

Master's Programme in Advanced Energy Solutions: Sustainable Energy in Buildings and the Built Environment

Roadmap for the Development of a Procurement Strategy in a Construction Company

Daniela Schenk

Master's Thesis
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Author	Daniela Schenk	
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Thesis supervisor	Prof. Antti Peltokorpi	
Thesis advisor(s)	Vili Eilavaara, MSc	
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Abstract

Over the last decades, the strategic role of purchasing and its contribution to company success has gained increased attention. Although purchasing and supply management research has suggested frameworks for strategic development of the purchasing function, little work has focused on developing purchasing strategies for project-based industries such as the construction industry.

The purpose of this research was to design a roadmap for the development of purchasing operations within the construction industry from the perspective of general contractors. This study employed the design science research methodology, comprising an initial diagnosis of general contractors' purchasing operations as well as the design, testing, and evaluation of the proposed roadmap within a case company. The roadmap was developed based on an initial diagnosis, consisting of a review of the purchasing literature, a questionnaire administered to purchasing professionals from general contractors, and 10 semi-structured interviews with purchasing staff from the case company as well as one with an external interviewee.

The results indicated that the successful development of purchasing strategies in construction companies could be facilitated by following a structured process, such as that proposed in the roadmap developed in this study. Furthermore, the purchasing strategy development and implementation processes should be supported by change management initiatives and continuous leadership involvement. The study also revealed 15 topics relevant to the development of purchasing strategies for general contractors, including *supplier management*, *spend and market analyses*, and *sourcing strategies*. Moreover, the research highlighted the impacts of project delivery methods on purchasing strategies for general contractors, depending on the level of developer/customer involvement.

Based on the evaluation by the case company, the proposed roadmap is regarded as a valuable tool for general contractors in developing purchasing strategies. However, further research should be conducted into the applicability of the proposed roadmap for other construction companies.

Keywords purchasing, strategy development, general contractor, construction industry, procurement

Tekijä Daniela Schenk
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Tiivistelmä

Viimeisten vuosikymmenten aikana hankinnan strateginen rooli yritystoiminnan menestyksen keskiössä on saanut osakseen kasvavaa huomiota. Hankintaa ja toimittajien hallintaa koskevassa tutkimuksessa on ehdotettu hankintatoimen strategiselle kehittämiselle erilaisia viitekehyksiä, kuten kypsyyksille ja kategoriajohtamista. Tutkimusta hankintastrategian kehittämisestä projektikeskeisillä aloilla, kuten rakennusalalla, on kuitenkin vain rajallinen määrä.

Tämän tutkimuksen tarkoitus oli luoda tiekartta rakennusliikkeen hankintastrategian kehittämiseen. Tutkimus toteutettiin suunnittelututkimuksena, jossa tehtiin diagnoosi pääurakoitsijoiden hankintatoimesta sekä luotiin, kehitettiin, ja arvioitiin hankintastrategian kehittämisen tiekartta kohdeyrityksen avulla. Tiekartta kehitettiin diagnoosin perusteella, joka koostui kirjallisuuskatsauksesta, pääurakoitsijoiden hankintahenkilöstölle suunnatusta kyselystä sekä kymmenestä teema-haastattelusta kohdeyrityksessä ja yhdestä ulkopuolisesta teema-haastattelusta.

Tulokset näyttivät, että pääurakoitsijoiden hankintastrategioita voidaan onnistuneesti kehittää jäsenneilyn prosessin, kuten tässä diplomityössä kehitetyn tiekartan, avulla. Tutkimuksessa havaittiin, että hankintastrategian kehityksen ja jalkautuksen prosesseja kannattaisi tukea muutoksen hallinnalla sekä johdon jatkuvalla osallistumisella. Lisäksi tunnistettiin 15 keskeistä aihetta, jotka erityisesti tulisi ottaa huomioon rakennusliikkeiden hankintastrategian kehityksessä. Näistä muutamina esimerkkeinä ovat toimittajien hallinta, kulu- ja markkina-analyysi sekä sourcing -strategia. Tutkimuksessa nousivat esille myös projektin toteutusmuotojen vaikutukset hankintastrategiaan, ja vaikutusten riippuvuus siitä, kuinka isossa roolissa kehittäjät ja asiakkaat ovat päätöksenteossa.

Kohdeyrityksen arvioinnin perusteella kehitettyä tiekarttaa voidaan pitää hyödyllisenä pääurakoitsijoiden hankintastrategian kehittämisessä. Lisätutkimus ehdotetun tiekartan soveltuvuudesta muihin rakennusliikkeisiin on kuitenkin tarpeen.

Avainsanat Hankinta, strategian kehittäminen, pääurakoitsija, rakennusala

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Daniela Schenk

Daniela Schenk

Abbreviations

CMR	Construction Management at Risk
CPO	Chief Purchasing Officer
DEA	Data Envelopment Analysis
HVAC	Heating, Ventilation and Air Conditioning
KPI	Key Performance Indicator
MSU	Michigan State University
RFMP	Recency, Frequency, Monetary Value, and Project Count
RFQ	Request for Quote

1 Introduction

1.1 Background and Motivation

The importance of well-designed purchasing strategies has long been recognised as a key factor contributing to the overall success of a company (Carr & Pearson, 1999). The same applies to general contractors, with up to 90% of their turnovers being spent on purchasing (Bemelmans et al., 2013; van Lith et al., 2015). Consequently, the development and implementation of strategically aligned purchasing operations in the construction sector has received a growing amount of attention in recent years (Ellegaard et al., 2010). However, much of this research has focused on purchasing practices surrounding the client – contractor relationship and there is a notable lack of research on the strategic development of the purchasing operations of both general contractors and other actors at the lower levels of the supply chain. Nevertheless, construction companies have recognised the importance of purchasing, some even incorporating purchasing into their core strategies:

“Purchasing operations are a fundamental part of our strategic work to raise profitability at NCC. Placing this function immediately under the ... Executive Management Team will further increase focus on this key area” - (NCC AB, 2018)

“Skanska continuously improves productivity and cost-effectiveness through increased utilization of standardized components, industrialized production and coordinated purchasing” - (Skanska., 2012)

However, the construction industry is characterised by unique products, temporary project organisations, and low trust between organisations (Ballard & Elfving, 2020). As a result, the sophistication of purchasing operations in the construction sector has typically lagged behind other industries such as manufacturing, where the nature of demand is more predictable.

Moreover, productivity in the construction sector has been exceedingly slow to increase; for example, in Finland productivity has only increased by around 6% since 1976, while manufacturing has seen an increase of around 75% in the same time frame (Statistics Finland, 2021). Furthermore, it has been recognised that a lack of integration in the sector, high fragmentation, adversarial relationships, and low trust all have a negative impact on the productivity of the industry as a whole (Bresnen & Marshall, 2000; Egan, 1998; Voordijk et al., 2000). Therefore, a strong focus has been placed on the role of purchasing as the interface between contractor and supplier. It has been suggested by Gadde & Dubois (2010) that purchasing has the potential to facilitate the development of long-term partnerships between contractors and suppliers, thus fostering an environment where collaboration, continuous improvement, and knowledge-transfer can grow. This emphasises the importance of a well-designed purchasing strategy, as it could potentially affect the productivity of the entire construction sector.

A number of studies have attempted to apply purchasing maturity frameworks to construction companies by outlining areas for improvement as companies strive to achieve integrated supplier management (Bemelmans et al., 2013; Meng et al., 2011; van Lith et al., 2015). While these maturity models can provide valuable strategic insight into approaches for developing the purchasing operations of general contractors, they neglect to consider the broader context of future market trends and the strategic goals of the company that should both be taken into consideration when developing a long-term strategy for purchasing operations. Consequently, a purchasing strategy development framework is required that reflects the unique position and opportunities of a given company.

1.2 Research Objectives and Questions

The main purpose of this thesis is to design a roadmap for the development of a purchasing strategy from the perspective of a general contractor (also referred to as *construction company*). The roadmap aims to provide general contractors with a framework for strategic considerations that will allow them to strengthen their market position, improve their bottom lines, and positively affect the productivity of their projects. While the roadmap will be developed in collaboration with a case company, the framework can serve as a starting point for other companies in the construction industry to develop their purchasing strategies, thus strengthening knowledge sharing in the industry.

To achieve the objectives of this research a primary research question has been formulated:

Main research question: *How can a general contractor develop its procurement strategy in alignment with the strategic goals of the company?*

Additionally, three sub-questions have been posed in support of the main research question:

RQ1: *How are purchasing operations currently being developed by general contractors and what are the best practices and lessons learned?*

RQ2: *What factors should be taken into consideration in the development of a purchasing strategy of a general contractor?*

RQ3: *How can a general contractor account for these factors in its purchasing strategy?*

The first sub-question will provide insight into the current state of general contractors' purchasing operations in the construction industry. This will provide context for the assessment of the present purchasing operations of the case company and help to identify a starting point for the roadmap. The second sub-question will elaborate on the factors that should be taken into consideration in developing a

purchasing strategy for general contractors. In this context, *factors* refer to topics relevant to purchasing in construction companies, such as the digitalisation of purchasing operations, internal organisation of purchasing departments (centralised vs. decentralised) or partnering with strategic suppliers. Additionally, wider, contextual factors are also included in the scope of this question, such as industry characteristics, the unique position of the construction company, and corporate strategy. Finally, the third sub-question will define an approach for implementing these factors, leading to the purchasing strategy development roadmap.

1.3 Research Scope

The scope of this thesis will be limited to the perspective of general contractors. The client-contractor relationships and subcontractor views will remain beyond the scope of this study. Furthermore, the thesis only examines purchasing strategies pertaining to production-related procurements. Consequently, the procurement of designers and other internal purchases, such as equipment and travel, fall outside the scope of this research. Additionally, the resulting roadmap will be the product of one iterative cycle of the design science research method. However, refinement and further development of the roadmap is beyond the scope of this thesis.

1.4 Research Methods

The research approach adopted in this thesis follows the principles of the design science research paradigm, which facilitates the pragmatic development of the purchasing strategy roadmap in close collaboration with practitioners. According to Lukka (2003), design science research produces scientific knowledge through the development of innovative constructions or artefacts, intended to solve practical, real-world problems. In addition to the creation of scientific knowledge, the proven utility and practical relevance of the designed artefacts are central to design science research, (Hevner et al., 2004; Kuechler & Vaishnavi, 2008; Lukka, 2003; van Aken, 2004; Voordijk, 2009). The process of knowledge creation in design science research involves iterative cycling of designing, testing, and evaluating (Kuechler & Vaishnavi, 2008). The research method and design are described in more detail in Chapter 4.

1.5 Thesis Structure

The rest of this thesis is organised as follows. **Chapter 2** reviews the literature on general purchasing practices, while **Chapter 3** reviews the literature on purchasing in the construction industry. **Chapter 4** outlines the research design of this thesis. **Chapter 5** discusses the empirical results of the problem diagnosis and presents the proposed strategy development roadmap. **Chapter 6** verifies and tests the proposed roadmap. Finally, **Chapter 7** evaluates the outcomes of the research, discusses the limitations of the study, and suggests further work.

2 Purchasing: Principles and Strategies

This chapter presents an overview of the literature on purchasing and purchasing strategies in general. An understanding of the purchasing function, its role within company strategy, and existing frameworks and practices is necessary to facilitate a deeper understanding of procurement in the construction industry. This, in turn, is an important prerequisite for the development of suitable procurement strategies for general contractors within the construction industry.

The chapter is organised as follows. Section 2.1 defines the terms and concepts central to the understanding of purchasing and purchasing strategy development. The strategic significance of procurement is outlined in Section 2.2. Section 2.3 examines purchasing strategies and their development. Finally, Section 2.4 presents frameworks and tools central to the development of strategic purchasing.

2.1 Purchasing Concepts

In order to study purchasing and the development of purchasing strategies, it is first necessary to gain an understanding of the key terms and concepts within the field. Based on this fundamental understanding, purchasing in the construction industry can be examined within the wider context of purchasing practices and strategical development. The literature highlights that no universally accepted definitions have been established for many of the concepts in purchasing and supply management. Therefore, this section defines the terms as they are applied in this research and seeks to provide clarity and transparency.

Purchasing and Supply Management

Purchasing and supply management are two terms that are often stated in connection with one another. Indeed, a large body of literature refers to itself as purchasing and supply management, or PSM. Nevertheless, these two terms are not the same.

Despite recognising the strategic significance of the purchasing function, few authors have sought to define the term purchasing itself within the literature. However, purchasing has been defined, for example by Monczka et al. (2015), as both a functional group and a functional activity. Their definition outlines purchasing in terms of essential factors that it must cover, namely “*getting the right quality, in the right quantity, at the right time, for the right price, from the right source*” (Monczka et al., 2015). On the other hand, a broader definition of purchasing that is not limited to a certain set of factors was developed by Van Weele (2010):

“Purchasing is the management of the company’s external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company’s primary and support activities is secured at the most favourable conditions”

Some authors make no distinction between the terms purchasing and procurement and suggest that these can be used interchangeably (Monczka et al., 2015), while others differentiate between the two terms. For example, Van Weele (2010) states that purchasing is related to the management of external resources of a firm, while procurement refers to all of the activities involved in the transfer of the product from the supplier to its final destination. According to Van Weele (2010), this allows for a total cost of ownership perspective and is often used in connection with project environments. In this research, the terms *purchasing*, and *procurement* are used interchangeably and follow Van Weele's (2010) broader definition of the purchasing function.

In contrast to purchasing, it has been argued by Monczka et al. (2015) that supply management is more inclusive than purchasing and covers a wider range of activities. The Institute for Supply Management defines supply management as "*the identification, acquisition, access, positioning, and management of resources and related capabilities an organization needs or potentially needs in the attainment of its strategic objectives*" (Flynn et al., 2015).

Purchasing Strategy

The research field of purchasing strategy development has been recognised as fragmented, leading to various definitions of the concept for purchasing strategies (Hesping & Schiele, 2015; Nollet et al., 2005). Consequently, no universally accepted definition has been established for purchasing strategy in the literature, especially as these strategies can range from higher-level functional strategies to more operational strategies, such as those directed at managing individual suppliers (Hesping & Schiele, 2015). For example, González-Benito (2007) define purchasing strategy as a portfolio of competitive objectives rather than a group of operational practices implemented by the purchasing organisation. Similarly, Watts et al. (1992) define purchasing strategies with respect to competitive objectives, such as cost, quality, delivery, and flexibility. In contrast, Birou et al. (1998), for instance, define purchasing strategies as a collection of purchasing practices such as cost reduction, global sourcing, supplier development, and benchmarking; and Burke et al. (2007) define purchasing strategies as single versus multiple sourcing.

Nevertheless, based on extensive literature reviews, Nollet et al. (2005) and Hesping and Schiele (2015) state that the term *purchasing strategy* is most commonly used to define the overall policies and capabilities that direct and facilitate the purchasing activities of the entire firm. These are also termed functional strategies, which strive to increase the competitive advantages of the function and add a level of detail to the corporate and business strategies (Hesping & Schiele, 2015). The focus of this research is on the functional strategy level and is developed with respect to both competitive objectives and purchasing practices.

Strategic Purchasing

The concept of strategic purchasing has emerged from the literature in connection with the growing recognition of the strategic contribution that purchasing can offer

to the overall performance of an organisation. In line with this recognition, it has been argued that purchasing should reach a strategic position within the organisation of a firm. One widely accepted definition of strategic purchasing was developed by Carr and Smeltzer (1997) who define it as:

“The process of planning, implementing, evaluating, and controlling strategic and operating purchasing decisions for directing all activities of the purchasing function toward opportunities consistent with the firm’s capabilities to achieve its long-term goals.”

Carr and Smeltzer (1997) further suggest that the status of the purchasing function, purchasing competence, the willingness to take risks, and purchasing resources all indicate a higher level of strategic purchasing. In line with other studies, their definition of strategic purchasing is also applied in this research.

2.2 Strategic Significance of Purchasing

In addition to the underlying concepts of purchasing and purchasing strategies, it is important to understand the strategic significance of purchasing for companies and their competitive objectives. In many organisations, the total value of externally purchased materials, systems, and services accounts for around 50 – 80% of the total cost of sold goods (Cammish & Keough, 1991; Dubois & Pedersen, 2002; van Weele, 2010). This not only highlights the potential for savings and a noticeable effect on the bottom line, but also the strategic impact that purchasing can have on the overall performance of the firm. This section reviews the developing recognition of the strategic importance of purchasing and its potential impact on firm performance.

2.2.1 Strategic Importance

The strategic importance and competitive potential of the purchasing function has received growing attention from academics and practitioners over the past four decades. In the early 1970s, purchasing was still considered a passive and administrative function with little or no strategic relevance (Ammer, 1974; Farmer, 1974). Growing interest in the strategic position of purchasing can be traced back to the mid-1970s, following the oil crisis and raw material shortages, when Farmer (1974) attempted to raise awareness about the strategic function of purchasing within organisations through a series of articles (Ellram & Carr, 1994; Ramsay, 2001).

Another reason for the growing focus on the strategic role of purchasing emerged a few years later and can be attributed to Porter’s (1980) recognition of suppliers as one of the five forces affecting the competitive position of a company (González-Benito, 2007; Krause et al., 2001). According to Porter (1980), the bargaining power of suppliers can have a direct impact on price structures and industry profitability, and thus also on the competitive position of an organisation, thereby increasingly elevating the role of purchasing to a more strategic level. In later works, Porter’s (1986) value chain also recognised the contribution of purchasing to the overall competitive success of an organisation. According to Porter (1986), purchasing acts

as a supporting function that affects every activity within a company as presented in Figure 1. Consequently, as companies strive to deliver increased customer value through the reduction of cost and an increase in quality, the strategic importance of well managed purchasing operations and supplier relationships is emphasised (Krause et al., 2001).

