the one hand secure that the list is aligned with corporate's and NTE's purchasing strategy and on the other hand increase the authority of the PC team in terms of decision making.

Providing authority to the PC team by taking part in decision-making together with the suggested reward system based on the team's performance will increase the sense of work's ownership and responsibility of the PC team's members. This in turn will motivate the team members to outperform (Driedonks, 2011).

Formalisation

As suggested by Glock and Hochrein (2011), a vital part in providing formality to a role is to clearly define such role in the organisation. Therefore, a clear job description (Roylance, 2008) where the interfaces of the role with other individuals and processes in NTE are clearly stated will further contribute towards that goal. In this way, the interdependencies between the PC and others in NTE are officially recognized, which in turn give formality to the PC role.

First of all, since the PC team's recommendations influence the package team's processes, such dependency should be formally stated and recognised in NTE operations as suggested by Driedonks (2011). In order to do so, the package team should be officially encouraged to take the PC long list of suppliers as a baseline for setting the final long list of supplier's draft. Formalising such process will support decision-making in the package team and foster the relationship between this and the PC team, according to Driedonks (2011).

In addition the authority provided to the PC team, by being involved in the final long list's approval, according to Driedonks (2011), indicates the teams involvement in the processes of the package team, which in turn adds formality the PC team role. Finally, formality of the PC concept will further be enhanced if the PC team is officially linked to the progress and activities of the project. A simplistic way to achieve this is by including the points of interaction between the PC team and the project into the Procurement and Engineering Milestone schedule. More specifically, add a section called Product Coordination activity on the segment of "Procurement Chain Activities" of the schedule. In particular, the activity to be checked is if the PRB has contacted and received the PC's team input in order to proceed to the next phases of the procurement process of the package. This type of recognition provides validity to PC team's input, while formalises the role of the PC team in the project's environment. This is because the PC team will be incorporated within the project's rules and processes, which does not officially happen at the moment.

6.4.2 Improving the factors affecting PC team's process

Communication

The importance of communication between the PC team and the relevant stakeholders was discussed earlier. In order to do that it is necessary to make the interactions between the PC team and its stakeholders occur. In this way, the PC team's participation and influence in decision-making upon supplier selection will be secured, as suggested by (Garrido-Samaniego and Gutiérrez-Cillán, 2004).

These interactions will be achieved through communication channels that need to be upgraded, defined and in some cases to become dedicated in order to enable and facilitate the processes of PC's team. As Driedonks (2011) mentions, the communication channels should be the enablers in order for the team to achieve high performance. The communication channels suggested below are mainly based on meetings and are classified into two main categories. The first category is the coordination channels. This relate to the channels that will be used by the PC team to build up the required product competence and to define the product's supplier strategy. The second category is the project related channels, which will be used in order for the PC team to be actively involved and provide its input to the project; more specifically to the package team.

- Coordination communication channels

In order to perform the PC work interactions between four clusters of individuals can be distinguished. First of all, in order to define the product's supplier strategy within NTE, input from the corporate purchasing strategy should be taken into consideration. Therefore, a stronger linkage with the corporate purchasing strategy should be achieved by direct contact with corporate figures. In the frame of that, the PC team should refer to and communicate with the Category Manager of products similar to the ones managed by the PC team. The communication should take place officially for two major activities. The first activity is a meeting for developing the product supplier strategy together with the Procurement Department Manager. This meeting will secure the alignment of the corporate purchasing strategy with NTE's specific products' supply strategy. The second interaction will be for involving the PC team in the suppliers' performance assessment. The team's input will be taken into consideration by the Category Manager, during suppliers' evaluation impact on whole NaroTech's operations. The PC team input about a supplier performance in NTE projects will be communicated to the relevant KSM through a specific template - document of suppliers' annual performance. Based on this, the KSM will be able to have a picture of supplier's performance as well as to define or re-define NaroTech's relationship towards it if necessary. Apart from these main activities, additional interaction can also occur before the start of every project to discuss upon strategic suppliers for NaroTech and share corporate's strategy for the specific category.

Secondly, it is of vital importance to create communication channels between the PCB and PCE. It is recommendable that the PC team meets for coordinating and assessing the product and supplier's information. The PCB and PCE should meet frequently such as in a monthly or every-other-week basis. For example, progress towards the goals can be discussed, supplier's risks can be pinpointed, and development of initiatives for the product can take place. Thirdly, in order to build up the product competence, communication channels should be developed between the PC team's members and PRBs and PREs of previous projects. The purpose of these channels will be the collection of information concerning suppliers' performance in previous projects within NTE. To facilitate these interactions, a specific template can be created within an already existed IT system such as the SNS where previous PRBs and PREs are called to provide information of suppliers in former projects. Last but not least, a dedicated channel should exist between the PC team and the NTE's Procurement Manager, where these two meet on a frequent basis. The purpose of these meetings is to follow up the PC team's progress (as described above) and the required guidance that need to be provided concerning team's performance and continuous improvement (Trent, 1998). The resulting new or improved interactions between all the abovementioned individuals are illustrated in figure 13.

- Project related channels

Fixed communication channels should exist between the PC team and the Package team (PRB and PRE), as illustrated in figure 14 below. More particularly, the PC team should have at least one meeting before the start of a project and one after the end, with the relevant PRBs and PREs of the package. In the meeting before project's initiation, views can be shared upon the purchasing strategy, while the PC team will also be responsible to share Corporate's strategy interest upon the specific package (if necessary). In turn, after the delivery of the package, the evaluation of the supplier's performance in the project will be carried out. The teams should emphasise on gathering the strong and weak areas about the supplier, since this information was suggested as important during the interviews. This evaluation should be documented and saved into systems, with the purpose of being used as an input for building supplier base market knowledge.

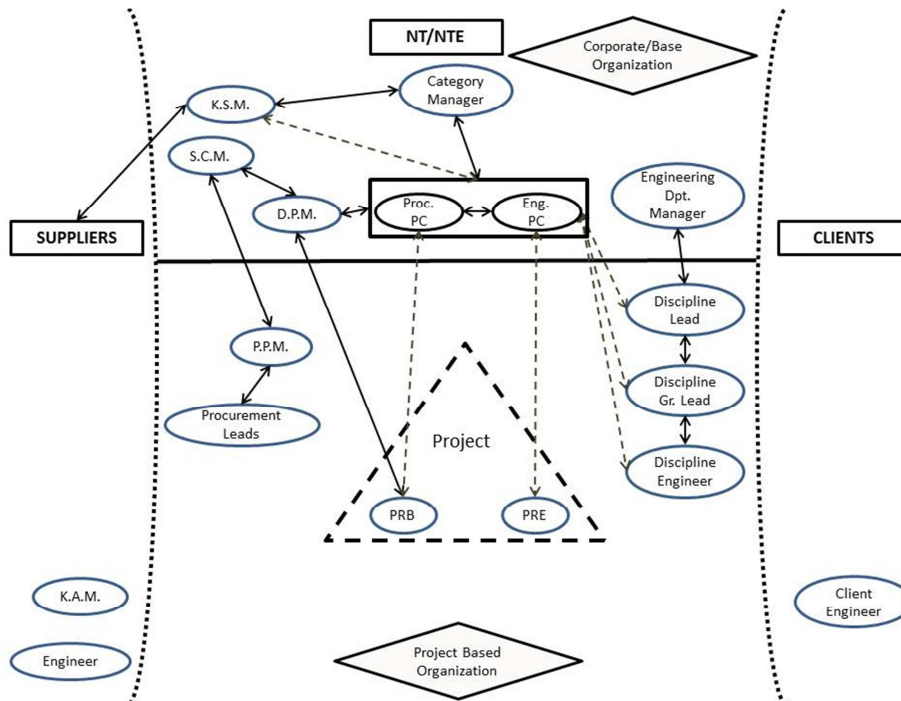


Figure 13: New network of connections between the PC team and those actors with whom the team needs to communicate and interact in order to build up the product competence and define the product's supply strategy. Solid and dotted arrows denote direct and indirect communication lines respectively.