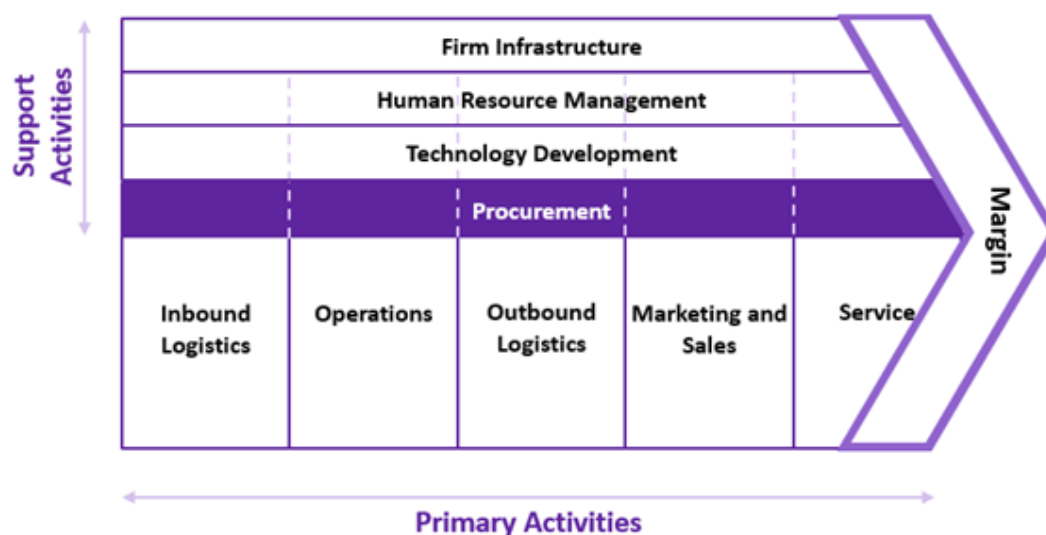


Figure 1. Porter's Value Chain. Adapted from Porter (1986)

Since the late 1980s, the recognition of the strategic significance of purchasing has grown steadily, reaching the level of *major strategic importance* according to Humphreys et al. (2000) by the beginning of the 21st century. Issues such as the integration of the purchasing function into the strategic frameworks and structures of organisations became a focus for research in the 1990s. Purchasing operations must evolve alongside the progress of the firm in order to fulfil their strategic contributions to the overall success of the organisation (Freeman & Cavinato, 1990). This view was further supported by Pearson and Gritzmacher (1990), who argued that a sophisticated and integrated purchasing function are necessary for competing successfully in changing market environments. To aid with the integration of purchasing operations into the overall corporate strategy, and in recognition of the strategic importance of the purchasing function, Watts et al. (1992) developed a conceptual framework that links purchasing to the wider corporate functions and strategies. Despite their contributions to recognising the importance of the purchasing function, much of the literature on the development of purchasing at that time was conceptual and lacked empirical and theoretical evidence (Ramsay & Croom, 2008).

More recently, therefore, interest in an empirical and theoretical understanding of the impact of various aspects of strategic purchasing on firm performance emerged. For instance, Carter and Narasimhan (1996) established that there is a high correlation between purchasing strategy and business performance based on a survey of purchasing professionals from the United States. Their research suggests that

factors such as the alignment between purchasing goals and firm-level strategies, human resource management, relationships with key suppliers, and the active integration of purchasing with other functions play a significant role in strategic purchasing and ultimately in firm performance (Carter & Narasimhan, 1996). Later, Ellram et al. (2002) studied the connection between the adoption of purchasing and supply management best practices and organisational success. Their study suggested that the application of best practices alone is not able to make up for an insufficiently developed overall corporate strategy, further highlighting the importance of strategy development on both the corporate and functional levels. Chen et al. (2004) surveyed 221 manufacturing firms from the United States, reporting that purchasing plays a central role in supply management, directly affecting the financial performance of the firm and aiding in the generation of sustainable strategic advantage.

More recently, González-Benito (2007) established a theoretical connection between purchasing capabilities and business performance based on Vickery's (1991) concept of production competence. The empirical evidence presented in the study indicates that the purchasing function contributes to business performance when there is alignment between the purchasing strategy and capabilities, and the purchasing and business strategies (González-Benito, 2007). Similarly, Baier et al. (2008) investigated the impact of strategic alignment (alignment between the business and purchasing strategies) and purchasing efficacy (the fit between the purchasing strategy and purchasing practices) on the financial performance of firms. Their results support the findings from González-Benito (2007), suggesting that both strategic alignment and purchasing efficacy are required in order to achieve the greatest benefits for firm performance. Moreover, their results support findings from Ellram et al. (2002), reporting that the isolated implementation of best practices are not sufficient to improve performance significantly if they are not in alignment with the strategic requirements of the purchasing function.

The above studies demonstrate empirical examples of the positive effects purchasing can have on company performance. Thus, there is evidence to support the strategic significance of purchasing in both theory and practice. Furthermore, beyond individual studies of the importance of the purchasing function and its impact on firm performance, Zimmermann and Foerstl (2014) and Tchokogué et al. (2017) conducted meta-analyses of the purchasing – performance literature and found evidence to support the strategic significance of the purchasing function. In conclusion, it appears that the strategic significance of purchasing is widely recognised and supported in the literature, underscoring the value of developing comprehensive purchasing strategies on the firm and functional levels.

2.3 Purchasing Strategies

As demonstrated in the previous section, the alignment between the overall business strategy and purchasing strategy is critical to achieving the benefits that purchasing can offer to business performance. However, it has been recognised that the formulation of a single, overarching purchasing strategy is challenging (Hesping & Schiele, 2015; Nollet et al., 2005). In response, Nollet et al. (2005) suggest that the development of a purchasing strategy should be regarded as a series of plans and that these

strategies should be broken down into three levels: strategic, tactical, and operational.

The strategic level is concerned with long-term decisions that influence the competitive position of the company. The tactical level concerns mid-range decisions and includes concepts such as contract and relationship management, and the development of professional skills within the purchasing organisation. Finally, the operational level comprises decisions regarding basic targets and functionality, such as quality, volume, and price. Examples of purchasing strategy related decisions, performance indicators and their suggested levels are presented in Table 1. Furthermore, Baier et al. (2008) emphasise the need for all three levels to be in alignment with the corporate strategy of an organisation, in order to develop a purchasing strategy that strongly supports firm performance.

Table 1. Decision making levels and considerations for purchasing strategies. Adapted from Nollet et al. (2005).

Strategic Level	Tactical Level	Operational Level
Sourcing (global) decisions/strategies	Benchmarking and research	Quality
Supplier selection strategies	Processes and procedures definition	Volume
Outsourcing decisions	Sourcing (make-or-buy) analysis	Cost/Price
Insourcing decisions	Value-added analysis	Service/delivery
Partnerships and supply chain management	Price determination	Flexibility
Technology adoption and investments	Supplier base management	Innovation
Competitive intelligence	Supplier certification programs	
Innovation and product life cycle management	Supplier quality assurance programs	
Effective contribution to corporate value and goals	Project management	
definition and design of performance measurement system (indicators)	Budgeting and reporting	
	Insurances, legal aspects,	
	Contract management	
	Risk management	

Breaking the purchasing strategy down into constituent levels can help to provide clarity and direction in the strategy formation process. Indeed, Hesping and Schiele, (2015), in a comprehensive literature review on purchasing strategy development, suggest five hierarchical levels of purchasing strategies. These levels are:

1. Firm strategy
2. Functional strategy
3. Category strategy
4. Lever strategy
5. Supplier strategy

Firm strategies are the highest-level strategy and integrate the activities of the functional units in achieving the overall business goals. Functional strategies refer to strategies that direct the operations of individual functions within an organisation.

The functional strategy for purchasing, for example can determine the necessary purchasing practices and policies that guide the entire firm in its purchasing operations. Category strategies refer to strategies aimed at the management of individual commodity groups. Lever strategies act as a bridge between the category strategies and the actual actions taken towards the given supply market. Examples of such sourcing levers include demand pooling, supplier base extension, and product optimisation. Finally, supplier strategies act as a description of how each individual supplier from any given category is to be approached. (Hesping & Schiele, 2015)

At each of these levels, it is possible to determine strategies that will support the competitive goals of the firm. Furthermore, the breakdown of a purchasing strategy into levels allows for the development and application of differentiated strategies in response to internal and external contextual factors (Hesping & Schiele, 2015). Additionally, elements of the purchasing strategies can be updated and developed at tighter intervals without requiring the redesign of the entire purchasing strategy.

2.3.1 Purchasing Strategy Development

Strategic management has been actively studied since the 1960s (Ronda-Pupo & Guerras-Martin, 2012). Despite the long history of research, scholars have not yet been able to reach consensus on concept of strategy, however, after conducting an extensive review of strategy literature, Ronda-Pupo and Guerras-Martin (2012) proposed the following definition of the essence of strategy as a concept:

“[strategy refers to] the dynamics of the firm’s relation with its environment for which the necessary actions are taken to achieve its goals and/or to increase performance by means of the rational use of resources.” - (Ronda-Pupo & Guerras-Martin, 2012)

Nollet et al. (2005) Identify three main approaches to strategy development. The first approach is based on experience and usually follows intuition. This type of strategy formation is generally informal in nature and driven by an entrepreneurial individual. On the other end of the spectrum, there are rational, systematic, and process-based strategy development methods. The main strengths of the formal approach are the focus on communication, strong planning, and its potential for validation (Nollet et al., 2005). However, it has also been recognised that *strategic thinking* as embodied by the informal approach, supports a more integrated perspective than the analytical nature of the formal approach (Mintzberg, 1994). A combination of these two approaches can benefit from both integrated and analytical aspects, whilst also balancing their identified shortcomings (Nollet et al., 2005). According to Nollet et al. (2005), the third approach to strategy development is centred around the adoption of best practices. However, it is suggested that best practices should be regarded less as strategy development methods and more as tools to support the strategy-making process (Nollet et al., 2005).

Regardless of the strategy development approach adopted, it has been established that the integration of the purchasing strategy into the overall business strategy plays an essential role in achieving improved firm performance. In response to this, a number of integrated purchasing strategy development frameworks have been

designed. For example, Virolainen (1998) suggested a five-phase framework for the development of an integrated purchasing strategy as presented in Figure 2. The five phases are: (1) information gathering and appraisal; (2) Identification and determination; (3) integration; (4) decision making; and (5) Implementation and measurement/ evaluation.

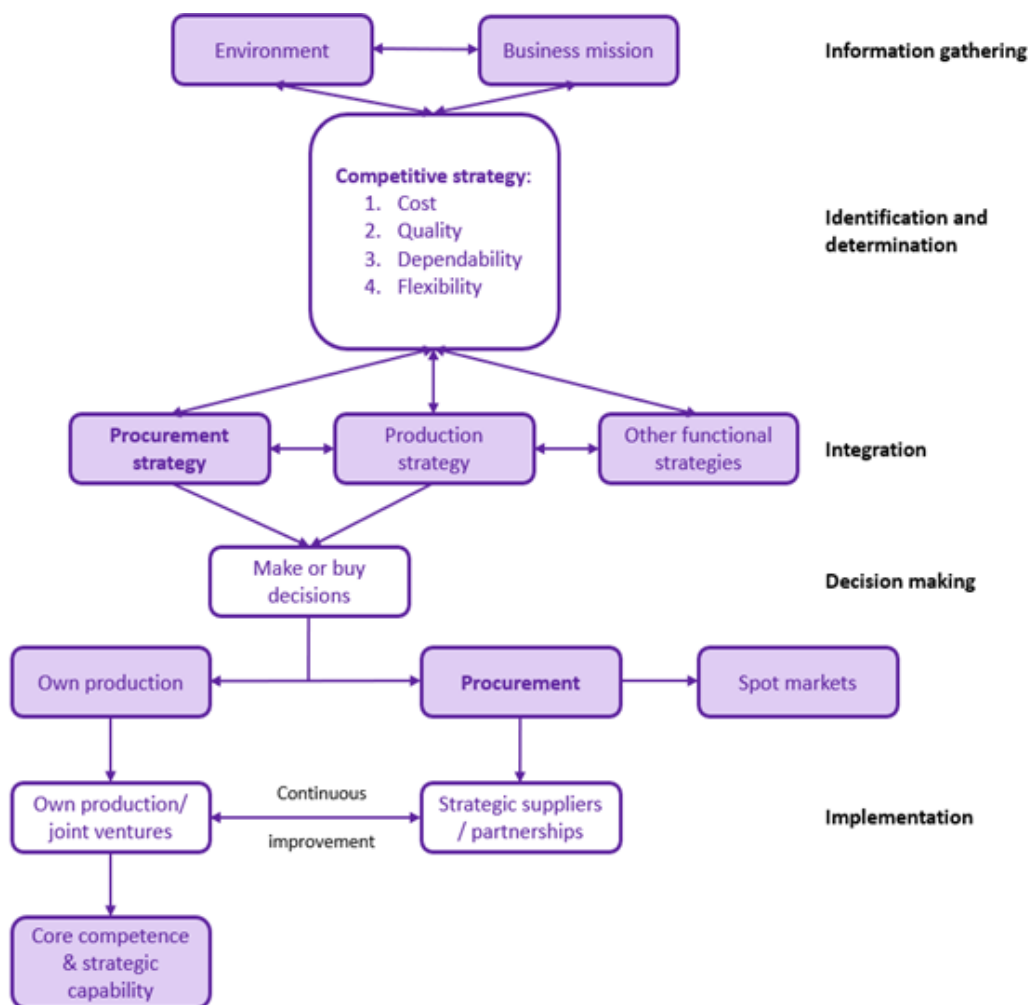


Figure 2. Integrated procurement strategy development framework. (Virolainen, 1998)

The first phase involves gathering and appraising information about the internal and external environmental factors that influence the purchasing function. According to Virolainen (1998), the environment can be thought of as the dynamic influences that management systems must accommodate. Environmental factors act as inputs to the strategy formation process and can be thought of as uncertainties that are difficult to predict but affect the strategies employed. Such factors include the supply and sales markets, circumstances of production, profitability, and institutional factors. (Virolainen, 1998)

The second phase is comprised of the identification of the value chain position, the procurement objectives, the supply market and bargaining position of the company, the decision-making hierarchy and strategic tools, and the organisational structure as a facilitator of strategy development. The value chain position is connected to the corporate strategy as it determines the role and mission of the company within the market. It is important that an understanding of this position is developed in order to ensure the strategic alignment between the corporate and purchasing strategies. Subsequently, the procurement objectives should be identified in line with the overall objectives of the company. Thirdly, an assessment of the supply market supports the realistic and relevant development of purchasing strategies, especially in connection with understanding the relative positions of suppliers with respect to market strength and leverage. Next, it is advised to develop an understanding of the decision-making hierarchy within the organisation. Virolainen (1998) defines three hierarchical levels: (1) competitive procurement strategies (comparable to Nollet et al.'s (2005) *strategic* items); (2) procurement system related strategies (comparable to Nollet et al.'s (2005) *tactical* items); and (3) performance related strategies (comparable to Nollet et al.'s (2005) *operational* items). Finally, the organisational structure should be understood, as this influences the scope and priorities of the purchasing function. (Virolainen, 1998)

The third phase of the model is the integration phase and involves the consideration of the overall corporate strategy as well as the strategies of other functions and ensuring that the purchasing strategy is in alignment with these (Virolainen, 1998). This phase is also recommended in a similar purchasing strategy development framework suggested by Nollet et al. (2005). The fourth phase is the decision-making phase which, according to Virolainen (1998), concerns issues such as defining the core competences of the company, make or buy decisions, and determining supplier relationships. Finally, the fifth phase is concerned with the implementation of the purchasing strategy which includes the allocation of sufficient resources, the individual objective specifications, as well as the maintenance and development of purchasing skills. Additionally, it is recommended to measure the performance of the purchasing strategy in order to sustain the competitive position. (Virolainen, 1998)

Similar frameworks for the development of integrated purchasing strategies were proposed by Nollet et al. (2005) and Monczka et al. (2015). A comparison of these frameworks is presented in Table 2. All of these models recognise the complex and dynamic nature of purchasing strategy development and suggest that purchasing decisions and strategic positions should be reviewed continuously. Furthermore, the models all consider the corporate strategy of the firm as one of the main starting points. This acts to support the strategic integration and alignment between both strategies.

Table 2. Comparison of strategy development processes.

Author:	Virolainen (1998)	Nollet et al. (2015)	Monczka et al. (2015)
Stages of strategy development	Information gathering	Firm strategy	Company objectives
	Identification and determination	Top-down cascade	Cross-functional business objectives
	Integration	Functional strategies	Purchasing and supply chain goals
	Decision making	Strategy content	Purchasing and supply chain strategies
	Implementation	Functional integration	Performance measurement system
	/	Down-Top consolidation	Performance measurement review
	/	Implementation	Continuous improvement

As demonstrated in Table 2, Nollet et al. (2005) and Monczka et al. (2015) recognise the value of the corporate strategy cascading down to the lower strategic levels of the functional strategies and operational purchasing and supply strategies, especially with respect to integrating the overall business objectives into the operational reality of the firm. Additionally, both Nollet et al. (2005) and Monczka et al. (2015) suggest that in cases where purchasing has reached a sufficient level of strategic importance and recognition, the opportunity for the involvement of business unit and purchasing executives in the development of the corporate strategy could exist, facilitating a higher level of integration between the business and purchasing strategies.

2.4 Towards Strategic Purchasing

The previous sections helped to develop an understanding of the strategic significance of purchasing as well as outlining some of the key considerations and processes involved in the development of purchasing strategies. The rest of this chapter introduces some of the models, best practices, and tools that have been developed for purchasing. This is not only essential to understanding the role of purchasing but also presents possible paths and methods for the strategic development of the purchasing function.

2.4.1 Maturity Models

In many companies, purchasing has evolved from an administrative and often overlooked buying function to a strategically integrated corporate unit (Ellram & Carr, 1994; Paulraj et al., 2006). There has been a growing interest in the development of purchasing operations since 1988 as demonstrated by Reck and Long (1988) in their paper entitled *Purchasing: A Competitive Weapon*. Since then, a growing body of literature has been dedicated to the understanding of the development of purchasing maturity within companies. Purchasing maturity is described by Rozemeijer et al. (2003) as a reflection of the level of purchasing professionalism within a company. Purchasing maturity measures how various strategic practices are managed in purchasing departments in order to capture value from suppliers (Úbeda et al.,

2015). Maturity models are founded on the assumption that purchasing operations develop progressively, transitioning through a number of stages. An overview of purchasing maturity development models from the literature is presented in Table 3.

Table 3. Overview of purchasing maturity models. Adapted from (Rozemeijer, 2000)

Authors	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	
Reck & Long, 1988	Passive	Independent	Supportive	Integrative	/	
Syson, 1989	Clerical (transactional)	Commercial	Strategic (proactive)	/	/	
Bhote, 1989	Confrontation	Arm's length	General congruence	Full partnership	/	
Freeman & Cavinato, 1990	Basic financial planning	Forecast based planning	Externally oriented planning	Strategic management	/	
Cammish & Keough, 1991	Serve the factory	Lowest unit cost	Co-ordinated purchasing	Strategic procurement	/	
Burt & Doyle, 1993	Reactive	Mechanical	Pro-active	Strategic supply management	/	
Keough, 1993	Serve the factory	Lowest unit cost	Co-ordinated purchasing	Cross-functional purchasing	World class supply management	
Monczka & Trent, 1995	Manufacturing support	Price buying	Consolidation	Integrated strategic sourcing and SCM	/	
Chadwick & Rajagopal, 1995	Clerical	Commercial	Supportive	Strategic	/	
van Weele et al., 1998	Transactional orientation	Commercial orientation	Purchasing coordination	Process orientation	Supply Chain orientation	Value Chain orientation
Cavinato, 1999	Basic financial planning	Forecast-based planning	Externally oriented planning	Strategic management	Knowledge access and execution	
Paulraj et al., 2006	Nascent	Strategic planning	Long-term focus	/	/	
Cousins et al., 2006	Undeveloped	Capable	Celebrity	Strategic	/	
Schiele, 2007	Initial recognition	Role assignment	Process documentation	Cross-functional integration	/	

While there are certain differences between the developed models, a number of similarities can be identified. Firstly, most models agree on the progression of purchasing organisation status within the company. In most cases, the purchasing function begins as a largely operational unit, holding a low position in the organisational hierarchy and often reporting directly to production. At the higher levels of maturity on the other hand, the purchasing unit reports directly to the top management of the company and takes on an integral strategic role within the organisation. Secondly, many of the models suggest that there is a final stage of maturity for

organisations to strive towards. At this final stage of maturity, purchasing is fully integrated into the business operations and is organised around cross-functional purchasing team structures. Thirdly, most models suggest that partnerships with suppliers indicate a high level of maturity. In order to reach this stage, the purchasing operations will develop from initially reactive responses to purchasing needs, through proactive purchasing to supplier management. Finally, the maturity models posit that supplier relationships grow with the maturing of the purchasing function. Initially, it is suggested that relationships are of *arm's length* nature, in the following stage, this transitions to a consolidation of the supply base and the development of cooperation with preferred suppliers. The final stage with respect to supplier relationships is the development of partnerships and the integration of suppliers.

One of the most widely applied maturity models, developed by van Weele et al. (1998) and based on Keough (1993), comprises six stages of maturity development. The model provides a comprehensive description of the progression from decentralised, operational buying operations to fully integrated purchasing functionality within an organisation. The model is presented in Figure 3 and described below.

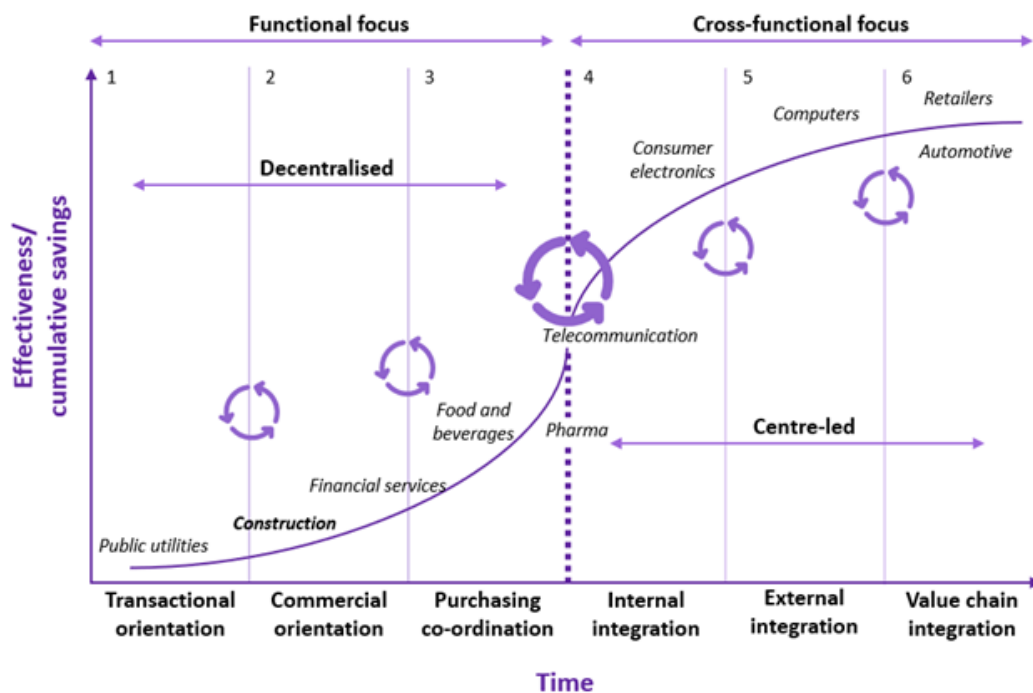


Figure 3. Maturity development of purchasing and supply operations (van Weele, 2010)

Transactional orientation: The first stage is characterised by reactive purchasing; the primary role of purchasers is to ensure the continuous availability of raw materials for the operations of the organisation and finding suitable suppliers. Operations are predominantly administrative and operational in nature with little or no strategic considerations. Information systems, if present, are also often heavily administrative in nature. With respect to organisational structure, companies in this stage often have a decentralised purchasing structure with low-level reporting,

usually directly to production or logistics. At this stage, the purchasing staff generally have little professional training for the execution of the tasks. (Bemelmans et al., 2013; van Weele, 2010)

Commercial orientation: The second stage often involves the active participation of a purchasing manager with enough status and credibility to be able to negotiate better prices with suppliers. At this stage the focus moves from keeping operations running to lowering prices. Indeed, the purchasing strategy itself is often centred around low unit prices. With regard to organisational structure, the purchasing function might have its own department within the business unit, reporting directly to the unit manager. Furthermore, the purchasing department will possess the necessary autonomy from other functions in order to be able negotiate the lower prices. (Bemelmans et al., 2013; van Weele, 2010)

Purchasing coordination: At this stage, strategy formulation begins with the aim of capturing the benefits of internal coordination. A strong central purchasing department starts to emerge, formalising policies, processes, and systems. The focus shifts from price alone to include considerations regarding the quality of purchased goods and their effects on the products. Collaboration and coordination between business units are emphasised. (Bemelmans et al., 2013; van Weele, 2010)

Internal integration: The fourth stage sees a transition in emphasis towards cross-functional problem solving. The focus shifts from unit price to the reduction of total lifecycle costs. In addition to internal cross-functionality, key suppliers are often involved as contributing problem solvers, which implies a transition from adversarial relationships towards collaborative relationships. At this stage the strategic significance of purchasing is also recognised and purchasing participates in an increasing number of strategic decisions. The organisational structure can be classified as centre-led, and a strong emphasis is placed on the harmonisation and integration of purchasing processes over the different business units. Purchasing performance measurement is introduced. (Bemelmans et al., 2013; van Weele, 2010)

External integration: At this stage, suppliers are actively involved in the development of new products, investments are made to strongly involve suppliers in a range of business processes and there is a shift away from simply buying goods and services as effectively as possible. Internally, purchasing is characterised by cross-functional teams and there is a focus on customer service towards internal customers with systems in place to streamline internal purchasing operations. Additionally, information technology systems are not only integrated internally between business units, but also with external suppliers. There is also a transition from supplier management to supply chain management. (Bemelmans et al., 2013; van Weele, 2010)

Value chain orientation: At this final stage of purchasing development, suppliers are constantly encouraged to take part in product development and support the market strategies of the buying company. Subcontractors also seek support from their suppliers in order to deliver the best value to the end customer. Indeed, the goal is to design an effective value chain to best serve the end-customer.

Furthermore, the purchasing strategy has reached a level where it is incorporated into the overall business strategy. (Bemelmans et al., 2013; van Weele, 2010)

There is an underlying assumption, that higher purchasing maturity is associated with better firm performance and that striving towards the application of world-class best practices can have a significant effect on the bottom line (Ellram et al., 2002; Schiele, 2007). However, Schiele (2007) argues that many of the developed purchasing maturity models are predominantly conceptual in nature. The main criticism of previous maturity models is that the majority have been developed inductively, based on observation, but with no empirical performance tests (Ramsay & Croom, 2008; Schiele, 2007).

In response to the lack of empirical evidence, Schiele (2007) designed a maturity model based on the literature and tested this through the auditing of the purchasing operations of fourteen different companies. A similar approach was developed by Úbeda et al. (2015) who tested their maturity model by surveying 278 South American companies. Both studies report that cost savings are positively associated with the maturity level of the company (Schiele, 2007; Úbeda et al., 2015). These findings are further supported by Foerstl et al. (2013), who, in a study of 148 global, cross-industry companies, discovered positive effects of higher purchasing maturity on firm performance, especially with respect to functional coordination and cross-functional integration.

Additionally, Schiele (2007) introduced the concept of absorptive capacity with respect to purchasing maturity. Schiele (2007) suggests a “*minimum maturity point*” that is required in order for an organisation to be able to benefit from the introduction of best practices or practices associated with higher maturity. In other words, introducing these practices too soon could result in wasted resources and investments, as it is likely that the benefits of these practices would be significantly reduced compared to companies with more mature purchasing functions. This supports the proposition that the maturity of purchasing functions within organisations is indeed progressive and that it could be more profitable to invest in the development of basic procurement functionality and operations before best practices and more *mature* operations are introduced.

Despite overcoming some of the limitations concerning maturity models with respect to a scarcity of empirical evidence, Schiele (2007) recognises that these models suggest the same maturity criteria, regardless of the industry in which the organisation operates. Most maturity models were developed from a manufacturing perspective. Therefore, Schiele (2007) suggests that industries, such as the service industry for example may even require a different set of criteria for the evaluation and development of their maturity.

Further criticism has been expressed towards maturity models, such as the apparent neglect of operational activities within purchasing, the dangers of applying overly simplified models to complex situations, and the omission or low status of supplier selection (Ramsay & Croom, 2008). Ramsay and Croom (2008) argue that depending on the goals and unique situation of a company, some of the activities defined in

maturity models as *operational* and therefore of low strategic interest, could, in some cases be a source of competitive advantage to the buying company. This, according to Ramsay and Croom (2008) also highlights some of the dangers associated with evolutionary models, as they suggest that these administrative activities should be reduced or even eliminated if higher maturity is to be achieved. In response, Rozemeijer (2008) argues that maturity models should always be applied with the unique situation of the buying company in mind and be adapted accordingly.

Nevertheless, Andreasen and Gammelgaard (2018) highlight shortcomings in the underlying assumptions of organisational change within purchasing maturity models. Particularly, the authors suggest that maturity models are too rigid in their trajectories, neglecting the opportunity for maturity development through emergent situations for example. Furthermore, Andreasen and Gammelgaard (2018) question the assumption that the status and acceptance of purchasing as a strategic entity is a product of purchasing maturity. This is predominantly due to the fact that the maturity models fail to account for power relations in organisations, which emerged as significant factors in the perception of the purchasing organisation (Andreasen and Gammelgaard, 2018).

In conclusion, maturity models present a potentially valuable tool to the development of strategic purchasing within companies. The various stages of maturity and the simplicity of the model allow practitioners to both gain an understanding of where their current purchasing operations lie, as well as directions for potential future developments. However, it is essential that practitioners apply these models with an awareness of their unique situations and with a sufficient understanding of organisational change processes in order to capitalise on the potential benefits of such models. Furthermore, practitioners should ensure that the purchasing maturity is developed in alignment with the overall corporate and business strategies, assuring that there is synergy between the purchasing function and other operations.

2.4.2 Organisational Design

The maturity models suggest a connection between the organisational design and the maturity of the purchasing function. It is assumed that decentralised purchasing operations are associated with lower maturity, and that higher levels of maturity are characterised by centre-led organisations (Bemelmans et al., 2013; van Weele, 2010). Consequently, the organisational design of the purchasing department could be considered as a significant factor to consider in firm-level purchasing strategies. Some authors argue that organisational design is determined solely by factors such as the environment or inherent cultures and structures (Lawrence & Lorsch, 1967). Others, based on contingency theory argue that decisions involving the organisation of purchasing are directed by strategic choices made by involved parties and based on internal and external contingencies (Bals et al., 2018; Frödell et al., 2013; Pettigrew, 1985). This research acknowledges both perspectives and adopts the view that purchasing organisations can be designed strategically and intentionally within the boundaries of the prevailing environment, structures, and culture.

There are numerous organisational designs for purchasing that have been outlined in the literature (Bals et al., 2018; Cavinato, 1992; Johnson & Leenders, 2006; Rozemeijer et al., 2003). At the most basic level, these designs can roughly be divided into centralised, decentralised, and hybrid purchasing structures and vary in their degree of internal integration and cooperation. There are several factors that can affect the structural design of the purchasing department. For example, Bals et al. (2018) identify a number of internal and external contingencies that can influence the purchasing organisation. These include external contingencies, such as environmental complexity and environmental dynamism, and internal contingencies such as the purchasing strategy, supplier management practices, and purchasing coherence and maturity levels (Bals et al., 2018). One key consideration that has emerged from the literature, however, is an emphasis on the fact that the structure of the purchasing organisation should be consistent with the overall strategy and structure of the firm (Johnson & Leenders, 2001).

Centralised purchasing is characterised by a central purchasing unit that is either entirely responsible for the purchasing of the firm, or to which local purchasing units report directly. In this model, local units are often consulted, however, they do not have full autonomy over their purchasing operations and policies, directions, and supervision are administered through the central group. Centralised purchasing allows an organisation to take full advantage of their buying power as well as the pooling of resources. (Cavinato, 1992). Benefits of the centralised purchasing model include improved buying and labour specialisation, simplified coordination, evaluation and control systems, greater efficiency, and more effective planning and research. However, these benefits come at the cost of responsiveness and flexibility (Bals et al., 2018). (Johnson & Leenders, 2006)

On the other end of the spectrum, decentralised purchasing is characterised by the presence of multiple, independent, and autonomous purchasing units within the organisation. Often, these purchasing units report directly to line management or the management of the business unit. In this model corporate overhead is minimised and there is no centralised coordination or policy development. The disadvantages of decentralised purchasing are reflected in the advantages of centralised purchasing and consist of a lack of buying power and integration across business functions. (Cavinato, 1992). The advantages, however, are increased responsiveness to local requirements, the effective deployment of local resources, and speed of operation (Bals et al., 2018; Johnson & Leenders, 2006).

Between these two ends of the spectrum, various forms of hybrid organisations have been reported in the research; these hybrid approaches aim to bridge some of the trade-offs associated with both centralised and decentralised purchasing organisations by combining elements of both (Bals et al., 2018; Johnson & Leenders, 2006). For example, Cavinato (1992) describes five additional forms of supply organisational structures in addition to the centralised and decentralised models. These are: centralised coordinator, area planner concept, supply manager concept, commodity teams, and the logistics pipeline approach. Each of these forms of hybrid organisational structures offer unique configurations and vary in their level of centralisation. For instance, the centralised coordinator model involves local purchasing units

reporting to a general manager at the business unit level, but the company also has a central coordinating group which manages issues that concern the entire firm and also seeks opportunities from a firm-wide perspective. Commodity teams, on the other hand, are formed around the purchasing involved with the production of a single product. This hybrid method is associated with a higher emphasis on value for the customer and has generally been identified in the construction industries and other project-centred businesses. (Cavinato, 1992)

With respect to determining the purchasing organisational design for a firm, Rozemeijer et al. (2003) propose a framework based on the constructs of corporate coherence, defined by the authors as “*the extent to which the different parts of the corporation operate and are managed as one entity*”, and purchasing maturity, as presented in Figure 4. Rozemeijer et al. (2003) identify three hybrid models, in addition to centralised and decentralised purchasing: coordinated purchasing (equivalent to Cavinato’s (1992) “*centralised coordinator*” model), centre-led purchasing, and federal purchasing. According to Rozemeijer et al. (2003), in centre-led purchasing local business units actively support the operations of cross-functional teams that are strongly led by a central purchasing group. Federal purchasing, on the other hand, consists of a small central unit that supports the efforts of autonomous, decentral purchasing units wishing to benefit from joint operations.