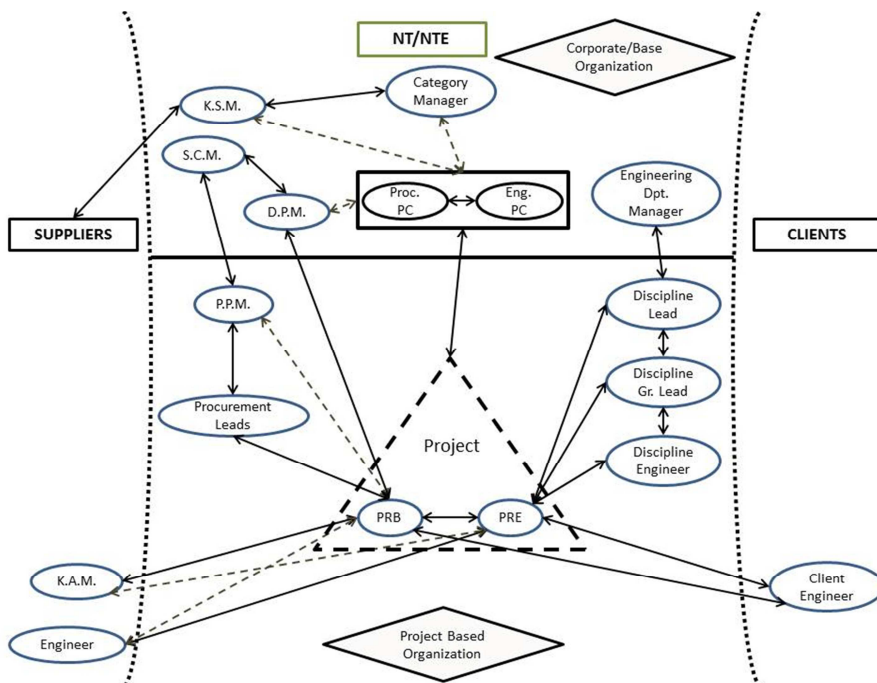


Figure 14: New network of connections between the PC team and the Package team during the PC team's involvement. Solid and dotted arrows denote direct and indirect communication lines respectively.

IT support for communication

In order to promote communication between all stakeholders and in turn guarantee the transfer of knowledge, it is important to have IT system that support those communication channels. This was also expressed by 55% of the survey's respondents, who considered as necessary the existence of IT support systems to maintain and further share the knowledge. The IT systems will be used to store and maintain the information deriving from the aforementioned meetings as well as from the supplier market research.

Furthermore, those systems will be the official means for facilitating information interchange between all the stakeholders. At the moment, in NTE and Naro Tech there are two IT systems that can be used for those purposes. These are SNS (NTE Procurement Department's intranet) and SBITS (NaroTech'Supplier Base IT System). SNS can be inter-connected with the Engineer Department's intranet as well as with other Naro Tech Business Units departments' intranets if is required, while the latter one is the Naro Techs supplier base IT system, where all suppliers have been categorized and rated based on some specific criteria. With the proper modifications and additions, both of those systems can be upgraded and used (one of those or both of them). For example, in SBITS, an additional caption can be added to the search engine called "Product Coordination". Search based on the "Product Coordination" parameter will result in suppliers for which specific information have been collected and inserted into the system, such as their capacity, weak points, strong points, etc. Overall, the key point for using the IT systems is the standardisation of templates' design that will be used in order the information to be maintained, interchanged and withdrawn. Communication and agreement among all the relevant stakeholders upon the standardisation of those IT templates should take place.

Standardisation

Standardisation of some elements is considered one of PC concept success' cornerstones, that will enable the PC teams processes-tasks to be carried out effectively as well as efficiently. The purpose of standardising PC team's elements (processes, templates, etc.) , as Garrido-Samaniengo and Gutiérrez-Gillán (2004) highlight, is to make the PC concept legitimate as well as to reduce the time required for PC tasks to be performed, since the use of standards reduces variability as well as the speculation on the actions that have to be carried out in order to accomplice the tasks.

To begin with, and as mentioned above, the number and frequency of the meetings between the two PC counterparts as well as with the rest stakeholders should be standardised. The predefined and scheduled meeting's will allow PC team to have a point of origin in order to prepare and plan the tasks, while is made sure that the flow of information and interaction between the different stakeholders will take place. Therefore, interrelation between standardisation and communication channels is observed.

The product market knowledge that the PC team should obtain and share would be of value if it is specified according to the interest of the company as well as the receivers of it. At present, there are no specifications of which specific aspects of market knowledge is required by the product coordinators to be acquired. Round-table discussions are suggested, where all the stakeholders will be able to express their views about the information of interest about the market as well as the supplier base. Taking into consideration this input, consensus upon the specific templates' content will be achieved. Considering that the Product Coordination deliverables are unclear for the majority of the survey's respondents, this standardisation of templates will contribute for the PC team's members to develop an understanding about what is it asked by them.

Lastly, standardisation of time is needed but this is however an ambivalent topic. On the one hand, 73% of survey's respondents stated that it would be better to allocate a fixed amount of time for Product Coordination responsibilities. On the other hand, the prioritisation of the project and the budgeting do not allow such a dedicated allocation of time. Moreover, the workload during the project length varies, making it difficult to set a fixed and constant amount of time. Thus, a practical solution could be that every month the PCE and PCB agree together with their Project Managers on the amount of time that they will invest in Product Coordination on a weekly basis. In this way it is also possible to consider both the situation at the project and the meetings that are coming up during that month regarding Product Coordination work. The survey conducted to Project Procurement Managers and Supervisors shows that these are willing to allow buyers to spend weekly an average of 4.5 hours on Product Coordination. Thus, it is believed that this solution can indeed be feasible and in the benefit of all parties involved. The allocation of time however is fundamental for letting the PC team members to perform their job but as well as for reinforcing their motivation and commitment. The absence of time resources allocated to the PC team would send a negative message about the importance of Product Coordination to the team members as supported by Trent (1998), which is not beneficial for the success of the implementation.

6.4.3 Impact of the PC team's output on performance

Throughout section 6.4 in this analysis the authors have discussed the actions that need to be taken by the company to guarantee the success of the PC team. More specifically, actions have been discussed in the input, the process and the output elements of the conceptual model proposed by Driedonks (2011). In parallel, during the analytical framework it was mentioned that the performance of the purchasing organisations could be measured in terms of its efficiency, effectiveness and adaptiveness (Stanley, 1993; Ruekert et al. 1985). Being the ultimate goal of Product Coordination to improve the purchasing performance of the focal company, it is sensible to discuss how the changes proposed for the PC team can thus contribute to that goal.

The impact of the improvements suggested on the effectiveness and adaptiveness have already been explained in the section of “Composition of Product Coordination team”. More particularly, effectiveness will stem from the quality of information provided by the PC team.

On another note, the efficiency of the PC team will stem from the reduced time spent on acquiring the product knowledge in order for the PC tasks to be carried out. It is thought that the benefits will come from standardising the information and templates, ensuring that communication between stakeholders occurs and incorporating the technical knowledge in the team. For example, all the time that currently has to be invested in order to receive the technical product input concerning suppliers, with the suggested team format will be drastically reduced. Through this way, the accomplishment of the PC tasks will become more efficient.

All the improvements suggested in this analysis are summarised in figure 15 below, which presents an adapted version of the Input – Process – Output model for sourcing team success proposed by Driedonks (2011) to the NTE’s context.

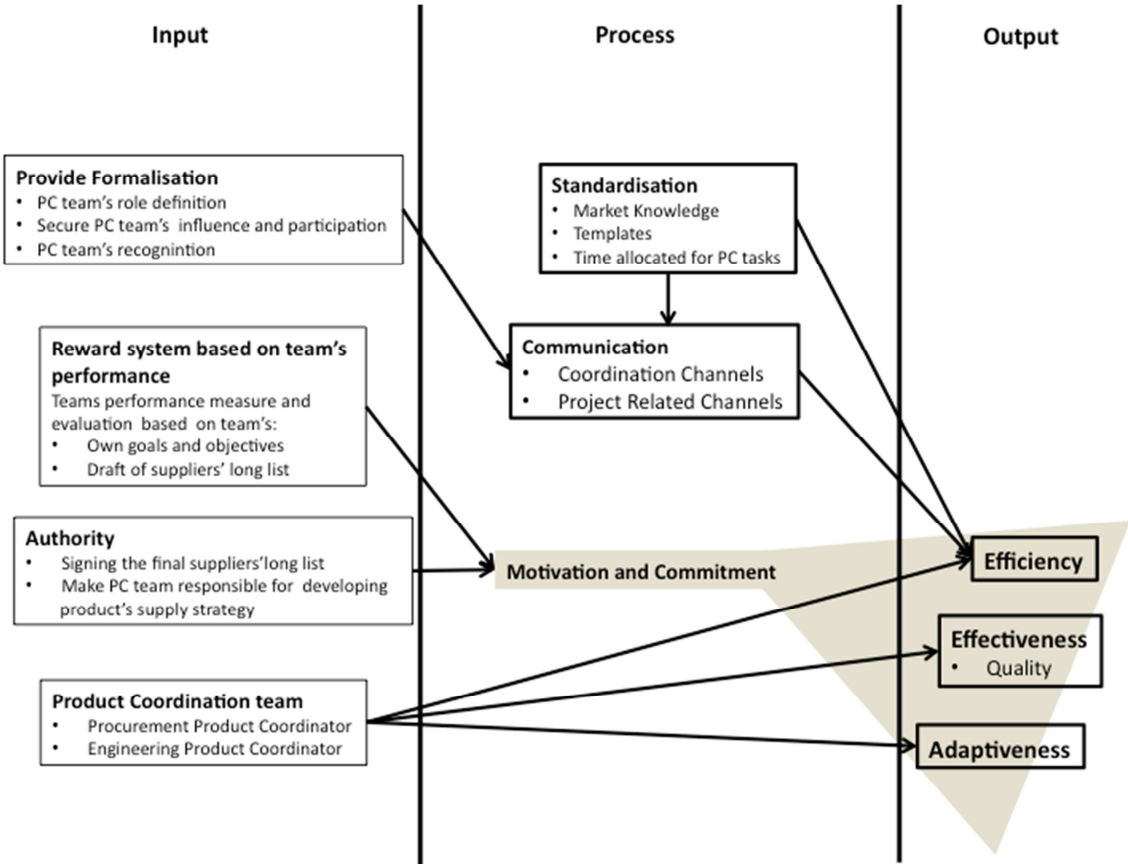


Figure 15: Summary of the improvements suggested in order to improve the performance and implementation of the Product Coordination concept. The improvements result in an adapted version of Driedonk’s (2011) conceptual model for sourcing team success to NTE’s context and needs.