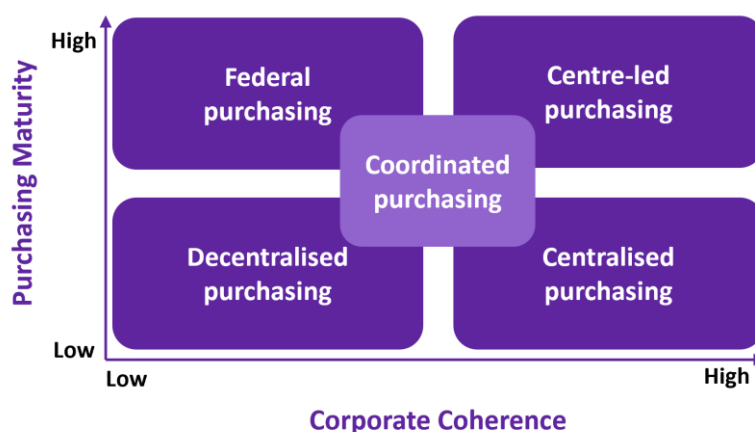


Figure 4. Organisational approaches to corporate purchasing. (Rozemeijer et al., 2003)

Despite these models designed to help businesses determine the optimal purchasing organisational structure, it has been demonstrated that there is no single best structure for purchasing and that it is not uncommon for firms to make major changes to their purchasing structures (Johnson & Leenders, 2006). Indeed, these changes are often initiated by an adjustment of overall company strategy and structure in response to changes in the competitive environment (Johnson & Leenders, 2006). Consequently, Bals et al. (2018) suggest that companies could benefit from expanding their views of purchasing organisation beyond the centralisation-decentralisation paradigm by actively taking internal and external contingencies into account. Furthermore, Bals et al. (2018) argue that it is possible for companies to develop their purchasing organisations around various dimensions, such as purchasing

categories, business units, geography, or activities, rather than limiting decisions to fit within the centralisation – decentralisation paradigm. Regardless of the selected approach, it is emphasised in the literature that the organisational structure of the purchasing operations should be compatible with the overall corporate structure and strategies.

2.4.3 Category Management

Another strategic approach that has been gaining traction in purchasing strategy development is the concept of category management. Category management has been recognised as a means of supporting the strategic development of purchasing operations within companies, facilitating synergies, and enabling the development of distinct category strategies (Heikkilä et al., 2018; Hesping & Schiele, 2015). The practice of category management has been recognised as a valuable approach to strategic purchasing amongst practitioners; therefore, this section provides a brief overview of category management and its implementation.

Originally, category management was developed from a sales and marketing perspective and is most widely practiced in the retail industry (Dussart, 1998). However, since the late 1980s, the concept of category management has also appeared in the development of strategic purchasing operations (O'Brien, 2019). The interest in the implementation of category management can be accredited to the growing level of globalisation within companies, as category management is regarded as a means to increase integration between various business units (Heikkilä et al., 2018; Trautmann et al., 2009). Despite the growing adoption of category management in purchasing operations, there remains a dearth of academic literature addressing this topic, particularly research of a prescriptive nature (Heikkilä et al., 2018; Heikkilä & Kaipia, 2009; Hesping & Schiele, 2015).

There are few definitions of category management within the purchasing literature. O'Brien (2019) defines category management as the “*segmentation of the purchasing spend of bought-in goods and services into discrete groups [...] according to the function of those goods and services and [...] to mirror how individual marketplaces are organised*”. Heikkilä et al. (2018) build on the concept of purchasing segmentation and define purchasing categories as: “*a set of products and services purchased from the same supply market having similar product or service and spend characteristics*”. Heikkilä et al. (2018) further highlight that the service and spend characteristics referred to in their definition consider a wider range of parameters than those traditionally adopted in commodity management, which is based simply on the similarity of the goods or services purchased. Beyond the definition of category management, O'Brien (2019) claims that category management is a “*vital enabler*” in supporting the potential value generated by purchasing and suggests that it can be applied to a wide range of businesses, as it is able to respond to organisational and sector-specific drivers as well as any given external market conditions. However, more empirical evidence is required in this area to discover the true extent of the impact and flexibility of category management, as highlighted by Hesping and Schiele (2015) and Heikkilä et al. (2018) in their calls for further research on the subject.

Principles of Category Management

There are a number of challenges associated with the implementation and development of category management. However, O'Brien (2019) offers a model for category management that seeks to overcome these challenges. According to O'Brien (2019), category management is based on three guiding principles, presented in Figure 5. These principles are: (1) a strategic take on sourcing; (2) strong understanding and management of the market; and (3) change management.

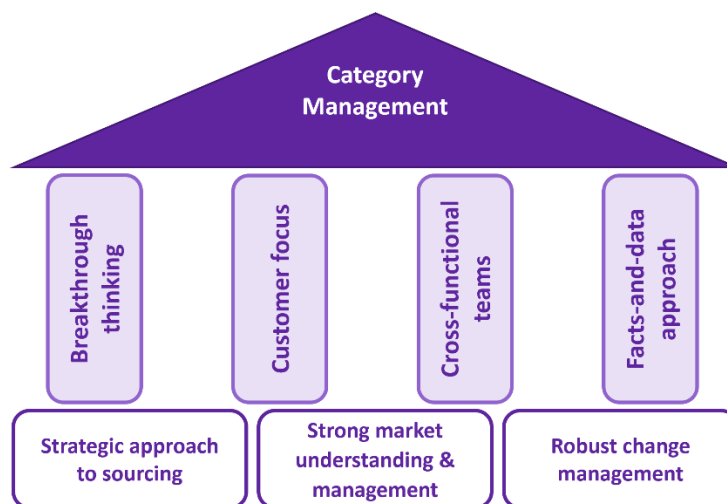


Figure 5. The foundations of category management. Adapted from O'Brien (2019)

The first principle highlights the importance of strategic purchasing once more and it is emphasised that individual category strategies should be in alignment with the purchasing strategy as well as the overall business strategy of the firm. The second principle underlines the need to develop a comprehensive understanding of how the business operations are connected to the market and its structure. Furthermore, an awareness of supply market structures, inter-supplier relationships and positions with respect to negotiating power are considered essential to the development and maintenance of category management. Finally, the importance of change management is acknowledged, especially when aiming to achieve permanent changes within purchasing operations. It is recognised that support from the entire company is essential to developing the strategic position of purchasing and implementing new frameworks such as category management. (O'Brien, 2019)

Built upon these three grounding principles are four further pillars, these are: (1) breakthrough thinking; (2) customer focus; (3) cross-functional teams; and (4) facts-and-data approach. With respect to breakthrough thinking, O'Brien (2019) claims that category management can act as an enabler for radical changes in purchasing operations facilitating breakthrough thinking, given that the transition to category management itself often requires measurable changes from traditional purchasing operations. Customer focus, in this model, refers to both internal and external customers. Internal customers interact with the purchasing function and

the second pillar focuses on managing these relationships as well as developing an understanding of the potential value added to external customers. The third pillar supports the notion that category management, and indeed the development of strategic purchasing, requires collaboration between internal functions in order to be successful. It is suggested that resistance to change can be reduced through the involvement of cross-functional teams for example. Finally, the fourth pillar argues that decisions within the organisation should be made rationally, based on facts. This, however, requires that relevant data is collected and made available, in order to form the basis of informed strategy development. (O'Brien, 2019)

Category Management Process

It has been recognised that there is a lack of academic literature on the category management development and implementation processes (Heikkilä et al., 2018; Hesping and Schiele, 2015). Nevertheless, O'Brien (2019) outlines a process with practical merit as demonstrated by its implementation in several large companies. O'Brien (2019) describes this five-stage category management development process as a cyclical operation, as presented in Figure 6. The cyclical nature of this process reflects the constant changes in environment, both within the market and the company itself (O'Brien, 2019). Consequently, the dynamic nature of this cycle allows alterations to be made, facilitating continuous learning and improvement. This also implies that category management cannot be implemented as a one-off project, rather, it requires fundamental and permanent changes in the operations of a company in order to achieve lasting benefits.

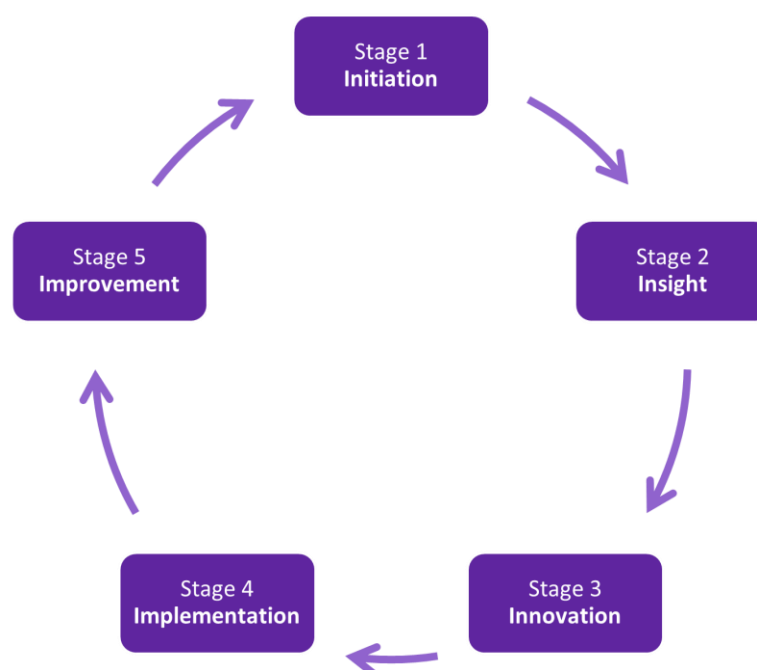


Figure 6. Category Management Process. (O'Brien, 2019)

O'Brien (2019) identifies a number of factors critical to the successful implementation of category management. Firstly, the organisation should implement only one single process for the development of category management, this ensures clarity and consistency throughout the business operations. Secondly, all involved parties should understand and embody the process. Thirdly, the language of the process should be significant to the organisation. And lastly, the process should incorporate best practices from group management, change management, and business development. (O'Brien, 2019)

O'Brien's (2019) category management process is described below:

Initiation: The first stage of the process is initiation and involves early project preparation including the definition and segmentation of the scope of the category, outlining the category targets and steps for achieving these, and forming a motivated, cross-functional team. Additionally, stakeholder mapping and gauging their involvement as well as gauging the business requirements are central to the initiation phase. The first step lays the foundation for future stages, therefore enough time and resources should be allocated to this phase. (O'Brien, 2019)

Insight: The second phase of the process is insight. This is one of the most important stages in category management and involves the gathering of data upon which the strategic directions of the categories are determined. The three key areas from which it is essential to acquire data are: (1) the category in question and its significance to the organisation; (2) current and potential future suppliers; and (3) current and potential future supply markets. It is also suggested that tools such as Kraljic's (1983) purchasing portfolio model could be used in the determination of strategic directions for the selected categories. (O'Brien, 2019)

Innovation: The third phase is innovation. In this stage, the insights from the previous steps are applied to the development of purchasing strategies for the categories. These category strategies outline how items from these categories should be sourced in the future. The objective is to develop category strategies that incorporate elements of breakthrough thinking and innovative approaches. (O'Brien, 2019)

Implementation: The fourth phase is implementation. In this phase the planned category strategies are initiated and applied. Project management and change management are recognised as two essential aspects of this stage, especially with respect to managing people. This stage usually accounts for the most time in the category management process as changes in suppliers, markets, and strategies carry certain risks with them and the goal is to effectuate lasting change. Here the significance of cross-functional teams is further emphasised, especially in countering any resistance to change as well as actively reporting to top management. (O'Brien, 2019)

Improvement: The final stage is improvement. In this stage, the success of the implementation is evaluated and the focus shifts to the management and development of supplier relationships. Furthermore, the cross-functional teams no longer play a critical role, and many may transition back to their previous functions. With respect to continuous development, it is essential that the company is aware of changes in

both the internal and external environments and that opportunities for improvement are acknowledged through the initiation of a new development cycle. (O'Brien, 2019)

2.4.4 Supplier Segmentation

Supplier segmentation is one possible strategic approach to the organisation of purchasing operations and can form the basis for the development of purchasing categories. Amongst supplier segmentation processes, purchasing portfolio models have received considerable attention in academia (Formentini et al., 2019; Gelderman & van Weele, 2003; Luzzini et al., 2012; Nellore & Söderquist, 2000; Olsen & Ellram, 1997; Wagner & Johnson, 2004). Portfolio theory can be traced back to the management of equity investments (Markowitz, 1952). Since then, portfolio models have been developed in several different domains, including strategic management (Porter, 1980), business investments (Hedley, 1977), and product investments (Wind & Claycamp, 1976). The first comprehensive portfolio model for purchasing and supply management was introduced by Kraljic (1983) and was recognised as an important breakthrough in the field (Gelderman & van Weele, 2002). However, systematic research into the development and application of portfolio models in purchasing operations did not receive much attention until several years later (Wagner & Johnson, 2004).

The objective of purchasing portfolio models is to classify purchases or supplier relationships into separate categories, allowing differentiated management strategies to be developed for each category (Formentini et al., 2019; Luzzini et al., 2012; Turnbull, 1990). For example, the aim of Kraljic's purchasing portfolio is to enable management to determine a purchasing strategy that will allow purchasing power to be exploited whilst simultaneously reducing risks associated with supply markets (Kraljic, 1983). One key underlying concept of the purchasing portfolio model is the differentiation between relationship management of suppliers within different categories, as it is recognised that not all buyer-supplier relationships should be managed in the same way (Gelderman & van Weele, 2005).

Other similar portfolio models have been developed over the years (Elliott-Shircore, 1985; Hadeler, 1994; Lilliecreutz & Ydreskog, 2001; Olsen & Ellram, 1997), however, it has been recognised that these models share more similarities with Kraljic's portfolio than differences (Gelderman & van Weele, 2005). Nevertheless, Kraljic's model became the dominant approach, especially with regard to "operational professionalism" (Cox, 1997) and is still applied in research and practice to date (Bals & Turkulainen, 2021).

In essence, these portfolio models consist of around three stages: the first stage is to categorise the suppliers according to the initial portfolio matrix. For example, Kraljic (1983) classifies products and services based on two dimensions: *importance of purchase* (or profit impact), and *complexity of the supply market* (or supply risk), each ranging from *low* to *high*; the formed matrix is presented in Figure 7. Kraljic (1983) makes no distinction in the model between the classification of products or services. The resulting categories are leverage, strategic, non-critical, and

bottleneck. Kraljic (1983) argues that each of these purchasing categories require distinctive approaches to management. Leverage items are arguably one of the most desirable categories for suppliers to be in from the perspective of the buying company. The buying company can exploit its full purchasing power, product substitution is often possible, and the company is able to save through tendering or target pricing, for example. Strategic items have both a high profit impact and high supply market risk. These items often require more attention and management, and companies should strive to develop long-term supply relationships and partnerships with suppliers. Bottleneck items often have large risks associated with them despite their lower profit impact, these issues can be mitigated through inventories, vendor control, and volume insurance. Finally, for non-critical items the goal is to minimise the amount of work required in their management, this can be achieved through purchasing volume, standardisation, and inventory optimisation for instance. (Kraljic, 1983)

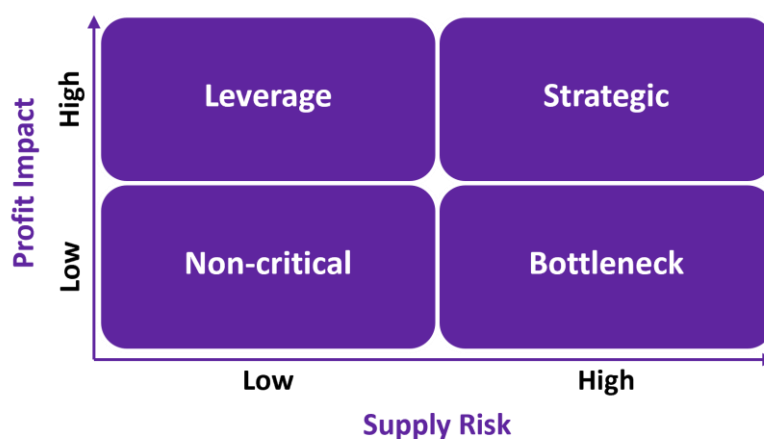


Figure 7. Kraljic's purchasing portfolio matrix. (Kraljic, 1983)

The second stage of purchasing portfolio models involves the evaluation of the relative positions of the buyer and supplier for strategic items, examining their relationships and determining *strategic thrusts* in order to manage and develop the relationships. In Kraljic's (1983) model, this classification is considered with respect to company strength (buyer power) and supply market strength (supplier power). Kraljic (1983) proposes three different *strategic thrusts*, depending on the relative power of the buyer and the supplier. For items where the buying company holds an inferior position compared to the supply market strength, the company should aim to "*diversify*" by seeking item replacement or new suppliers. For items where the buying company holds an equal position to the supply market strength, a "*balanced*" approach is suggested as diversification could be too costly and an overly aggressive approach could worsen supplier relationships. Finally, for items where the buying company holds a dominant position compared to the supplier, Kraljic suggests that the buying company should seek to "*exploit*" its position through favourable pricing or contract terms, as the risk of supply losses is low. However, it is emphasised that an over-exploitation of the advantage could jeopardise long-term supplier relationships and should therefore be considered with care. (Kraljic, 1983)

Indeed, the suggested aggressive approach of supply market exploitation has raised some concern amongst researchers (Olsen & Ellram, 1997). In response, Olsen and Ellram (1997) propose that the supplier relationships should be analysed with respect to relative supplier attractiveness and the strength of the relationship, going beyond the view that relationships are determined solely by power and the risk of opportunistic behaviour. Olsen and Ellram (1997) suggest that factors affecting the attractiveness of the suppliers include financial factors, performance factors, technological factors, and organisational, cultural, and strategic factors. Factors describing the strength of the relationship, on the other hand, include economic factors, the character of exchange in the relationship, cooperation between the buyer and the supplier, and the distance between the buyer and supplier. Furthermore, Olsen and Ellram (1997) emphasise the fact that companies should discuss which of the above factors is the most important and allocate weights accordingly. This approach allows for a deeper understanding of buyer-supplier relationships in the portfolio than the market power of either party and encourages companies to examine their portfolios of supplier relationships beyond the boundaries of the strategic category.