7. CONCLUSIONS

Product Coordination is a concept introduced within NTE in order to improve the company's purchasing performance. The concept consists on the centralisation of product competence in the form of the Product Coordinator, i.e. the PC role. As mentioned at the beginning of this thesis, Product Coordination has been introduced for a long time in NTE but obtained low receptivity and tangible outcomes. In this context, the purpose of this thesis is to study and evaluate how the concept of centralised product competence has been implemented in NTE to improve the company's purchasing performance. To begin with, the research assessed the suitability of the Product Coordination concept taking into consideration the context and requirements of NTE. Furthermore, the aim also focuses on proposing improvements to the current organising of the Product Coordination concept within NTE in order to institutionalize the PC role in the organisation.

As explained in the introduction of this thesis, the highly regulated O&G industry has led to an apparently limited base of known qualified suppliers for NTE. As a result the company has faced an unfavourable situation towards suppliers in some products that it wants to avoid. This situation, together with the competitive environment and market uncertainty, makes supply risks of great concern for NTE. In response, the company needs to rely on a good supplier selection process that allows it to choose the best-in-class supplier. This is also the main challenge for all EPC contractors, as found in the literature. In addition, due to the decentralised-project based strategy of NTE, the knowledge about suppliers gained in a project is spread over many individuals making it difficult to gather and build upon it. The later is perhaps the concern that was mostly expressed by buyers and engineers interviewed during this research. Given this context, the company is facing the need of organising its procurement activities to increase the market knowledge, leverage on its buying power as well as gather internal knowledge in a way that facilitates transfer of experience. This has been done by deciding to centralise product competence and materializing it in a new function, i.e. the PC role. Centralising product competence can provide a high level of technical expertise and global market knowledge as well as the possibility of internal knowledge transfer gained from previous projects throughout the organisation. Both of these reasons have shown to be drivers of introducing centralised purchasing structures in the industry. The benchmarking case provides an example. However, the question is if the PC role has been structured in the best way considering the company's context and needs, which leads to the first research question.

Is the concept of centralised product competence appropriately organised considering NTE's context?

The organising must enable NTE to master the supplier market knowledge, identify the most qualified suppliers, and build up a strategy for each of the products within areas that need further development depending on the supply situation. These are all aspects that the

current set up of Procurement activities are not supporting. The need of having high quality knowledge about the product market justifies the introduction of an additional specialist that supports the package team members. This has been confirmed by the findings where the majority of the buyers agreed that letting the PRB manage and concentrate all product knowledge is not a suitable solution. Second of all, actions to tackle supply risks through supplier selection must be decoupled from the lifespan of the project, as observed in the benchmarking case.

In this sense, Product Coordination will enable centrally coordinated actions for the product that are not project-specific but are aligned towards the benefit of all projects, which in turn will enhance NTE's performance and value proposition. Nevertheless, even when decoupled from the project, Product Coordination should be managed within NTE rather than at the corporate level. This is because the design specificity of NTE's projects and products results in a low commonality between these and those of the other NaroTech's business units. In turn, having a coordinator that is familiar with NTE's specific supply requirements and needs is of more value for its purchasing performance. Similar conclusions have been observed in the literature and in the benchmarking company, where commodity items are managed corporate-wide by category managers while expert buyers are used to manage project-specific products. However, a stronger alignment is needed between the PC and the Category Managers and KSMs than what there is today in order to exploit on synergies.

The main conclusion from the discussion above is that centralising product competence in NTE through the PC role is indeed suitable for the company. Yet, the implementation of the PC role has presented variations in performance so far, which leads to the second research question below.

What are the organisational factors determining the performance of the PC role in NTE?

The current organising of the PC role was evaluated based on the structural characteristics of the purchasing organisation proposed by Glock and Hochrein (2011). More specifically, the factors; standardisation, formalisation, connectedness, involvement and configuration showed to be appropriate to identify the issues existing with the organising of the PC role. These factors were further classified into those related to how the role has been designed, i.e. internal factors, and those related to the characteristics of the organisation, i.e. external factors. Regarding the internal factors, the first factor identified was the lack of a clearly defined and standardised job description. This resulted in an overall lack of clarity about the PC role among all members of the Procurement Department that should be tackled. The findings suggest that there is a medium understanding of the PC role as a concept and its purpose. Yet, the lack of clear demands seems to be impeding making people responsible for what is expected from them. In particular, it was observed that the absence of clear standards that provide guidance on what to do, when to do it, what to deliver and in what terms hinders the routine execution of tasks and thus the PC effort. Moreover, it was

concluded that the lack of standardisation is especially important given the part-time nature of the job. This factor also resulted in a variability of performance among PCs that in turn makes PRBs as users still search for further information upon supplier selection, resulting in double work. Secondly, another major conclusion from this thesis is that the lack of communication channels and direct lines of communication between the PC and its key stakeholders is negatively affecting the performance. Furthermore, the extent to which communication takes place depends on the individuals' initiative. More specifically, the study found lack of connections between three clusters of individuals as shown in the analysis. The lack of connection between the PC and the package team is limiting the degree of participation and influence that the PC can have on the selection decision. Further, the low frequency of communication between the product coordinators and the Procurement Department to follow up PC work was suggested to be a cause of the product coordinators' low commitment. Lastly, individuals with expertise about the product are not formally aware of being a source of information to the product coordinators. In turn, building up the product knowledge for the product coordinator to achieve his or her tasks is not facilitated. Thirdly, another factor affecting the performance is the low formalisation and visibility of the PC role in the organisation. NTE and its project operations are characterised by a high degree of formalised roles with clear and recognised authorities that legitimise decision makers. In contrast, the PC is only to a limited extent included in a formal way in NTE's processes, reducing the awareness of the PC role in the organisation. Thus, its legitimacy is not as strong in comparison to other roles in the organisation. Consequently, the potential participation and influence of the product coordinator on the Package team and in relation to those with whom he or she needs to collaborate to perform the job is low.

Regarding the external factors, the authors have identified that the configuration of the organisation and cross-functionality used in its operations affect the PC implementation. NTE stakeholders outside the Procurement Department with possible interests in Product Coordination are currently little involved in the PC initiative, i.e. Corporate and Engineering Department. The interviews suggest that neither have these been directly introduced to the PC role and what it entails. On the one hand, the importance of meeting technical requirements and the high status that Engineering enjoys in the organisation has led to an overall agreement of the benefits of actively involving the Engineering Department in Product Coordination. Taking this step is not easy since the initiative is until now driven by Procurement. Nevertheless, the positive perception that interviewed engineering representatives showed about PC could be a good sign that management should draw upon. On the other hand, the empirical findings suggest that higher levels of management need to be involved and support the PC implementation. Particularly, a higher involvement of the corporate level in Product Coordination was observed as necessary to drive the initiative from the top of the organisation. The lack of management support in turn

is not providing the needed formality and legitimacy needed to make the role fit in the entire NaroTech.

What actions are needed in order to improve the implementation of Product Coordination and institutionalise the PC role in the organisation?

To begin with, the active involvement of Engineering in Product Coordination is not only vital for securing technical acceptance but also for increasing the influence as well as the perception of the PC role within NTE. In order to do so, the findings from the interviews and questionnaire suggest that organising Product Coordination in a team format, together with engineering, would enable the PC role to better meet its goals. Nevertheless, the usage of such team should be limited to those products where the best decisions are only yielded by a team and the benefits outweigh the costs of using such structure. For the rest of the products the technical support should be provided as it is currently done. Yet, the engineering representative should be formally designated and aware of its responsibility within Product Coordination.

The legitimacy of the PC role can be achieved by formalising its participation and authority in the organisation. Taking the benchmarking case as inspiration, formality can be enhanced by aligning and directly linking Product Coordination with NaroTech's purchasing strategy. All stakeholders should perceive the PC as an adapted solution of the category managers to the specific context of NTE, which also contributes to NaroTech's supply objectives. This linkage can be achieved by developing the supplier strategy of the product between the PC team, the relevant Category Manager and/or KSM and NTE's Procurement Department Manager. In this way, synergies will be exploited on, the importance of the PC mission is formally recognised, and the commitment of the PC members is fostered. Furthermore, authority can be provided, as it is now, by formalising the PC team's approval as a prerequisite for approving the final long list of suppliers. Lastly, formal participation can be secured by incorporating points of contact between the PC team and the package team into the Procurement Milestone Schedule of the projects.

In order to enhance the connection between the PC team and its key stakeholders it is necessary to create dedicated communication channels between these. To achieve this, it is important to define when, for what purpose and how frequent communication should take place between the PC team and with those external to the team. Further, meetings can be allocated to formalise such necessary communications. In this way, direct lines of communication arise, which will enhance the information flow and ensure participation of the PC team in decision-making activities such as supplier selection.

Lastly, standardisation of outputs and deliverables related to Product Coordination is pivotal to enhance the clarity about the PC tasks and meet its objectives. Agreeing upon and standardising the information that all PC teams should manage and provide about their products will increase the quality of the output. Further, it will facilitate the routine execution of the work, which is valuable considering the part-time nature of the job. Yet,

the supply situation of every product differs and should be taken into account. A change proposed in this regard is the introduction of a process for setting the goals and objectives for every product, which is determined between the individual PC teams and the management team. This in turn facilitates the follow up of the team's progress, the evaluation of its performance and ultimately facilitates the team's commitment.

8. RECOMMENDATIONS

Based on the findings in the present Master's thesis, NTE'S Procurement management is recommended to:

Change the current organisational arrangement from a product coordinator to a Product Coordination (PC) team. The PC team will be composed by two members/counterparts. Those members will be one from the Procurement and one from the Engineering Department respectively; namely Product Coordinator Buyer (PCB) and Product Coordinator Engineer (PCE).

The Product Coordination concept, i.e. the centralised product knowledge, should be realised through a PC team. The PC team format will be applied for those products of strategic importance for NTE. These could be priority one and priority two products. Incorporating product technical knowledge into the concept of Product Coordination will secure technical acceptance and increase the influence as well as the perception of the PC team role within NTE. In order to achieve that, the Product Coordination's purpose and mission as well as the benefits that will be generated for NTE, should be properly and clearly communicated to the Engineering Department. The engagement of the specific department's personnel is of significance concerning Product Coordination mission's success. The Engineering Department should be convinced about the Product Coordination concept's necessity in order for it to allocate human resources to the PC team as PCEs.

Communicate Product Coordination's mission and benefits generated for NTE as well as for the entire NaroTech to the corporate level.

Product Coordination's institutionalisation and legitimacy will be realised if the PC concept's goals are aligned with the corporate purchasing strategy. The PC team is the entity through which the two aforementioned levels can be aligned. This team can become the point of contact between NTE's tactical and operational level to the strategic level of NaroTech's. Since NaroTech's higher level management is not completely aware of the PC concept's mission and benefits, proper communication will definitely contribute to the concept's and its high potentials' recognition. This type of recognition will add legitimacy and formalisation to the PC team's role, which in turn will affect the team's performance as well as the way that the PC concept is perceived by the rest of NTE's organisation.

Let the PC teams define their goals and objectives, based on which they will be evaluated as a unit.

Each product has its own characteristics, both commercially (or market-wise) as well as technically. Therefore, it is recommended that the PC team in cooperation with NTE's Procurement Management establish tailor-made goals and objectives upon supplier strategies and performance for the corresponding product. It is anticipated that involving the PC team members into their own performance evaluation process will further enhance

the level of engagement and motivation while a clear understanding concerning the team's purpose and deliverables will be achieved.

Set the draft of supplier's long list, as a mean of evaluating the PC team's performance in terms of quality of information (output).

The draft of supplier's long list will be the main output of PC teams to the projects, as discussed above in section 6.4.1. Using the specific draft as a measure of the PC team's performance (as presented in section 6.4.1), it is believed that motivation could be further enhanced. This is because the team's members will feel that their output is actually influencing the progress of a process; namely, best in-class supplier selection. This way of performance evaluation in combination with the goal-settings described above will result in the establishment of a more compressive and holistic evaluation system.

Enhance Product Coordination's legitimacy and recognition through further authority and formality.

The fact that the PC team will form the supplier strategy, with or without the Category Manager's input (see section 6.4.1), as well as the fact that the final long list of suppliers should be mandatorily signed by both PC team's members, guarantees the PC team's involvement in the decision making process. This in turn enhances the PC teams' authority as well as provides formality to the PC notion. In addition, making the PC team the point of contact between NTE and the Corporate Procurement level further enhances its formalisation. Lastly, following up the PC team's performance progress through fixed meetings as well as including the PC team's "contact activity" in the Project Procurement Manager's Milestone Schedule, add further formality and visibility to the PC team.

Create dedicated IT system-supported communication channels internally as well as externally to the PC team.

Establish the necessary communication channels in the form of pre-planned meetings. The first external channels are based on meetings with the relevant Category Manager and NTE's Procurement Manager on an annual basis in order to define the supplier product strategy as well as evaluate the suppliers' performance. In case of absence of a Category Manager, the team itself will be responsible to define the supplier base strategy, taking also into consideration input from the corporate level through the NTE's Procurement Manager. Furthermore, the PC and the Package team communication should officially take place at least in two meetings; one before the start of the project and one after the closing of the package. Meetings between the PC teams and NTE's Procurement Manager should also be established, in order to follow up the PC team's progress and performance. Finally, internal communication and close collaboration within the PC team should be secured through setting fixed meetings once or twice a month between the PCB and PCE.

Deploy standardisation in elements where is possible.

Initially, the deployment of standardisation will contribute to make the PC team's tasks as well as the type of information required clear. This in turn will reduce the time invested for those tasks. This time-savings will be achieved through the anticipated elimination of the current time invested on performing PC tasks based on the Product Coordinators speculations on what information is of importance for the relevant stakeholders. Therefore, round-table meetings among all relevant stakeholders to the PC team are recommended to take place. Through bringing together all stakeholders an agreement will be achieved upon the information that the PC team is required to acquire concerning product's market and suppliers' knowledge. The standardisation of information will also lead to the standardisation of the templates through which the information is exchanged. In addition, as also expressed above, it is recommended that the frequency as well as the agenda of the meetings between the relevant stakeholders be standardised. Concerning Product Coordination team's tasks time allocation, it is recommended a standardised fixed amount of time to be invested on a weekly basis. This fixed time should be agreed with the Project Procurement Manager every month.

Describe the role of the Product Coordination team

Based on Roylance's (2008) guidelines a suggestion of PC team role's discription is presented below.

Job title	Product Coordination Team Composed by two members: <ul style="list-style-type: none">• Product Coordinator Buyer• Product Coordinator Engineer
Location	Belongs to NTE's base organisation
Reporting line	The team reports to NTE's Procurement Department's Manager, by whom also its performance is monitored and evaluated.
Primary purpose	The team to be the centre of product's market knowledge and be able to actively contribute to projects through the building of a valuable draft of suppliers' long-list as well as through its product competence and knowledge.
Key responsibilities	<ul style="list-style-type: none">• Develop the supplier base strategy for the assigned product.• Contribute to the projects' purchasing function through the delivery of a comprehensive and of "high-value" long list draft.
Tasks	<ul style="list-style-type: none">• Scan the specific product's market in order to acquire and update information about the market situation, prices, fluctuations, forecasts, possible

	<p>acquisitions or merges that affect the market, etc.</p> <ul style="list-style-type: none"> • Searching the relevant supplier market, obtaining and updating information concerning suppliers' capacity, lead times, accuracy and other relevant strong and weak points that can contribute to risks identification. • Contact PRBs (the procurement PC) and PREs (the engineer PC) in order to receive references of suppliers' performance during previous projects within NTE • Search supplier's evaluation in the SBITS • Take into account the existing Vendor Performance Evaluations • Conduct together with the Category Manager and Procurement Department Manager, a supplier portfolio analysis based on supply risks and supplier's impact on financial results in order to define a supplier base strategy for the specific product • If the aforementioned analysis has concluded that the supplier portfolio needs expansion, the team should search for new appropriate suppliers. If the PC team decides that the new potential supplier(s) meet the relevant commercial as well as technical standards, then initiate the process of introducing the supplier in the SBITS. • Review and assess suppliers' performance annually on running projects within NTE • Based on the product's supply market knowledge to produce a draft of suppliers' long list, which will be used as a major input by the PRB during creation of the final long list.
Dimensions	<p>Two dimensions co-exist in the team; the commercial (represented by the procurement PC) and the technical (represented by the engineering PC). The parties need to cooperate in order for the suppliers included in the portfolio to meet both the aforementioned standards and specifications.</p>
Working arrangements	<p>The PC team's tasks will be carried out within the official weekly working hours. The weekly time allocation will be fixed and agreed with the Project Procurement Manager every month, depending on the expected project workload. An average time recommended is two hours.</p>
Decision making responsibilities	<ul style="list-style-type: none"> • The team (in conjunction with or without the Category Manager) will be responsible to decide the suppliers' portfolio size and content (supplier

	<p>base strategy).</p> <ul style="list-style-type: none"> • The team will be indirectly involved in the supplier selection decision process through the draft of suppliers' long list.
Individuals qualifications	<ul style="list-style-type: none"> • Both parts of the team, based on their experience, should have relevant product knowledge; technically as regards the engineering PC and commercially as regards the procurement PC • Both members should be proactive and willing to enhance their career opportunities.