Both Kraljic (1983) and Olsen and Ellram (1997) include a final stage in their portfolio models: the development of action plans based on the classification of items and supplier relationships. These action plans enable companies to determine specific strategies for the development of their purchasing operations, allowing for optimised resource allocation, strategically focused relationship improvement, and secure long-term supply (Olsen & Ellram, 1997). The value of these models and action plans is in the development of differentiated strategies for each group of items and suppliers as well as supplier relationships (Gelderman & van Weele, 2005).

However, despite its strengths, Kraljic's purchasing portfolio model has received much criticism over the years and several shortcomings have been identified, as summarised in Table 4. For example, several authors have argued that the analysis of the category values is too simplistic as they are evaluated based on only two dimensions and ambiguously defined as "*high*" or "*low*" (Dubois and Pedersen, 2002; Gelderman and van Weele, 2003; Luzzini et al., 2012). Consequently, there is no clear break between the different quadrants on Kraljic's purchasing portfolio model, complicating the positioning of items within the matrix (Gelderman and van Weele, 2003; Montgomery et al., 2018; Padhi et al., 2012). Furthermore, it is argued that the strategic recommendations, especially near the demarcation lines, should be applied with care in order to avoid the inappropriate application of the recommendations (Cox, 2015; Gelderman & van Weele, 2002, 2003; Homburg, 1995). Other authors have also criticised the model for not sufficiently considering the buyer-supplier relationships (Dubois & Pedersen, 2002), and for being too static (Cox, 2015; Gelderman & van Weele, 2005).

Table 4. Summary of criticisms against Kraljic's (1983) purchasing portfolio model.

Issues	References
Issues with criteria	
Analysis of category value too simplistic (only two dimensions evaluated as high/low)	Luzzini et al., 2012; Dubois and Pedersen, 2002; Gelderman and van Weele, 2003; Nellore and Söderquist, 2000
Selection of criteria and respective weighting in each dimension is difficult and imprecise	Olsen and Ellram, 1997; Nellore and Söderquist, 2000; Gelderman and van Weele, 2003; Cox, 2001; Ramsay, 1996
There is no clear break between quadrants on PPM; positioning of items on the matrix is complex	Gelderman and van Weele, 2003; Homburg, 1995; Montgomery et al., 2018; Olsen and Ellram, 1997; Padhi et al., 2012; Ramsay, 1996
Erroneous focus on supply market complexity rather than buyer and supplier exchange	Olsen & Ellram, 1997; Dubois and Pedersen, 2002
Issues with data and subjectivity	
Availability of quantitative and qualitative data inputs and difficulties to synthesize data	Gelderman & Van Weele, 2003; Zolkiewski and Turnbull, 2002; Olsen & Ellram, 1997; Ramsay, 1996
Subjectivity of data may limit model efficacy	Gelderman & Van Weele, 2003; Olsen & Ellram, 1997; Padhi et al., 2012; Zolkiewski & Turnbull, 2002 Day 1986
Limitations of recommendations	
Inappropriate and/or misguided strategic sourcing recommendations	Gelderman & van Weele, 2002, 2003
Exploiting the market is too aggressive	Olsen & Ellram 1997
Recommendations should be applied with reserve, especially near demarcation lines	Homburg, 1995; Gelderman & van Weele, 2003
Practitioner competence	
Lack of specific skills by purchasing professionals	Formentini et al., 2019
Critical analysis and discussion required for effective implementation; PPM requires cross-functional support	Homburg, 1995; Gelderman & Van Weele, 2003
Issues with stance	
The Kraljic framework, does not provide guidelines for movements within the matrix, it is too static and reactive	Cox, 2001; Gelderman & Van Weele, 2005;
Lack of prescriptions and procedures for measurement, limited operational dimension	Ramsay 1996
Supplier leverage / relationship issues	
Sustainable competitive advantage achieved through inter-firm relationships not considered	Wagner and Johnson, 2004
Changes in power dynamics between buyer and supplier not accounted for, supplier strategies and reactions not accounted for	Gelderman & van Weele 2000, 2002; Llliecreutz and Ydreskog, 2001; Dubois & Pedersen, 2002; Kamann 2000

Nevertheless, Gelderman and van Weele (2005) argue that much of the criticism for the portfolio model originates from conceptual studies rather than empirical studies and does not necessarily fully represent the experience of practitioners. Furthermore, several studies have been conducted to develop the portfolio model in an attempt to overcome some of the identified shortcomings. For example, Olsen and Ellram (1997) included supplier relationships in their portfolio model in order to

better manage the interactions between firms and avoid the pitfalls of over-exploiting suppliers in the leverage quadrant. Additionally, Olsen and Ellram (1997) recognise that overly complex dimensions in the matrix can hinder companies from capitalising on the full potential of portfolio models with respect to improved resource allocation and communication. They further argue that the process of item categorisation could be considered even more important than the categorisation itself as this process facilitates communication among decision-makers. On the other hand, Olsen and Ellram (1997) also recognise that important variables can be overlooked if the dimensions are too simple. Their model therefore seeks to balance complexity and comprehensiveness whilst including the supplier relationship dimension. Despite this, Dubois and Pedersen (2002) and Wagner and Johnson (2004) advocate for a stronger emphasis on the management of supplier relationships. Indeed, Wagner & Johnson (2004) developed a strategic supplier portfolio management framework in which the portfolio is extended to consider the network of relationships with suppliers rather than focusing on individual relationships as in previous portfolio matrices.

Another criticism that has been addressed in the literature is the static and reactive nature of the portfolio model, not accounting for strategic movement of commodities within the matrix. To fill this gap, Gelderman and van Weele, (2003) developed a model for strategic movement within the matrix based on three case studies in close collaboration with practitioners. The movement of commodities within the matrix allows buying companies to manoeuvre suppliers into more strategically advantageous categories. The strategic directions for each category are presented in Figure 8. In essence, Gelderman and van Weele (2003) suggest that there is a dichotomy in each situation, where the buying company has to decide whether to hold the current position, or to deploy strategies to move suppliers to another position. The most common movements will be to reduce the bottleneck items and increase the leverage items. This can be achieved by altering the product specifications, thereby expanding the potential supplier pool, and reaching the non-critical category. For the non-critical items, a strategic move would be to pool requirements and move the non-critical items into the leverage category. Movement between the leverage and strategic categories can go in both directions, depending on the performance of suppliers and the possibility of generating or terminating partnership contracts. (Gelderman & van Weele, 2003).

More recently, Formentini et al. (2019) developed a framework for the implementation of purchasing portfolio models that would be able to “*support decision-makers in formulating differentiated supplier strategies*” and align with the overall business strategy of the company, simultaneously overcoming some of the criticisms addresses at portfolio models for purchasing. To achieve this, Formentini et al. (2019) combined and refined three portfolio approaches: Kraljic (1983) for supplier segmentation based on the criticality of the purchased items, Olsen and Ellram (1997) for the evaluation of supplier relationships and strategic directions, and Scott and Westbrook (1991) for the assessment of supplier dependency. Formentini et al. (2019) emphasise that the resulting framework provides a dynamic and comprehensive tool for the strategic assessment and continuous monitoring of supplier segmentation. Moreover, the authors argue that their proposed purchasing portfolio

model overcomes a number of criticisms addressed at portfolio models. Firstly, the proposed framework covers several strategic levels of purchasing decisions, from the higher-level purchasing strategy to more operational supplier strategies. Secondly, the authors underline the cyclical nature of their model, which not only allows for continuous improvement, but also overcomes the “static” nature of other portfolio models. And thirdly, the structured approach to the evaluation of criteria reduces the amount of subjectivity involved in the process, potentially improving the efficacy of the model.

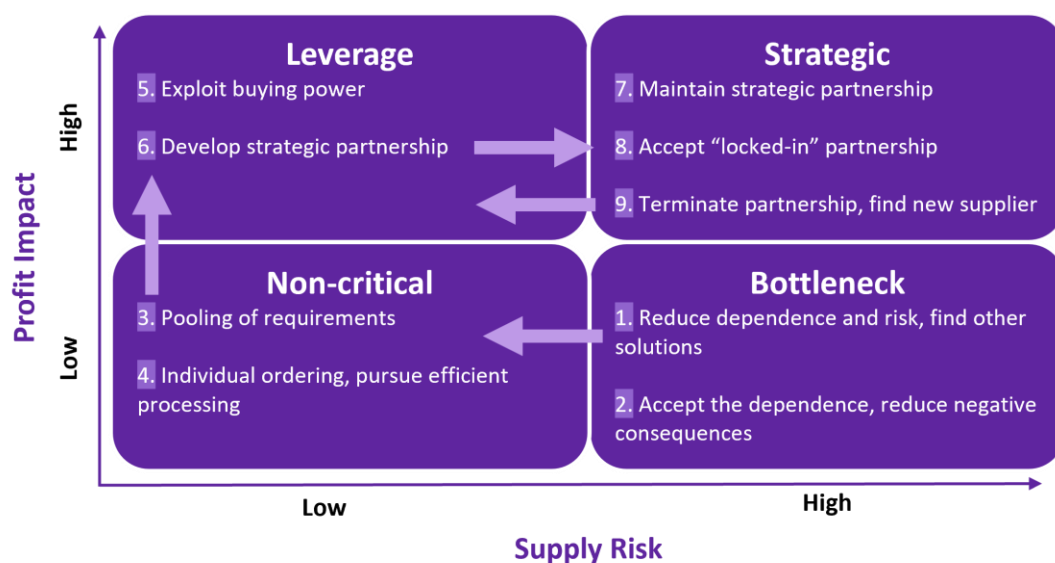


Figure 8. Movement in the portfolio matrix. Adapted from Gelderman and van Weele (2003)

Other models developed in response to the shortcomings of portfolio models include the so-called *Purchasing Chessboard*, developed by Schuh et al. (2009) who consider power dependencies a central factor affecting buyer-supplier relationships, and the *Sourcing Portfolio Analysis*, developed by Cox (2015). The Purchasing Chessboard consists of three strategic tiers, progressing from four basic strategies translating sixteen purchasing levers to sixty-four operational methods and was developed in response to the need for new supply strategies in supplier dominant markets (Schuh et al., 2009). Despite this development, Cox (2015) criticised purchasing portfolio models, including the Purchasing Chessboard for lacking rigour and robustness. In response, Cox (2015) developed the Sourcing Portfolio Analysis model which consists of a matrix comprising sixteen potential sourcing scenarios through the combination of criticality and power analyses of the commodity and market situation.

In conclusion, despite the numerous shortcomings of portfolio models, it would appear that practitioners have found ways to overcome these challenges (Gelderman & van Weele, 2002, 2003, 2005; Luzzini et al., 2012; Wagner & Johnson, 2004). Furthermore, the positive association between the implementation of purchasing portfolios and purchasing maturity as discovered by Gelderman and van Weele

(2005), suggest that benefits beyond immediate supplier strategies and item classification can be achieved. Despite the fact that it is unclear whether the application of purchasing portfolio models is the cause or effect of a higher maturity in purchasing, studies show that the portfolio model can serve as a starting point for strategic discussion about purchasing and that these discussions constitute a central part of the development of purchasing operations in practice (Olsen & Ellram, 1997).

2.5 Chapter Summary

This chapter has reviewed the purchasing and supply management literature, examining a range of core concepts, frameworks, and models applicable to the development of purchasing strategies. Defining the key purchasing and supply management concepts allowed a deeper understanding of purchasing strategies to be developed. The literature revealed that alignment with the corporate strategy is central to the development of a successful and sustainable purchasing strategy. This is further reflected in the purchasing strategy development processes outlined in Section 2.3, which recognises the overall corporate strategy as a starting point for purchasing strategy development.

Despite the presented tools and models, such as maturity frameworks, category management and purchasing portfolio matrices, an understanding of the specific characteristics of the construction industry and purchasing operations therein is essential to the design of a purchasing strategy roadmap for general contractors. Therefore, the next chapter will examine the literature on purchasing within the construction industry.

3 Purchasing in the Construction Industry

This chapter evaluates the literature on purchasing in the construction industry. The chapter is organised as follows. Section 3.1 presents the characteristics of the construction industry and their implications on purchasing strategy development. Section 3.2 introduces supply chain management in the construction industry and its connection to purchasing operations. Considerations concerning the organisational design of purchasing operations in the construction industry are presented in Section 3.3. Section 3.4 examines supplier relationship, including partnerships and supplier development. Purchasing maturity models in the construction industry are presented in Section 3.5. Finally, conclusions are drawn from the literature and an initial strategy development roadmap is presented in Section 3.6.

As demonstrated in the previous chapter, purchasing can have a significant impact on the performance of a company. The construction industry is no exception. Indeed, research shows that general contractors can spend up to 90% of the project turnover on externally purchased goods and services (Bemelmans et al., 2013; Hartmann & Caerteling, 2010) and around 70 – 85% of their total turnover (Dubois & Gadde, 2000; Junnonen, 2012; Vrijhoef & Koskela, 2000). Although external service and material providers have a significant impact on the success of construction companies, purchasing has been identified as an area that still requires significant improvement (Gadde & Dubois, 2010; Naoum, 2003; Proverbs & Holt, 2000). Furthermore, purchasing has been shown to be an under-researched field within the construction management literature (Frödell, 2014).

Nevertheless, research examining supply chain management and purchasing in the construction industry has received growing attention in recent years. One topic that has emerged in the literature is the need for achieving integration between various supply chain actors. Particularly, the client – contractor relationship has received much attention in the literature (Bresnen & Marshall, 2000a; Bygballe et al., 2010), while the contractor – subcontractor perspective has yet to receive equal attention (Akintoye et al., 2000; Bemelmans, Voordijk, & Vos, 2012). However, it has been recognised that a better theoretical and practical understanding of the relationships between contractors and subcontractors could help to drive the implementation of more sophisticated purchasing practices in the construction industry (Dainty et al., 2001; Hartmann & Caerteling, 2010; Proverbs & Holt, 2000).

3.1 Characteristics of the Construction Industry

The construction industry is characterised by unique products, challenging production environments, adversarialism, fragmentation, and discontinuous business relationships (Ballard & Elfving, 2020; Dainty et al., 2001; Dubois & Gadde, 2002b; Hartmann & Caerteling, 2010). Ballard and Elfving (2020) divide these features of the construction industry into industry characteristics, practices, and attitudes, as presented in Table 5. Similarly, Vennström and Erik Eriksson (2010) discovered attitudinal, industrial, and institutional characteristics within the construction

industry that act as barriers to development in purchasing operations and the construction industry as a whole. See also Table 5.

Table 5. Overview of the peculiarities and barriers for change in construction industry.

Peculiarities	
Industry characteristics	Fragmentation, industry structure, discontinuous business relationships, unique products, the product as the factory
Industry practices	Transactional buying, low price purchasing, decentralised managerial focus, purchasing organisational structure, separation between design & construction
Industry attitudes	Adversarial, lack of trust
Barriers to change	
Institutional barriers	Standard contracts, traditional procurement processes, laws
Industrial barriers	Conservative industry culture, traditional organisation of construction process, industry structure
Attitudinal barriers	Adversarialism, lack of ethics and morality, project focus over process focus, short-term focus

(Ballard & Elfving, 2020)

(Vennström & Erik Eriksson, 2010)

Much of the purchasing and supply management literature focuses on the manufacturing industry which is characterised by repetitive or standardised products and predictable production environments. It has therefore been argued that the same practices that apply in these industries may not be directly transferrable to the construction industry (Dubois & Gadde, 2002b). The very nature of construction is inherently project-based and site specific (Cox & Thompson, 1997). These characteristics have been identified as significant obstacles to the development of integrated purchasing operations in the construction sector (Ballard & Elfving, 2020; Eriksson, 2015; Frödell et al., 2013). The focus on individual, decentralised projects promotes sub-optimisation as well as hindering long-term collaboration and learning between the involved parties (Gadde & Dubois, 2010). Furthermore, there is often a project-oriented focus on profit and management which implies that the potential of capitalising on economy of scale for multiple projects, for example through framework agreements, is often not realised (Ballard & Elfving, 2020; Frödell et al., 2013). Nevertheless, it has been recognised that a certain degree of project-level autonomy can be beneficial, due to the application of local knowledge and increased flexibility (Dubois & Gadde, 2002b; van Lith et al., 2015).

Another characteristic of the construction industry that has a noticeable impact on purchasing practices is the uncertainty of demand. There is high economic risk for general contractors associated with the direct employment of the production workforce due to unpredictable fluctuations in demand (Eccles, 1981; Hartmann & Caerteling, 2010; Sacks, 2016). Consequently, as much as 90% of construction work is

carried out by subcontractors (Karim et al., 2006; Sacks, 2016). While this allows general contractors to transfer risk and liability to the lower tiers of the supply chain, the heavy reliance on external organisations suggests that purchasing and relationship management play a critical role in the overall success of the project and the construction company as a whole. Additionally, the specialisation of these subcontractors into individual trades has been identified as a factor contributing to a high level of fragmentation within the construction industry (Dainty et al., 2001; Dubois & Gadde, 2000; Eccles, 1981). The construction of a building requires input from various skilled trades, such as plumbing and electrical, throughout the production process. Due to the high investments in equipment and personnel involved in developing skilled labour, these trades are often specialised (Sacks, 2016). Furthermore, trade specialist companies are often relatively small in size, operate in localised markets, and would not necessarily have the capacity to serve several geographically dispersed projects simultaneously (Dainty et al., 2001; Karim et al., 2006). The result is a fragmented market with many small players, complicating purchasing operations.

According to Hartmann and Caerteling (2010), the fragmented market, combined with the need to provide competitive cost estimates to customers for a unique product that is to be constructed results in heavily price-oriented subcontracting. It has been argued that these price-driven purchasing processes ultimately lead to adversarial relationships and low trust between the involved parties (Fulford & Standing, 2014). These adversarial and short-term relationships, it is suggested, are partially to blame for low productivity of the construction industry (Bresnen & Marshall, 2000b; Egan, 1998; Studer & de Brito Mello, 2021). Consequently, the introduction of long-term, collaborative relationships has been proposed as a means to improve productivity within the industry (Bygballe et al., 2010; Egan, 1998; Latham, 1994). Nevertheless, research suggests that adversarial, arms-length relationships remain prevalent between general contractors and subcontractors (Broft et al., 2016; Saad et al., 2002).

One factor that could be considered a barrier to the wider implementation of partnering between general contractors and suppliers is the characteristic nature of construction as a product. According to Akintoye et al. (2000), the customer has great influence over the physical aspects of the product (design, materials, etc.) as well as the delivery parameters (project duration, delivery date, etc.), leading to the unique and unpredictable nature of each individual product. This presents challenges in the development of many long-term contractor – supplier relationships, as these are vulnerable to disruption if the supplier is not able to meet the demands and specifications set forth by the customer.

Given the above characteristics of the construction industry, traditional purchasing practices have been transactional and *arm's-length* in nature, project-based, and relationships have been largely discontinuous and adversarial (Cox & Thompson, 1997). Overcoming and changing the industry characteristics, practices, and attitudes are essential to developing improved purchasing practices within the construction industry, however, these remain challenging obstacles to overcome. Nevertheless, researchers and practitioners are working to facilitate the adoption of

purchasing and supply management principles from other industries in an attempt to increase productivity in the construction industry.

3.2 Towards Supply Chain Management

Many authors agree that supply chain management could contribute to increased performance in the construction industry (Broft et al., 2016; Dainty et al., 2001; Dubois & Gadde, 2002b; Vrijhoef & Koskela, 2000). Supply chain management has been described as

“a new way of thinking about management and processes, in order to coordinate supply chains more efficiently by managing the associated relationships to deliver customer value, through innovation and continuous improvement”- (Broft et al., 2016).

As has been established in the previous section, the construction industry relies heavily on outsourcing which indicates a strong dependence on suppliers and sub-contractors from lower tiers of the supply chain (Dubois & Gadde, 2000). Consequently, the selection of suitable suppliers, relationship management, and a more complete integration of operations across projects with a long-term focus on profitability and collaboration are recognised as central factors in fostering supply chain management success in construction (Broft et al., 2016). Furthermore, it is suggested that the primary objective of supply chain management is to enhance mutual competitive advantage, ultimately competing on a supply chain level rather than as individual firms (Broft et al., 2016). Central to improved short-term financial gains and, more importantly, long-term competitive power are efficient and constructive network relationships (A. P. King et al., 2019).

Despite the significance of supply chain management with respect to construction products, research in this field is still in its infancy, especially when compared to other industries such as manufacturing and retail (Studer & de Brito Mello, 2021). Barriers, such as the project-focused nature, temporary networks, and high variability and unpredictability of on-site conditions impede the direct transfer of supply chain management practices to the construction industry (Bankvall et al., 2010). Low levels of trust between parties, adversarial relationships, and traditional purchasing practices have also been identified as further factors leading to the slow adoption of supply chain management in the construction industry (Broft et al., 2016). Furthermore, it has been recognised that supply chains in the construction industry are often far more complex than in other industries, involving temporary configurations of multiple stakeholders including clients, designers, general contractors, subcontractors, and suppliers, as presented in Figure 9. The dotted arrows in the figure represent the flow of information, materials, and services, as well as funds, where information flows in both directions and the flow of materials and services always flow in the opposite direction to the flow of funds.

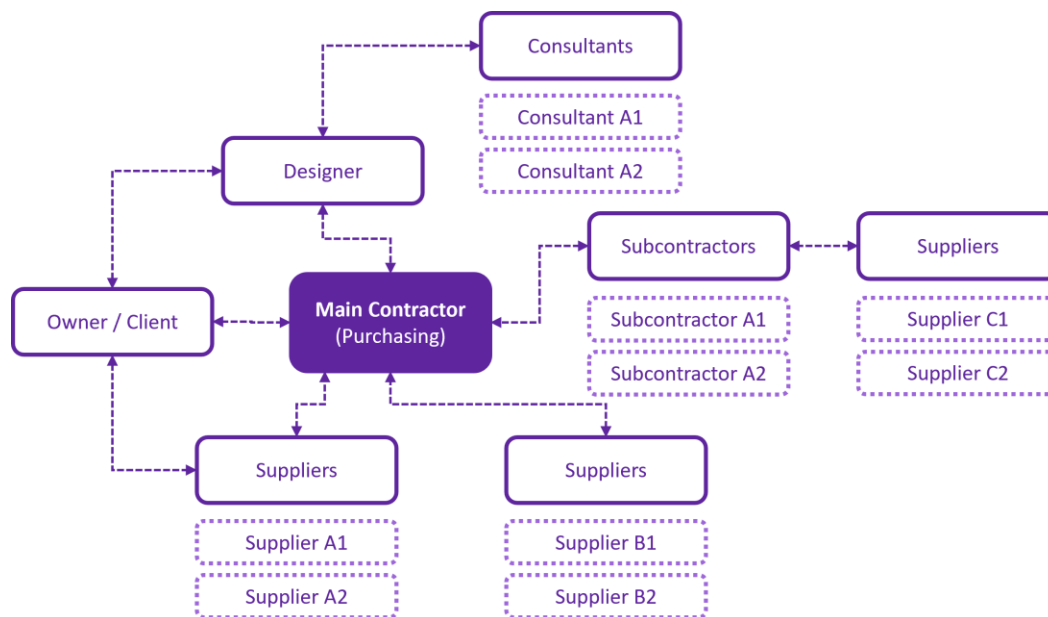


Figure 9. Example of a typical construction supply chain. Adapted from (Studer & de Brito Mello, 2021)

While much of the progress in the construction industry towards supply chain management has been examined from the perspective of the client (Broft et al., 2016), the position of general contractors within the construction supply chain has been recognised to hold vast potential for further improvements. While large clients with enough leverage and projects spanning long timeframes have been able to drive a certain level of supply chain management, this has not always reached the lower levels of the supply chain (Broft et al., 2016). Consequently, the focus of supply chain efforts is beginning to shift towards general contractors as these often have more immediate influence over the project organisation and the quality of work delivered by subcontractors and are also in a position to manage their own supply networks with more overall consistency (Broft et al., 2016; Manu & Knight, 2019).

As the interface between lower tier suppliers and the project organisation, the role of purchasing has been recognised as integral to supply chain management by several authors (Carr & Smeltzer, 1999; Leenders et al., 1994; Studer & de Brito Mello, 2021). However, empirical evidence of the relationship between purchasing and supply chain management is sparse, and this is an area that is yet to be researched thoroughly (Carr & Smeltzer, 1999). Particularly the development of preferred suppliers and strategic, collaborative partnerships have been recognised as areas in which purchasing can contribute to stronger supply chain management (Carr & Smeltzer, 1999; Leenders et al., 1994). Furthermore, Leenders et al. (1994) suggest that achieving the benefits of supply chain management require the purchasing function to reach a more strategic level within the company and for internal structures to adapt accordingly. This notion is supported by Dubois and Gadde (2000), who have identified the structure of purchasing operations as a barrier to the implementation of supply chain management in construction. Furthermore, in connection with the development of purchasing structures, Studer and de Brito Mello

(2021) recommend a strategic change management approach due to the conservative nature of the construction industry.

Overall, it would appear that it could be beneficial for general contractors to strive towards adopting a larger role in the management of construction supply chains. Well-coordinated supply chains can contribute to overall firm performance and support on-site logistics and operations, thus also playing an integral role in the productivity of the construction industry. Much of the literature agrees that the strategic management of relationships with suppliers and subcontractors is essential to the development of supply chain management and integration, particularly with respect to the flow of information and the potential for innovation and continuous improvement (Ballard & Elfving, 2020; Broft et al., 2016; Fulford & Standing, 2014; Studer & de Brito Mello, 2021). One prerequisite for supplier relationship management that extends beyond the scope of individual projects is the organisational design of the purchasing function within general contractors (Dubois & Gadde, 2000; Studer & de Brito Mello, 2021).

3.3 Organisational Design of Purchasing

Over the past sixty years, a wealth of research has been conducted into the organisational design of the purchasing function (e.g., Bals et al. (2018); Glock and Hochrein (2011); Johnson and Leenders (2001); Luzzini and Ronchi (2011); Schneider and Wallenburg (2013)). In contrast, far less research has been published on the organisation of purchasing operations in construction companies or from other industries with similar project-centred characteristics (Moretto et al., 2020). Nevertheless, the proper organisation of the purchasing function in largely decentralised and project-oriented companies remains an important aspect of the development of strategic purchasing. Particularly, since there has been a tendency for general contractors in the construction industry to implement purchasing philosophies developed for the manufacturing industry directly to their operations with little or no modification (Frödell et al., 2013). Therefore, it is important to gain a deeper understanding of purchasing organisation in project-focused companies.

In project-based companies, one of the central elements for the organisational design of the purchasing function lies in managing the interplay between local project supply chain activities and centrally located purchasing activities and teams (Bildsten & Manley, 2015; Briscoe & Dainty, 2005). Tensions between cost, quality, and delivery time can occur when central purchasing units attempt to direct supply-related decisions for local, decentralised operations (Moretto et al., 2020). On the other hand, the achievement of traditional purchasing objectives, such as quality, savings, and long-term supplier relationships can be difficult to achieve when there is a lack of influence over local project decisions (Bemelmans et al., 2013; Eriksson & Westerberg, 2011). Furthermore, the organisational structure of purchasing operations should ensure that inefficiencies and the duplication of activities are minimised on the project level, and that local information and requirements are transferred to central purchasing units for these to support the projects effectively (Moretto et al., 2020).

Based on a review of the literature, Moretto et al. (2020) suggest six structural variables to characterise purchasing organisational structures in project-based settings:

1. Centralisation
2. Configuration
3. Specialisation
4. Formalisation
5. Project participation
6. Supplier integration

Centralisation is the degree to which the responsibility for purchasing decisions is concentrated. In decentralised structures the responsibility is situated in the projects and in centralised structures the responsibility lies in a corporate purchasing unit. Configuration refers to the authority structure of the purchasing department within the organisational structure of the company and the degree of influence that purchasing has within the company. Specialisation is related to the formation of specialised groups that are responsible for the procurement of certain goods or services. Groupings can be based on commodity categories, geographic area, product line, or procurement processes. Formalisation concerns the documented description of practices, policies and procedures within the purchasing operations and can be employed to mitigate uncertainty in operations. Project participation describes the degree to which the purchasing department is involved with individual project activities. Finally, supplier integration refers to the extent to which suppliers are involved in the project activities. (Moretto et al., 2020)

Moretto et al. (2020) suggest that the structural variables presented above are influenced by internal and external contingencies, such as resource allocation and level of uniqueness. Project-based companies can design their purchasing organisations in response to these external and internal contingencies. Based on 11 case studies of various project-based companies, Moretto et al. (2020) propose a framework dividing purchasing organisations of project-based companies into procurement-focused organisations, project-focused organisations, and hybrid organisations, depending on the internal and external contingencies as presented in Figure 10.

Moretto et al. (2020) discovered that three of the four construction and engineering companies involved in their study had adopted hybrid approaches to the purchasing organisation. For most of these construction and engineering companies time was not regarded as a primary performance dimension and the level of uniqueness of the projects varied from 20 – 80%. Process-centred approaches were adopted in the companies where the level of uniqueness was 20 – 40%, whereas project-specific approaches were adopted for the company with 80% uniqueness. It is worth noting, however, that these construction and engineering companies predominately deliver projects for the oil and gas or metal and mining industries. Nevertheless, this study provides valuable insight into potential organisational structures for project-based companies as well as factors that should be taken into consideration. (Moretto et al., 2020)

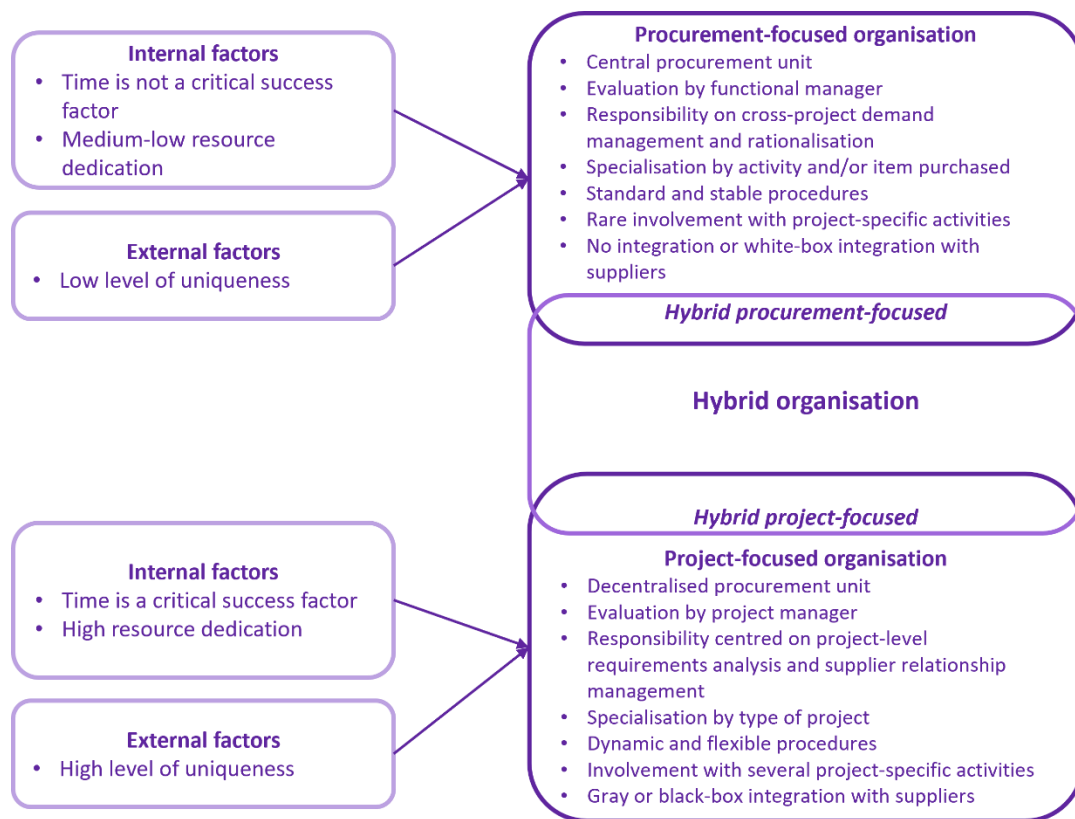


Figure 10. Organisation of purchasing operations in project-based companies. (Moretto et al., 2020)

The adoption of hybrid purchasing organisation models for construction companies is also supported by Frödell et al. (2013) in a study examining integration barriers for purchasing organisation in a large commercial and residential construction company. According to the authors, construction companies face the challenge of coordinating projects in such a way that the projects maintain the requisite level of autonomy whilst still being integrated into the overall operations of the company. Coordination, it is believed, can be increased through the appropriate division of tasks, which can be facilitated by a suitable purchasing organisation (Vrijhoef & Koskela, 2000).