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APPENDIX A – Template for semi-structured interviews

Template for semi-structured interviews to buyers of NTE Procurement Department

1. Can you please describe us a bit about your role in NTE?
2. Can you please describe us a bit about your role within the PC programme?
3. According to you, what is the PC programme and what does it entail?
4. What are the typical tasks that you do as a PC?
5. How do you organize your time/duties/tasks to compensate with both roles?
6. Have you ever been involved in a project providing input as a PC? If yes? Can you tell us, in which stage of the project phase?
7. From your point of view, what are the advantages of PC?
8. What are the disadvantages?
9. Can you pinpoint some potential aspects of the PC programme that could be improved?
10. What do you think are the factors affecting the PC initiative?
11. Do you believe that PC is important for NTE?
12. If yes; why and in what ways?
13. When is the best time for the buyers to do PC work?
14. Which are the key stakeholders affecting the work of the Product Coordinators?

Template for semi-structured interviews to NTE associates other than buyers

1. Can you please describe us a bit about your role in NTE?
2. When is procurement involved in the project?
3. When does the Procurement and Engineering department interact? How?
4. How early are suppliers involved in the project? In what ways are these involved?
5. According to you, what is the PC initiative and what does it entail?

If the interviewee did not know about PC, the concept was described briefly as follows:
The PC is an initiative in NTE's Procurement Department with the objectives of reducing administrative time and cost reduction, increasing supplier market knowledge and trends, maintaining supplier relations and finally, fostering organizational learning improvement.

6. From your point of view, what are the advantages of PC?
7. What are the disadvantages?
8. Can you pinpoint some potential aspects of the PC initiative that could be improved?
9. What do you think are the factors affecting the PC initiative?
10. Why do you think that the PC is important for NTE?

APPENDIX B – Template of survey to NTE’s buyers

Please, tell us what role you are currently executing and the priority of the products handled by you. (Mark the option(s) and priority level(s) that apply)

- Product Coordinator (PC)..... Product Priorities 1 2 3 4
- Product Specialist (PS)..... Product Priorities 1 2 3 4

1. A) On a scale from 1 to 5, to what degree will the PS positively contribute to the following benefits? (1 as very low, 2 low, 3 medium, 4 high, 5 very high contribution. Please circle your answers)

- | | | | | | |
|---|---|---|---|---|---|
| a. Avoiding double work | 1 | 2 | 3 | 4 | 5 |
| b. Managing supplier relationships during the project | 1 | 2 | 3 | 4 | 5 |
| c. Choosing the appropriate/best in class supplier
(for the Long List and further) | 1 | 2 | 3 | 4 | 5 |
| d. Providing information about supplier's areas of special attention (advantages and disadvantages of supplier) | 1 | 2 | 3 | 4 | 5 |
| e. Provide valuable supplier market knowledge | 1 | 2 | 3 | 4 | 5 |
| f. Expand the supplier base(introduce new suppliers) | 1 | 2 | 3 | 4 | 5 |
| g. Manage supplier relationships with strategic suppliers | 1 | 2 | 3 | 4 | 5 |
| h. Other..... | 1 | 2 | 3 | 4 | 5 |

B) Being aware that time-savings is indirectly included in some of the above benefits; as a separate benefit and on a similar scale from 1 to 5, to what degree will the PC positively contribute to time-savings for the project? 1 2 3 4 5

2. On a scale from 1 to 5, how clear is to you the difference between PC and PS? (1 as totally unclear, 2 unclear,3 medium clear, 4 clear, 5 entirely clear. Please circle your answers.)

- | | | | | | |
|-----------------------------|---|---|---|---|---|
| a. Overall | 1 | 2 | 3 | 4 | 5 |
| b. Purpose of each role | 1 | 2 | 3 | 4 | 5 |
| c. Tasks of each role | 1 | 2 | 3 | 4 | 5 |
| d. How to perform the tasks | 1 | 2 | 3 | 4 | 5 |
| e. Deliverables (output) | 1 | 2 | 3 | 4 | 5 |

3. A) Please rank, by circling your answers on a scale from 1 to 5, the degree of importance of the information that the PS should manage and provide (1 as very low, 2 low, 3 neutral, 4 important, 5 very important).

a. Type of products	1	2	3	4	5
b. Capacity of suppliers	1	2	3	4	5
c. Lead time of suppliers	1	2	3	4	5
d. Suppliers' accuracy	1	2	3	4	5
e. Material characteristics	1	2	3	4	5
f. Technical capability to meet engineering department's requirements	1	2	3	4	5

B) If any, what other information should be managed and provided by the PS? Please rank according to the level of importance used above.

a.	1	2	3	4	5
b.	1	2	3	4	5
c.	1	2	3	4	5

4. How much time do you currently invest on the PS's tasks on a weekly basis?

5. How much time do you think that it should be invested on PS's tasks on a weekly basis?.....

6. Should there be a fixed amount of time allocated for the PS's responsibilities?
Yes - No

7. When is the most appropriate time to perform PS's activities during a project?
.....

8. a) On a scale from 1 to 5, can you please rank the level of management's involvement towards the implementation of the Product Coordination's concept? (1 no involvement, 2 low involvement, 3 medium involvement, 4 adequate involvement, 5 high involvement)

	1	2	3	4	5
--	---	---	---	---	---

b) Regardless of the degree of involvement, what ways of involvement would you consider as necessary?
.....

9. Please rank the importance of the below possible outcomes, i.e. deliverables, of the PS's responsibilities? (1 as not important, 2 low importance, 3 medium importance, 4 important, 5 very important. Please circle your answer.)

a. Long List of suppliers	1	2	3	4	5
b. New suppliers	1	2	3	4	5
c. Presentation of the market situation	1	2	3	4	5
d. List of risks per supplier (strengths and weaknesses of a supplier)	1	2	3	4	5
e. List of risks per product	1	2	3	4	5
f. Other.....	1	2	3	4	5

10. On a scale from 1 to 5, in your opinion, how suitable is each of the below ways to structure the PS role in AET? (1 as highly unsuitable, 2 unsuitable, 3 neutral suitability, 4 suitable, 5 highly suitable. Please circle your answer)

a. Dual role where buyer executes both as PRB and PS(current state)	1	2	3	4	5
b. Dedicated position belonging to the Procurement Department (at the base organization)	1	2	3	4	5
c. All product knowledge should be built and managed by the PRB, hence no PS is needed	1	2	3	4	5
d. PS should have a counterpart from engineering and responsibility will hence be shared by both parties	1	2	3	4	5
e. Dedicated team composed by a member from procurement and from engineering (at the base organization)	1	2	3	4	5
f. Other.....	1	2	3	4	5

11. Who should the PS have direct contact with from the relevant engineering discipline and exchange information in order to effectively carry out the role? (please, choose only one option)

- a. Discipline lead
- b. Group lead
- c. PREs
- d. Other discipline engineers
- e. Other.....

12. From the options below, what metrics should the work of the PS be evaluated on?
 (More than one option can be chosen. Please circle your answer)

- a. New supplier entries
- b. Time saved by the PRB
- c. Number of suppliers in the bidders list
- d. Quality of information provided
- e. Number of international suppliers
- f. Other qualitative aspects.....
- g. Other quantitative aspects.....

13. On a scale from 1 to 5, please rank the below means of support that are necessary to execute the PS role appropriately. (1 as not at all necessary, 2 low necessity, 3 medium necessity, 4 necessary, 5 very necessary. Please circle your answers.)

a. Training	1	2	3	4	5
b. Kick-off meeting	1	2	3	4	5
c. Continuous progress meeting/evaluation	1	2	3	4	5
d. IT support through dedicated systems to retain the knowledge	1	2	3	4	5
e. Standardized template(s)	1	2	3	4	5
f. Dedicated communication channels among the relevant stakeholders	1	2	3	4	5
g. Other.....	1	2	3	4	5

14. If additional training is needed, what type of skills do you consider necessary to acquire?

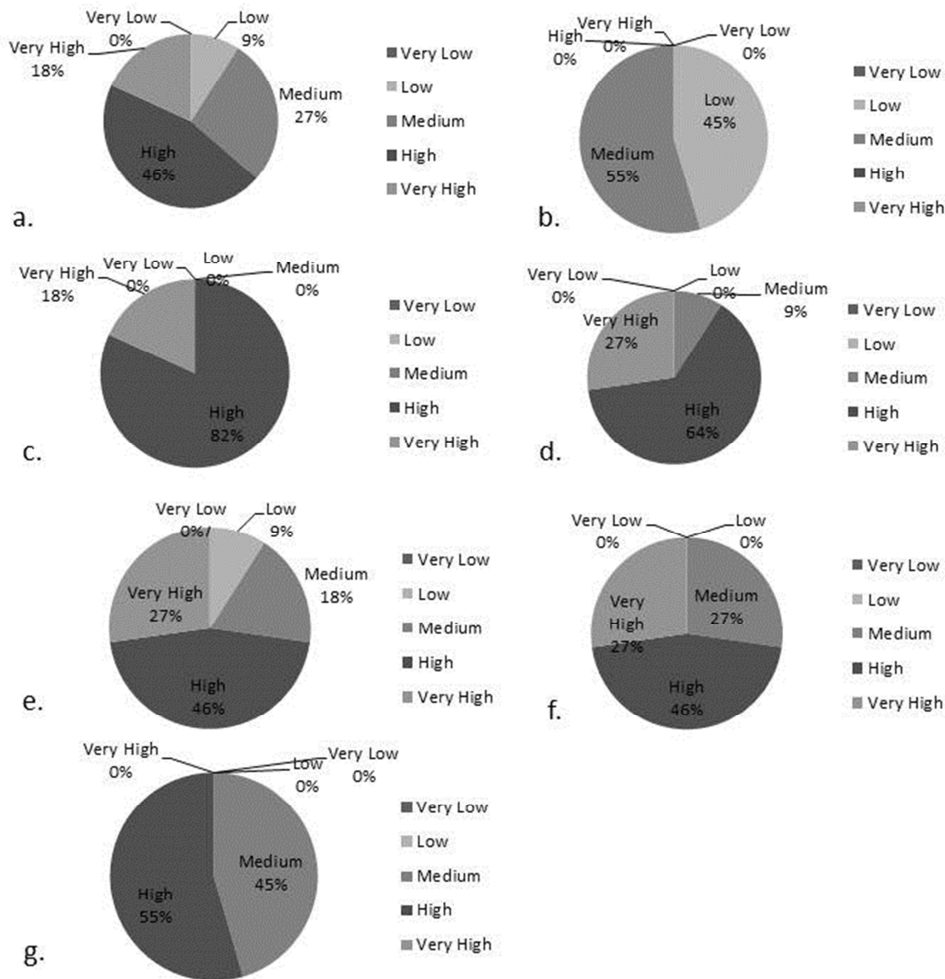
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15. Further comments concerning the Product Coordination concept and role's improvement:

.....

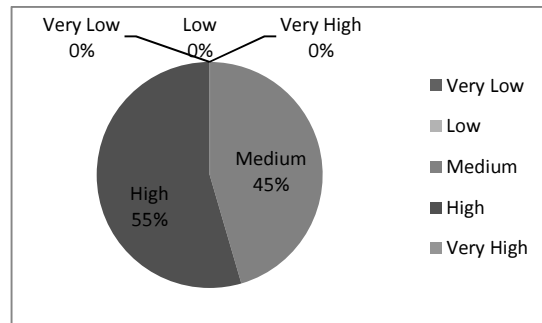
APPENDIX C – Survey’s results

1. A) On a scale from 1 to 5, to what degree will the PS positively contribute to the following benefits? (1 as very low, 2 low, 3 medium, 4 high, 5 very high contribution. Please circle your answers)

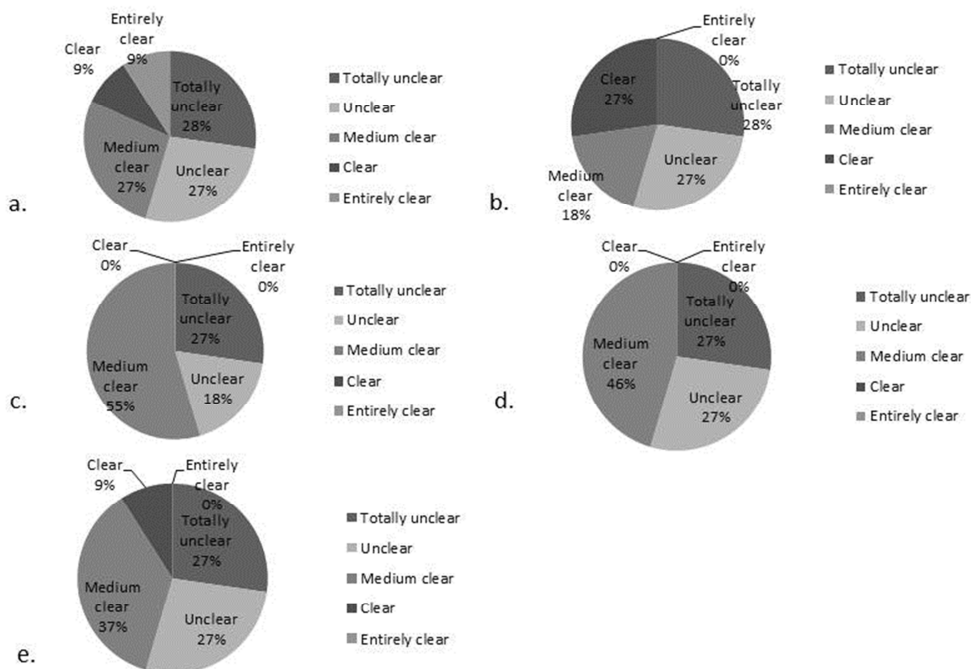


- Avoiding double work
- Managing supplier relationships during the project
- Choosing the appropriate/best in class supplier (for the Long List and further)
- Providing information about supplier's areas of special attention (advantages and disadvantages of supplier)
- Provide valuable supplier market knowledge
- Expand the supplier base(introduce new suppliers)
- Manage supplier relationships with strategic suppliers

B) Being aware that time-savings is indirectly included in some of the above benefits; as a separate benefit and on a similar scale from 1 to 5, to what degree will the PC positively contribute to time-savings for the project?

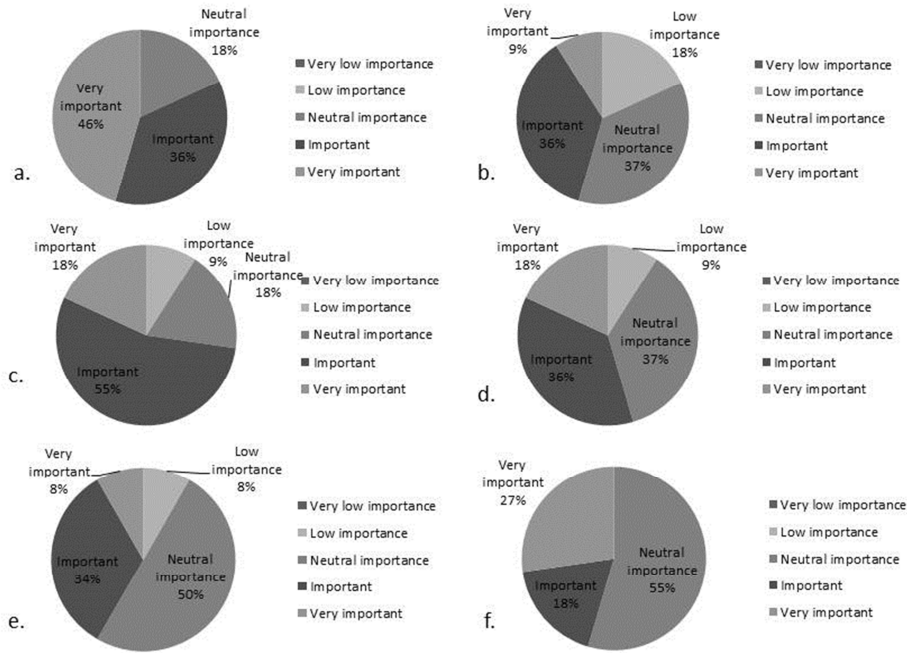


2. On a scale from 1 to 5, how clear is to you the difference between PC and PS? (1 as totally unclear, 2 unclear, 3 medium clear, 4 clear, 5 entirely clear. Please circle your answers.)