The case company studied by Frödell et al. (2013) intended to transform the purchasing practices from operational, project-based activities to a centralised and strategic function. This trend of adopting purchasing practices from the manufacturing industry in the form of centralised purchasing operations and the introduction of framework agreements in order to increase efficiency has also been identified in other construction companies (Axelsson, 2005). However, Frödell et al. (2013) argue that striving towards the full centralisation of purchasing operations in construction companies risks the loss of local, project-specific knowledge and limits the flexibility of projects. Furthermore, studies have found that both fully centralised and fully decentralised models are dysfunctional to some extent and that hybrid models have been more successful in yielding positive results on purchasing and project performance (Frödell et al., 2013).

Frödell et al.'s (2013) study uncovered a number of inefficiencies created by the adoption of centralised purchasing operations due to structural factors still present in the company. For example, the financial responsibility for the project, including the financial responsibility for purchasing, remained on the project level, with the site manager. Consequently, the framework agreements introduced by the centralised purchasing department were only taken advantage of when the local project organisation deemed them to be more favourable than the spot market. As a result, suppliers had to market their products to both the central purchasing department and the individual projects to ensure the order fulfilment of their products. Frödell et al. (2013) term this model parallel purchasing due to the duplicity of purchasing activities carried out by the department and on site, and advocate for the mediating purchasing model as presented in Table 6.

Table 6. Contractor purchasing organisational models (Frödell et al., 2013)

	Centralised	Mediating	Parallel	Decentralised
Top management	Systematic commitment in purchasing and unambiguous decision scope and division of tasks	Systematic commitment in purchasing and less ambiguous decision scope and division of tasks	Vague commitment in purchasing and ambiguity in decision scope and division of tasks	Full delegation (empowerment) of purchasing to projects
Purchasing department	Authorised decision scope and resources	Collaborating with projects	Parallels with projects	Non-existing or peripheral involvement
Projects	Subordinate to purchasing department regarding preferred suppliers	Projects collaborate with purchasing department	Parallels with purchasing department	Authorised decision scope and resources regarding purchasing
Preferred suppliers with framework agreements	Agreement with central purchasing department	Triads active with projects and purchasing departments	Bi dyads are created to projects and purchasing department	Project preferences
Suppliers	Market relationship with projects	Market relationship with projects	Market relationship with projects	Market relationship with projects

Frödell et al. (2013) argue that the mediating purchasing organisation model allows for a certain level of disintegration as the importance of project involvement in purchasing is maintained, yet a collaborative approach is adopted. Moreover, it is recognised that the successful collaboration between the projects and the centralised purchasing department requires clear directions set out by top management, thus avoiding ambiguity. For example, a clearly stated policy could require framework agreements with suppliers to be formed through internal collaboration between projects and purchasing and could allow the management of non-framework agreements to continue on the project level. (Frödell et al., 2013)

Furthermore Ballard and Elfving (2020) recognise the need for a certain level of centralisation in purchasing operations if supply chain management practices are to be adopted in the construction industry. Ballard and Elfving (2020) suggest that some degree of centralisation is required in order to be able to deploy new policies across decentralised business units and projects. Particularly with respect to developing the supply base and relationships with suppliers, it is suggested that a centrally functioning unit is required to facilitate the development of new purchasing practices. However, the authors also recognise the importance of purchasing operations within the decentralised projects as these have knowledge of the local environment and characteristics of the projects in question. (Ballard & Elfving, 2020)

Despite the relative sparsity of literature on purchasing organisations in the construction industry, it would appear that a hybrid organisational structure could result in the desired increase in efficiency without the loss of local autonomy and knowledge. Furthermore, the existing studies indicate that organisational structures developed for manufacturing, for example, may require modification before they can be successfully applied to the construction and other project-based industries. Additionally, the involvement and commitment of top management is highlighted as an important factor contributing to the successful implementation of developed purchasing organisational models. Clear policies, instructions, and divisions of activities and responsibilities are required in order to ensure cohesive and collaborative purchasing efforts between projects and central purchasing units. Finally, it is recognised that certain purchasing structures can facilitate internal and external integration more effectively than others, supporting the development of collaborative relationships, both between internal parties and with external suppliers (Leenders et al., 1994).

3.4 Supplier Relationship Management

Supplier relationship management has emerged as a topic of much interest within the construction management literature. Due to the reliance of general contractors on subcontractors and suppliers for the majority of the value-adding operations, the management of the relationships with these parties is significant to the overall project outcomes (Bemelmans, Voordijk, & Vos, 2012). One area within supplier relationship management that has gained much attention is the concept of establishing partnerships, which is believed to enhance project and ultimately company performance (Gadde & Dubois, 2010).

This section presents the literature on supplier relationship management and is organised as follows. Section 3.4.1 discusses the concept of partnerships within the construction industry. Section 3.4.2 addresses supplier development including the pre-qualification of suppliers, supplier performance evaluation, and supplier segmentation.

3.4.1 Partnerships

Since the release of industry reports such as Latham (1994) and Egan (1998), there has been a growing focus on collaborative relationships between parties in the

construction industry. Both reports strongly advocate for a transition away from the adversarial, confrontational, and low-trust relationships characteristic of the construction industry and highlight the benefits that can be gained from collaborative partnerships. One of the main incentives for encouraging the adoption of partnerships is to combat the high level of fragmentation in the construction industry and thus remedy one of the greatest perceived barriers to project success (Bresnen & Marshall, 2000b).

Despite many years of research, there is still no single definition or unified understanding of the concept of partnerships in the construction industry (Bygballe et al., 2010; Khouja et al., 2021). Nevertheless, one definition that is often referred to was put forth by the Construction Industry Institute who define partnering as:

“A long-term commitment by two or more organizations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant’s resources. This requires changing traditional relationships to a shared culture without regard to organization boundaries. The relationship is based upon trust, dedication to common goals, and an understanding of each other’s individual expectations and values. Expected benefits include improved efficiency and cost-effectiveness, increased opportunity for innovation, and the continuous improvement of quality products and services.” (CII, 1991)

The definition refers to a *long-term* commitment between two parties, however, many partnerships are formed within the boundaries of individual projects, which has also been reflected in the strong focus of research efforts on project partnerships (Gadde & Dubois, 2010). Beach et al. (2005) define project partnerships as being *“created and sustained for the life of a specific project and focus on short-term benefits”*. In contrast, strategic partnerships are characterised by the intention to *“last for significant periods of time, include several projects, and seek gains for the long-term”* (Beach et al., 2005). In this study the term partnership refers to the general concept of collaborative relationships between contractor and subcontractor or supplier and Beach et al.’s (2005) definitions project partnerships and strategic partnerships are adopted.

In addition to the benefits of partnerships addressed in the definition by the CII, several more benefits have been identified in the literature (Bresnen & Marshall, 2000b; Gadde & Dubois, 2010). These include

- greater productivity and cost reduction
- reduced throughput time through early supplier involvement
- improved quality by means of transferred learning and continuous improvement
- higher client satisfaction and increased responsiveness
- increased stability and effective deployment of resources

(Bresnen & Marshall, 2000b). More recently, Khouja et al. (2021) conducted a comprehensive literature review on interorganisational relationships in the construction

industry and discovered that economic outcomes, such as reduced cost, enhanced value creation, and reduced risk, had received the most citations, with other identified positive outcomes pertaining to social and knowledge-related benefits. According to Khouja et al. (2021), the economic benefits include reduced cost, enhanced value creation activities, and reduced risk. Social benefits, on the other hand are comprised of enhanced communication and trust between people and organisations, and finally, the knowledge-related benefits are joint organisational learning, holistic creativity, and improved knowledge, innovation, and capabilities. Furthermore, in a survey of the UK construction industry, Black et al. (2000) discovered that general contractors regard less adversarial relationships, increased customer satisfaction, and increased understanding of parties as the most valuable benefits of partnering. Other observed benefits included improved timescales, reduced risk exposure, and reduced cost (Black et al., 2000).

Despite the multitude of expected benefits resulting from collaborative relationships and partnerships, these have been slow to manifest themselves. Moreover, the predicted revolutionization of the construction industry has been more difficult to achieve than originally anticipated (Bygballe et al., 2010; Humphreys et al., 2003; Sundquist et al., 2018). Bygballe et al. (2010) attribute these shortcomings to the strong focus of research and practitioners on the dyadic relationships between clients and contractors while the relationships between contractors and the lower tiers of the supply chain have largely been neglected. This is exemplified by a survey exploring supply chain collaboration in the construction industry, which discovered that in general, construction companies regarded collaborative relationships with clients more important than those with their suppliers (Akintoye et al., 2000). Bygballe et al. (2010) highlight that companies and the construction industry could benefit from the interactions of relationships between suppliers in the lower levels of the supply chain, encouraging them to “*develop and use the same standards and technologies across projects and stakeholders*” (Bygballe et al., 2010). This also draws on principles of supply chain management, whose goal it is to integrate supply chain actors, enabling the sharing of knowledge and information (Broft et al., 2016).

Another reason for the relatively slow adoption of partnering practices in the lower tiers of the supply chain can be attributed to the reluctance of general contractors to develop long-term strategic partnerships with suppliers and subcontractors. Traditionally, construction firms strive to avoid becoming too dependent on specific business partners. Historically, the notion of independence and maintaining a base of interchangeable suppliers has been the recommended approach. This approach has been known to stimulate competition between suppliers, encouraging competitive prices and better performance, reduce uncertainty through the availability of alternative suppliers, and prevent contractors from becoming locked into the solutions and products of certain suppliers. (Gadde & Dubois, 2010)

Consequently, it has been recognised that trust plays a central role in the development and adoption of long-term relationships between general contractors and their suppliers (Akintoye et al., 2000; Beach et al., 2005; Wood & Ellis, 2005). Similarly, it has been suggested that traditional purchasing practices encourage firms to withhold information from each other, preventing collaboration and the establishment

of trust (Broft et al., 2016). This once again highlights the importance of developing purchasing practices and strategies if the benefits of collaborative relationships are to be pursued.

On the other hand, trust can be taken advantage of and there are certain risks and vulnerabilities associated with close relationships between buyers and suppliers. For example, opportunistic behaviour from suppliers with respect to price and performance could result from increased levels of trust. Additionally, familiarity with buyer auditing systems could lead suppliers to cut corners, assured continuity of purchasing could decrease supplier motivation to improve performance, and buyers may lose the opportunity to discover more capable suppliers as they enter the market. (Noorizadeh et al., 2018).

Despite the many benefits that are believed to stem from increased collaboration and the formation of partnerships within the construction industry, Cox and Thompson (1997) caution against regarding partnerships as the objective of purchasing strategy development rather than as a means of improving project productivity. Furthermore, Cox and Ireland (2002) recognise that relationships and power positions within the construction industry vary and suggest that there is a false dichotomy between adversarialism and collaboration. Cox and Ireland (2002) propose instead that a range of relationships can emerge based on the dominance of the buying or supplying firm and that these should be considered when determining the kind of relationship to be pursued, suggesting that win-win situations for both buyer and supplier are rare. An overview of the purchasing power positions is presented in Figure 11. Additionally, it has been suggested that partnerships should not be deemed as a criterion of success themselves, rather they should be regarded as a mediator between cooperative purchasing procedures and project performance (Eriksson & Westerberg, 2011).

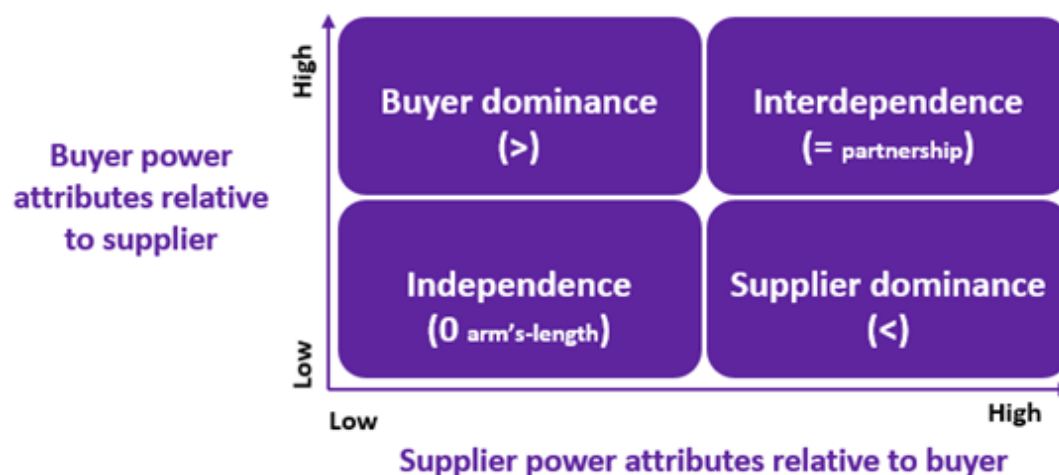


Figure 11. The purchasing relationship power matrix. Adapted from (Cox & Ireland, 2002)

Furthermore, Cox (2004) argues that strategic collaboration with partners may not always be feasible or even desirable for construction companies due to the high investment costs that may, in some cases, exceed the expected benefits from the development of a collaborative relationship. Bemelmans, Voordijk, Vos, et al. (2012) also recognise the high investment costs and risks associated with the development of strategic partnerships in industries where parties operate within temporary, decentralised networks. Indeed, Gadde and Dubois (2010) cite the characteristics of the construction industry, with the heavy focus on individual projects, as one of the main reasons for the wider adoption of project partnerships than strategic partnerships since interactions between parties are most intense on the project level. Nevertheless, Bemelmans, Voordijk, Vos, et al. (2012) suggest that companies should investigate opportunities for developing collaborative relationships with certain suppliers, carefully assessing in which cases the greatest benefits could be attained.

A number of managerial tools and techniques have been introduced to aid in the selection and development of collaborative relationships with suppliers and subcontractors (Gadde & Dubois, 2010). However, Bresnen and Marshall (2000b) argue that managerial tools and techniques alone are not sufficient to facilitate the development of long-term, strategic partnerships, as these often require “*shared cultures, mutual orientation, and trustful relationships which take time to build*”. Instead, Bresnen and Marshall (2000b) suggest that long-term partnerships should be developed with a stronger emphasis on social and informal aspects, rather than formal management procedures alone.

3.4.2 Supplier Development

Supplier development has been recognised within the construction industry as a valuable approach to building long-term relationships with suppliers, ultimately acting as a gateway to supply chain management (Ballard & Elfving, 2020). The objective of supplier development is to facilitate supplier performance improvements with the aid of the buying company, once areas of development have been identified within the operations of suppliers (Bemelmans, Voordijk, Vos, et al., 2012; Gosling et al., 2015; Noorizadeh et al., 2018). Typically, supplier development initiatives facilitate the improvement of both supplier performance and buyer-supplier relationships, ultimately having a positive effect on the performance of the buying company (Noorizadeh et al., 2018).

A small number of studies have been published on the development of suppliers in the construction industry. For example, Bemelmans, Voordijk, Vos, et al. (2012) present a maturity assessment framework for relationship management in the construction industry, where supplier development is identified as one key contributor in developing relationship management maturity. Manu and Knight (2019) outline the implementation of supply chain management from the perspective of a general contractor, which adopts similar practices to supplier development. More recently, Ballard and Elfving (2020) provided a detailed description of the design and implementation of a supplier development programme in Skanska’s Nordic supply chain operations. According to Ballard and Elfving (2020), there are three elements that

are required before engaging in supplier development, these are: (1) pre-qualification; (2) supplier performance evaluation; and (3) supplier segmentation.

Pre-qualification

The pre-qualification of suppliers serves a twofold purpose, firstly, to reduce risk, ensuring that suppliers meet minimum legal and construction company requirements, and secondly to consolidate the supply base by eliminating suppliers that do not qualify for further collaboration (Ballard & Elfving, 2020). The pre-qualification process can be aided by tools such as self-evaluation questionnaires that potential suppliers are required to submit and update regularly before being approved for any project. In their study, Ballard and Elfving (2020) discovered that a significant number of suppliers who had filled out the self-evaluation questionnaire did not meet the minimum legal or company requirements. This highlights the importance of requiring adequate documentation and pre-qualification of suppliers, especially as illegal (grey) activity is a known issue in the Finnish construction industry. Additionally, with the increased awareness of the importance of sustainability within the construction industry, pre-qualification could support general contractors in engaging only with suppliers and subcontractors that meet given quality and environmental criteria.

The second purpose of pre-qualification, the consolidation of the supply base, allows the buying company to increase its share of suppliers' revenues consequently also increasing the influence of the buyer over the supplier (Ballard & Elfving, 2020). Supply base optimisation is also presented by Bemelmans, Voordijk, Vos, et al. (2012) as the starting point for developing more mature purchasing and relationship management in the construction industry. Bemelmans, Voordijk, Vos, et al. (2012) report that many companies claimed that the consolidation of their supply base allowed them to become more competitive and flexible, as well as reducing costs.

Supplier Performance Evaluation

Supplier performance evaluation constitutes an integral part of implementing supplier development, aiding in the supplier selection process, the determination of which suppliers to develop, and allowing the monitoring of progress and performance to be executed (Ballard & Elfving, 2020). Ballard and Elfving (2020) describe an evaluation process in which they differentiate between two types of suppliers: critical subcontractors, and framework suppliers. For critical subcontractors, project managers and procurement personnel from the business line regions evaluate these subcontractors based on time, quality, cost, safety, environment, complaints handling, cooperativeness, and development. Critical subcontractors are defined by Ballard and Elfving (2020) as service suppliers that are considered to be critical to the successful delivery of a project. An average score between 1 and 5 is then awarded to the subcontractor and reengagement decisions are made based on the individual scores of the subcontractor. Framework suppliers, on the

other hand are evaluated based on on-time delivery and quality. Ballard and Elfving (2020) argue that this approach to critical subcontractor and framework supplier evaluation reduces the number of evaluations that must be carried out.