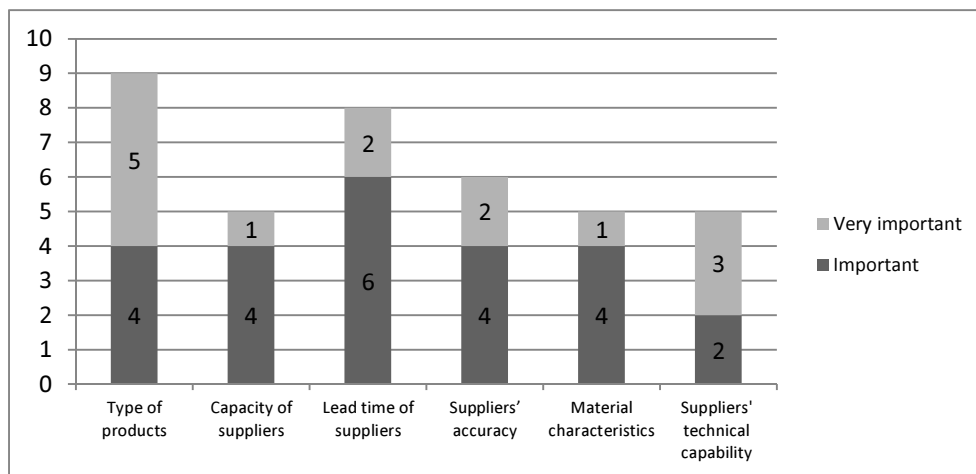


- a. Overall
- b. Purpose of each role
- c. Tasks of each role
- d. How to perform the tasks
- e. Deliverables (output)

3. A) Please rank, by circling your answers on a scale from 1 to 5, the degree of importance of the information that the PS should manage and provide (1 as very low, 2 low, 3 neutral, 4 important, 5 very important).



- a. Type of products
- b. Capacity of suppliers
- c. Lead time of suppliers
- d. Suppliers' accuracy
- e. Material characteristics
- f. Technical capability to meet engineering department's requirements



The number of people that answered as “important” and “very important” upon each type of information.

B) If any, what other information should be managed and provided by the PS? Please rank according to the level of importance used above.

- Market Knowledge
- Project Knowledge - references to relevant projects
- Vendor Performance Evaluation
- Long-term information, e.g. References
- Quality and HSE management systems
- Suppliers' flexibility to changes
- References to relevant PRE/PRBs

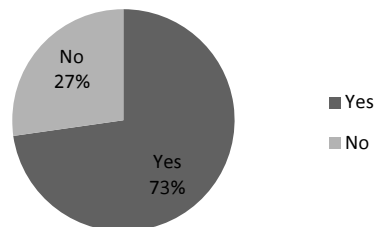
4. How much time do you currently invest on the PS's tasks on a weekly basis?

Average: 1,1 hours

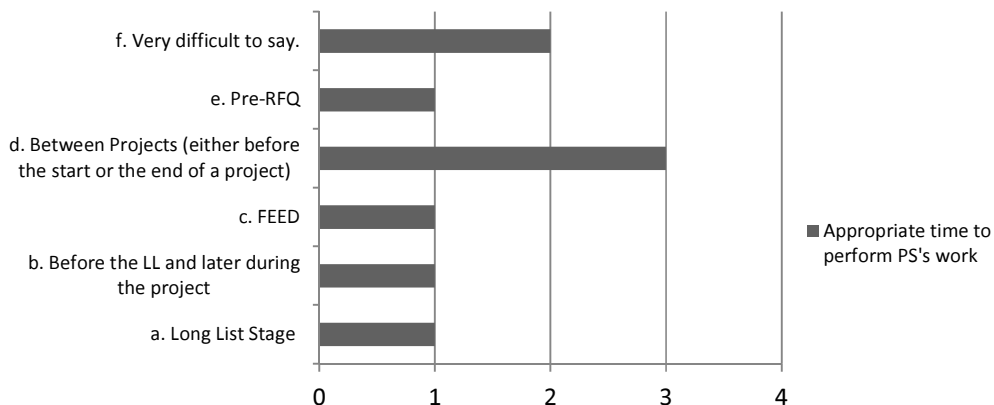
5. How much time do you think that it should be invested on PS's tasks on a weekly basis?

Average: 1,9 hours

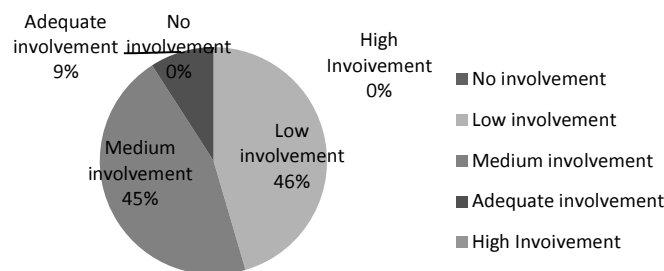
6. Should there be a fixed amount of time allocated for the PS's responsibilities?



7. When is the most appropriate time to perform PS's activities during a project?



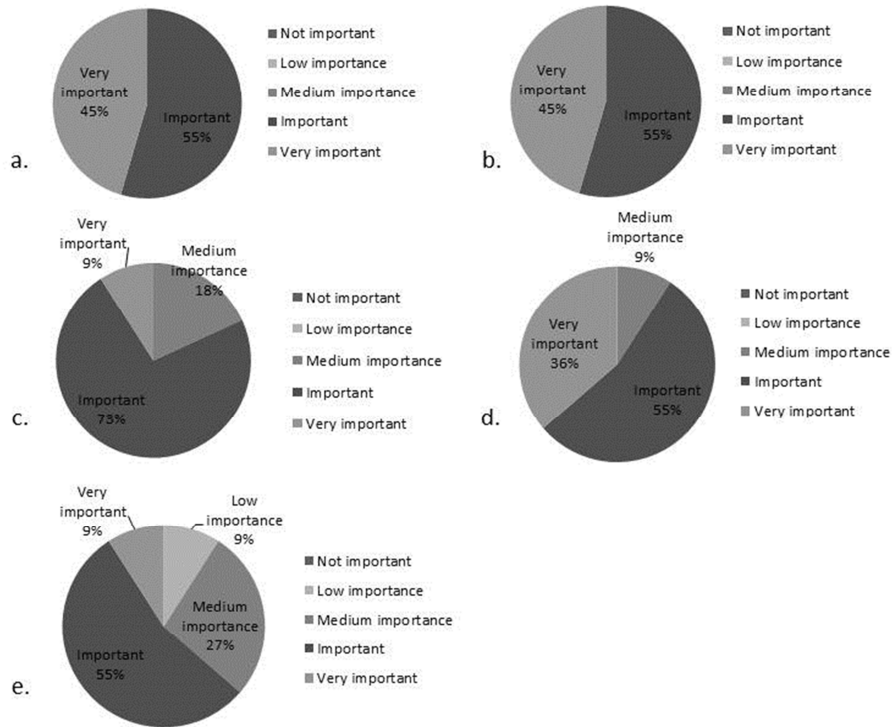
8. A) On a scale from 1 to 5, can you please rank the level of management's involvement towards the implementation of the Product Coordination's concept? (1 no involvement, 2 low involvement, 3 medium involvement, 4 adequate involvement, 5 high involvement)



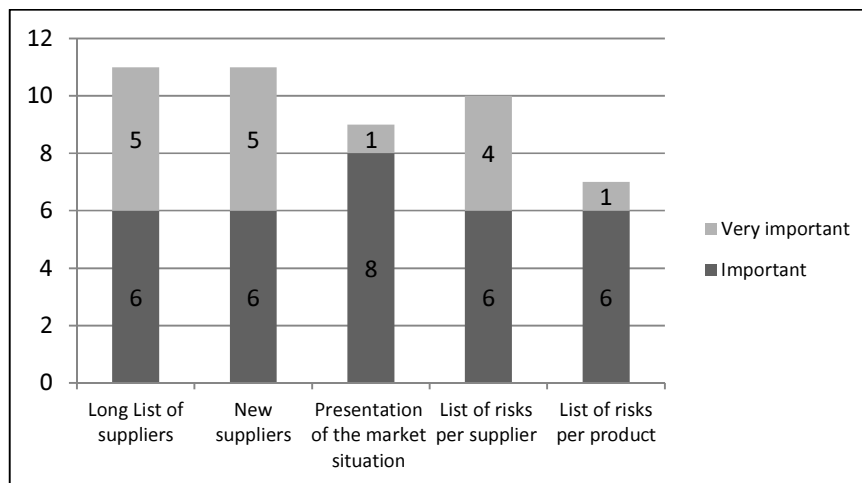
B) Regardless of the degree of involvement, what ways of involvement would you consider as necessary?

- More direction, more work examples, more teamwork.
- Allocation of time for PC tasks, i.e. accepting reduced capacity for the project. Follow up of PS activities in a monthly basis.
- Clear description of expectations as different products have different characteristics. Promote higher involvement from/with engineering.
- Clear tasks communicated through meetings; focus on how to improve the results. The tasks still unclear to the person and make it difficult to allocate time when there is almost no follow up in terms of meetings.
- Share the experience with a supplier on other projects
- Management should define clear tasks and deadlines for the tasks for all PCs. Keeping in mind the individual's previous experience and inclination with packages before deciding the PC will help to bring in clarity about the roles assigned as well.
- Clarity in required output, following up of deliverables, formalize a specific time that should be invested for PC/PS.

9. Please rank the importance of the below possible outcomes, i.e. deliverables, of the PS's responsibilities? (1 as not important, 2 low importance, 3 medium importance, 4 important, 5 very important. Please circle your answer.)

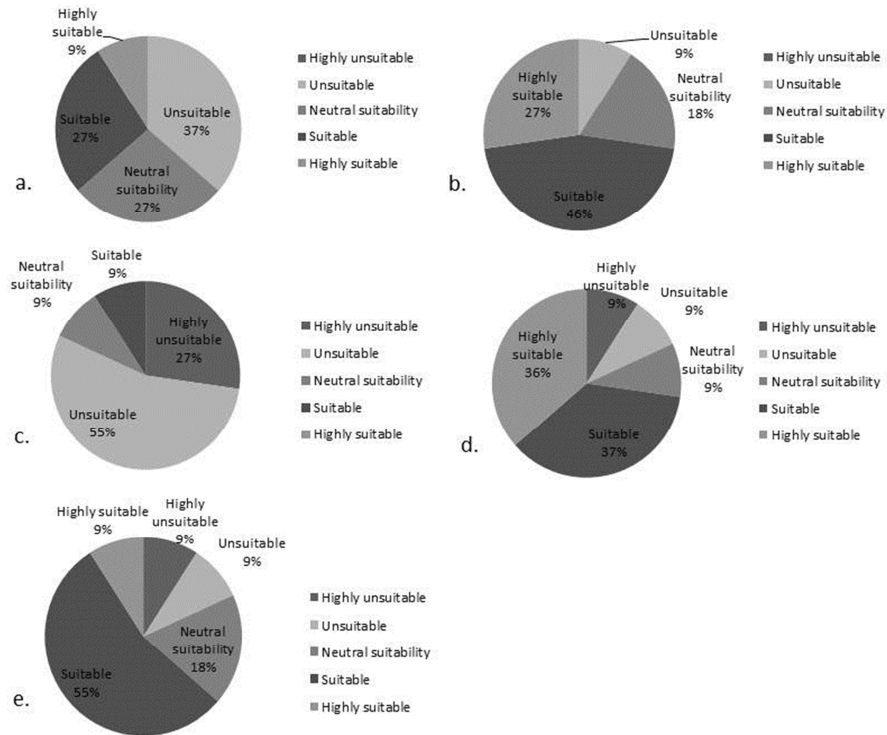


- a. Long List of suppliers
- b. New suppliers
- c. Presentation of the market situation
- d. List of risks per supplier(strengths and weaknesses of a supplier)
- e. List of risks per product



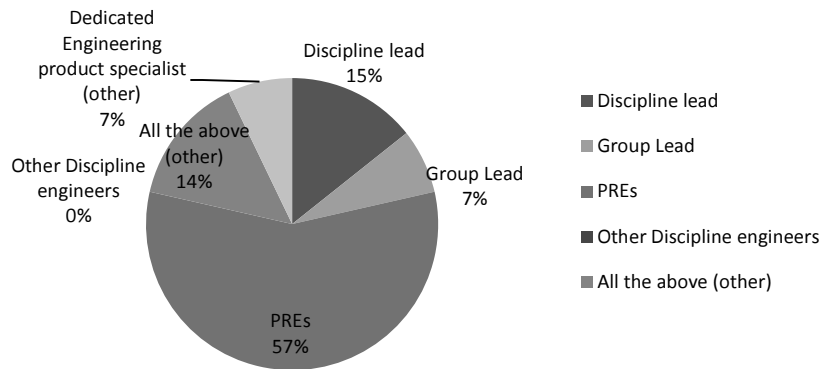
The number of people that answered as “important” and “very important” upon each outcome

10. On a scale from 1 to 5, in your opinion, how suitable is each of the below ways to structure the PS role in AET? (1 as highly unsuitable, 2 unsuitable, 3 neutral suitability, 4 suitable, 5 highly suitable. Please circle your answer)

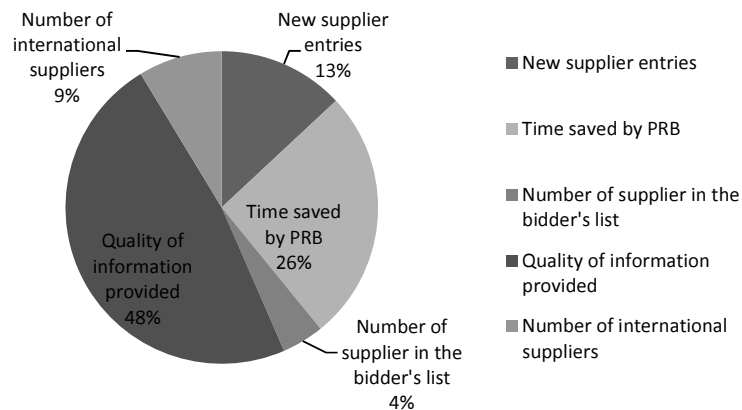


- a. Dual role where buyer executes both as PRB and PS (current state)
- b. Dedicated position belonging to the Procurement Department
- c. (at the base organization)
- d. All product knowledge should be built and managed by the PRB, hence no PS is needed.
- e. PS should have a counterpart from engineering and responsibility will hence be shared by both parties
- f. Dedicated team composed by a member from procurement and from engineering (at the base organization)

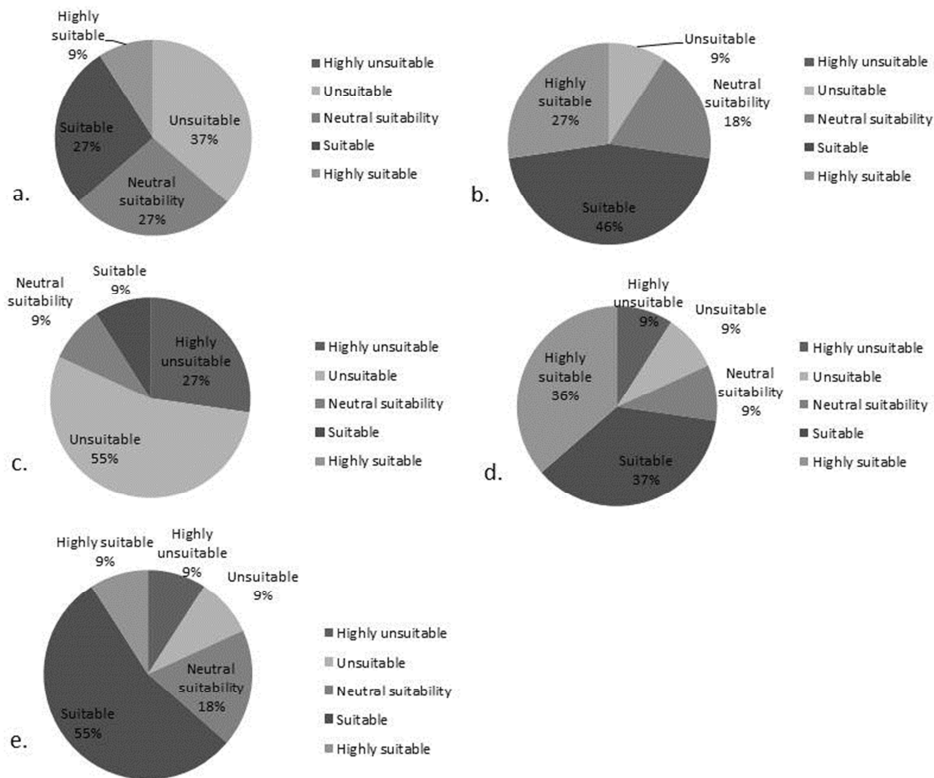
11. Who should the PS have direct contact with from the relevant engineering discipline and exchange information in order to effectively carry out the role? (please, choose only one option)



12. From the options below, what metrics should the work of the PS be evaluated on? (More than one option can be chosen. Please circle your answer)



13. On a scale from 1 to 5, please rank the below means of support that are necessary to execute the PS role appropriately. (1 as not at all necessary, 2 low necessity, 3 medium necessity, 4 necessary, 5 very necessary. Please circle your answers.)



- Training
- Kick-off meeting
- Continuous progress meeting/evaluation
- IT support through dedicated systems to retain the knowledge
- Standardized template(s)
- Dedicated communication channels among the relevant stakeholders

14. If additional training is needed, what type of skills do you consider necessary to acquire?

- Evaluation of methods, templates, technical acceptance of products.
- Seminars to share experience.
- Basic understanding of the product (typically by PREs) and introduction tools that might help on collecting and structuring the information/knowledge.
- What to focus on, where to find the info, how to understand the tasks.
- Training on the specific position and required outputs
- Basic engineering and process training for supply chain

15. Further comments concerning the Product Coordination concept and role's improvement:

- Engagement by the PRBs
- Clear instructions

- Cooperation and shared goals between Procurement and Engineering Department
- Follow up meetings
- Provide a platform for the PC/PS to kick-start