While the supplier evaluation process presented in Ballard and Elfving (2020) is roughly outlined, no detailed description of the process is presented. Other sophisticated supplier evaluation models have been developed and described in detail. For example, Ho et al. (2010) conducted a literature review on multi-criteria decision-making approaches for supplier evaluation and selection and discovered that data envelopment analysis (DEA) was the most prevalent approach in the literature. DEA assesses the comparative efficiency of given entities through mathematical programming (Tsolas, 2013). One of the benefits of DEA is that it enables the aggregation of multiple dimensions of supplier performance, based on a variety of indicators, into a consolidated measure (Tsolas, 2013). While DEA has been successfully implemented in other industries, Noorizadeh et al. (2019) emphasise the need to consider the effects of changing operating environments on the evaluation of supplier performance in the construction industry. According to Noorizadeh et al. (2019), changing operating environments refer to external factors that cannot be controlled by suppliers, but can have a positive or negative effect on their performance, and can vary between projects. These environmental factors can be divided into project, product and location characteristics, project organisation characteristics, and buyer supplier transaction characteristics, as presented in Table 7.

Table 7. Characteristics of the changing operating environment. (Noorizadeh et al., 2019)

Project product and location	Project organisation	Buyer-supplier transaction
Project product type	Client type	Number and mix of suppliers
Project product size	Number of order and inventory management	Position of supplier in project operations spectrum
Project location	Project delivery method	Continuity of transactions and relationships

Noorizadeh et al. (2019) argue that these external factors should be taken into consideration in the development of supplier evaluation practices, as performance measures that may be essential in a hospital project, for example, may be of little relevance in a residential project. Given the nature of the construction industry, it is likely that many suppliers will be involved in projects of varying types, sizes, locations, and complexity for the same client. Empirical evidence from their study highlights these challenges associated with supplier evaluation in the construction industry. Consequently, Noorizadeh et al. (2019) suggest that DEA methods should be developed and

adapted to account for these external environmental factors, rather than attempting to remove these factors from the evaluation.

Another supplier evaluation approach for subcontractors that has been suggested in the literature is based on the balanced scorecard developed by Kaplan and Norton (1992). Eom et al. (2008) argue that most existing performance measurement frameworks in the construction industry “*lack the comprehensiveness required for evaluating subcontractor performance*” and propose a modified balanced scorecard framework. As a strategic management tool, the balanced scorecard is used to increase the alignment between business activities and the organisational strategy as well as to monitor the performance of the organisation against strategic goals (Eom et al., 2008). In addition to comprehensive evaluation criteria, this method ensures alignment with the overall business strategy, which has been recognised as an important aspect of the development of strategic purchasing operations within companies. Eom et al. (2008) propose a three-phase process consisting of a subcontracting strategy system, a subcontractor evaluation system, and a subcontractor management system based on an empirical study conducted in the Korean construction industry.

The subcontracting strategy system covers the creation of a strategy for subcontractor evaluation and management which includes the definition of goals for the subcontractor management, the determination of evaluation criteria based on the four categories of the balanced scorecard: financial, service, process, and improvement, and the definition of subcontractor indices. The subcontractor evaluation system comprises calculating weights for each of the subcontractor indices, evaluating the scores of subcontractor performance, and the production of a final subcontractor score. Finally, the subcontractor management system uses the weighting of the indices and individual subcontractor scores in each of the evaluation criteria to develop a managerial subcontractor index (MSI). Based on this index, general contractors can clearly communicate not only areas of improvement to the subcontractors, but also areas where the subcontractors are performing well. It is argued that this subcontractor management approach encourages learning and development. An overview of the evaluation framework is presented in Figure 12. (Eom et al., 2008)

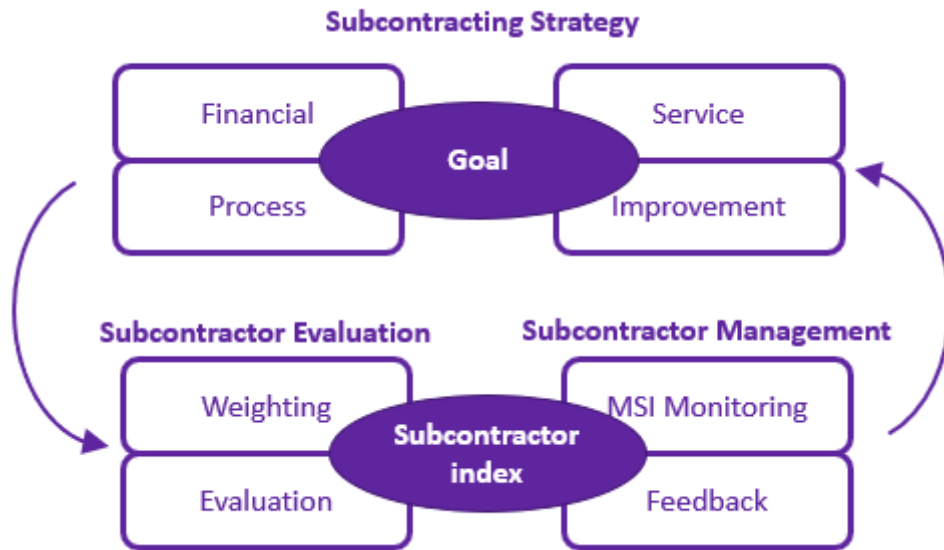


Figure 12. Subcontractor evaluation and management framework. Adapted from (Eom et al., 2008)

Regardless of the selected evaluation method, it is generally agreed upon that supplier evaluation is an important tool for the development of supplier relationships and more sophisticated purchasing practices. Firstly, supplier evaluation opens channels for feedback and communication between contractors and suppliers, indicating areas of improvement and areas of success which can form the basis for supplier development. Secondly, it can allow general contractors to make more informed decisions when selecting suppliers for any given project. Finally, supplier evaluation can form the basis for supplier segmentation which is the next step presented by Ballard and Elfving (2020) in the description of the supplier development programme at Skanska.

Supplier Segmentation

Due to the fragmented and localised nature of the construction industry as well as the multitude of suppliers with which general contractors interact, it would not be feasible to develop each and every supplier (Noorizadeh et al., 2018). Construction companies must decide which suppliers they will dedicate their limited development resources to. Supplier segmentation is therefore necessary in order to identify the most strategic suppliers and focus development efforts on these (Ballard & Elfving, 2020; Gosling et al., 2015; Noorizadeh et al., 2018). Noorizadeh et al. (2018) also suggest that the benefits of a stratified supplier development approach could extend beyond merely identifying suppliers that demonstrate the most potential for collaboration. The authors argue that suppliers in the same category may be able to benefit by learning from one another through benchmarking or consulting the customer for help (Noorizadeh et al., 2018).

A number of approaches to supplier segmentation have been suggested in the construction supply chain management literature. For example, Ballard and Elfving (2020) divide their supply base into five categories: Not Approved, Pre-Qualified, Approved, Preferred and Key, based on the pre-qualification process, average scores from the supplier evaluation, and alignment between the vision and strategy of both the buying and supplying companies. Ballard and Elfving (2020) suggest that there should be at least five preferred suppliers for each trade in any given geographical region in order to decrease the dependence on a single company and encourage competition between suppliers. Key suppliers should then be selected from amongst the preferred suppliers after sufficient experience of cooperation in projects has been collected and the alignment of values and strategies has been assured (Ballard & Elfving, 2020). Furthermore, the decisions for supplier categorisation are made through various levels of the organisational structure. For example, decisions about the most strategic suppliers are made by the Sourcing Board, whilst lower-level supplier segmentation decisions are made by Category and Portfolio Managers (Ballard & Elfving, 2020). This approach to supplier segmentation is strongly based on the subjective observations of suppliers and their performance, on the other hand, it also allows deeper engagement with the supply base.

Another approach to supplier segmentation that has been presented in the construction supply chain management literature and does not rely on subjective evaluation was proposed by Noorizadeh et al. (2018). Noorizadeh et al. (2018) developed a supplier segmentation pyramid based on a combination of recency, frequency, monetary value, and project count (RFMP) as well as data envelopment analysis using objective transaction data. The use of objective transaction data eliminates the need for subjective data-gathering tools which the authors argue can be laborious and challenging to implement in fragmented industries such as the construction industry and are subject to misinterpretation (Noorizadeh et al., 2018). Nevertheless, based on industry feedback, Noorizadeh et al. (2018) recognise the significance of subjective supplier evaluation in the process of supplier segmentation and propose that a combination of both subjective and objective inputs could lead to more wholesome supplier segmentation.

Portfolio models can also be employed to segment suppliers based on various dimensions. For example, Ferreira et al. (2015) and Arantes et al. (2014) applied the Kraljic matrix to construction companies in order to determine the strategic position of suppliers of various commodities and services. While the Kraljic matrix does offer some insight into which suppliers would fall into the strategic category, that particular purchasing portfolio model has been criticised for a lack of focus on relationship management as discussed in the previous chapter. Moreover, given the shortcomings of the Kraljic matrix and the existence of other supplier segmentation methods that may be more suited to supplier development initiatives, it is possible that this supplier segmentation approach may not be the most appropriate.

Altogether, supplier segmentation is a cornerstone of supplier development, by allowing buying companies to focus their resources and efforts on suppliers with the most potential, the vast supplier bases characteristic of the construction industry become more manageable. The merits of supplier segmentation are also recognised beyond supplier development initiatives themselves, as argued by Cox and Thompson (1997) who advocate for a differentiated approach towards the development of partnerships within the construction industry. It would therefore appear that supplier segmentation, beyond those based solely on supplier spend, are valuable to consider in the development of purchasing strategies within the construction industry.

Once the foundations described above have been set in place, focus can be turned to the development of the suppliers. Gosling et al. (2015) propose four strategies designed to improve supplier performance based on the segment to which they have been allocated. The first strategy involves the exploitation of competitive pressures, the main mechanisms being market forces and benchmarking which is believed to drive supplier performance. Gosling et al. (2015) suggest that the traditional purchasing practices of the construction industry, such as short-term contracts and competitive tendering, would be appropriate development initiatives in this category. The second strategy focuses on feedback, for example through balanced scorecards, evaluation, and certification. This way general contractors are able to require certain standards with respect to quality, cost, and safety, for example. The third strategy presented by Gosling et al. (2015) involves incentivising supplier performance, for example through supplier awards. The final strategy suggested is direct involvement. This is the most resource intensive of all the strategies, as the buying company involves itself directly with the suppliers, for instance through financial or equipment investments, partial ownership, or the sharing of resources. Gosling et al. (2015) further propose that these individual strategies correspond to the various supplier segments as presented in Table 8.

Table 8. Supplier segment and development initiatives. (Gosling et al., 2015)

Relationship category	Type of initiatives	Example initiatives
Gosling et al. (2015)		
Approved	Competitive pressures	Comparison of performance measures, multiple sourcing
Preferred	Evaluation and certification, incentives	Supplier awards
Strategic partnerships	Direct involvement	Training and technical investment
Ballard and Elfving (2020)		
Pre-Qualified, Approved	information exchange, recommendation, request, promise, threat, legalistic plea	Informing supplier of performance, promising reward for improvement
Preferred, Key	The above plus consulting, supplier clubs	-

Ballard and Elfving (2020) suggest a wider variety of supplier development strategies with a total of nine instruments for the development of suppliers. These include

information exchange, recommendation, request, promise, threat, legalistic plea, consulting, and supplier clubs. These instruments are also applied to certain supplier segments as demonstrated in Table 9. The first seven instruments become progressively more demanding with information exchange involving the voluntary provision of information to the suppliers without any demands for action, and the legalistic plea consisting of a formal agreement to comply with certain targets set out by the buying company. Consulting and supplier clubs are reserved for preferred and key suppliers as these are the most resource intensive supplier development instruments, whereas the other instruments can be applied to suppliers from any category. (Ballard & Elfving, 2020)

Moreover, Ballard and Elfving (2020) reported significant positive impacts of the supplier development programme on the performance targets set out at the beginning of the initiative. According to the authors, the supplier development programme reduced the risks presented by engaging with unqualified suppliers, consolidated the supply base giving the company more influence over its suppliers, increased the share of spend on better performing suppliers, and was positively correlated with increased profitability of the company. Despite the successes of the initiative, Ballard and Elfving (2020) also reported a number of obstacles to the implementation of supplier development programmes including the requisite top-management support, the risk of creating corporate disadvantage through the over-reliance on a small group of suppliers, and the high resource and time requirements associated with communication and training. The prerequisites, benefits, and obstacles encountered in the deployment of the supplier development programme are presented in Table 9.

Table 9. Prerequisites, benefits, and obstacles in supplier development. (Ballard & Elfving, 2020)

Prerequisites	Benefits	Obstacles
- Centralised purchasing (to a degree)	- Reduced risk	- Incentives structures encouraging short-term gains over long-term benefits
- Standardisation of project control & logistics	- Consolidated supply base	- Possibility of creating competitive disadvantage (if supply base becomes too small)
- Commitment from top management	- Increased share of spend on better performing suppliers	- High implementation and set-up costs
	- Increased profitability	- Requirement of cross-functional cooperation
		- High time commitment for communication and training

On the whole, it would appear that supplier development is worth considering in the development of a purchasing strategy. Furthermore, Ballard and Elfving (2020) demonstrate that supplier development can also successfully be applied in the construction industry, despite the underlying institutional, industrial, and attitudinal barriers characteristic of the construction industry. Nevertheless, it is recognised that the development and implementation of such a programme requires

considerable investments of time, resources, and competence. Despite the challenges in designing and implementing supplier development programmes, they have been recognised as gateways to supply chain management, encompassing supplier selection and evaluation methods, as well as active means of supporting and developing suppliers, encouraging the construction industry to adopt more collaborative working practices with the ultimate goal of improving industry productivity.

3.5 Purchasing Maturity in the Construction Industry

As outlined in the previous chapter, maturity models have been developed for purchasing operations, guiding practitioners in the development of their purchasing strategies, and offering suggestions for the ideal purchasing function. Maturity models have predominantly been developed for companies outside of project-based industries such as construction. Nevertheless, Bemelmans et al. (2013) and van Lith et al. (2015) used maturity models to assess the development of purchasing operations within Dutch construction companies.

Both maturity assessments are based on the Michigan State University, (MSU) model originally developed by Monczka et al. (1993). The MSU-building model was adapted to the Dutch construction industry and has been tested in 19 Dutch construction companies to ensure its suitability for the construction sector (van Lith et al., 2015). The adapted model consists of eight strategic processes and six enabling processes as presented in Table 10 and Table 11.

Table 10. Overview of strategic processes in MSU-building model. Adapted from (van Lith et al., 2015)

Strategic process	Description
SP1: Insourcing or outsourcing	Strategic choices between insourcing and outsourcing
SP2: Develop commodity/product group strategies	Determine company needs and formulate commodity strategy
SP3: Optimise the supply base	Determine most suitable suppliers for the company
SP4: Establish and manage relations	Develop, manage, and optimise relationships with strategic suppliers
SP5: Integrate suppliers into the value creation process	Use knowledge from suppliers in the development of new products, processes, or services for construction company
SP6: Integrate suppliers into the operational process	Simplify, standardise, and synchronise operational processes of the companies
SP7: Integrate supplier performance and quality	Identify and act on areas of improvement in suppliers' activities
SP8: Manage costs strategically across the supply chain	Collaboratively identify and reduce costs in supply chain

Table 11. Overview of enabling processes in MSU-building model. Adapted from (van Lith et al., 2015)

Enabling Process	Description
EP1: Establish integrated and aligned procurement and supply plans and strategies	Align company and purchasing strategies
EP2: Develop that purchasing organisation	Develop purchasing organisation strategies in alignment with other disciplines and company goals
EP3: Use supplier market possibilities	Optimise purchasing possibilities on local, regional, national, and international levels
EP4: Implement performance indicators for purchasing	Define and measure target performance
EP5: Consider information technology for purchasing	Control value chain through IT
EP6: Human resource management	Identify required competencies, training, recruitment, etc.

In their longitudinal study of purchasing maturity development in multiple construction companies in the Netherlands, van Lith et al. (2015) discovered that the increase in maturity was relatively low for most of the case companies. The areas showing the greatest improvement include the establishment and management of supplier relations, and the management of costs across the supply chain. In contrast, the strategic areas showing the lowest level of improvement were the development of commodity group strategies, and the integration of the suppliers into the value chain process. van Lith et al. (2015) suggest that these strategic measures may be more challenging to apply in the construction industry, for example, the authors reported that construction companies were still reluctant to engage in formal partnerships, becoming reliant on a single supplier.

It was discovered that some construction companies wish to monitor their progress towards purchasing maturity. In response to this, Bemelmans et al. (2013) developed a tool to deliver a quick overview of progress made towards maturity based on the MSU-building model and van Weele's (2010) maturity model as presented in Chapter 2. The resulting maturity framework is presented in Figure 13. Interestingly, despite not being explicitly stated in the MSU-building model, Bemelmans et al. (2013) suggest that the centralisation of purchasing operations is associated with higher purchasing maturity, even within the construction industry. This is, however, contrary to findings presented by Frödell et al. (2013), for instance, who argue that a level of decentralisation remains necessary within construction companies. Nevertheless, it can be argued that elements of Bemelmans et al.'s (2013) purchasing maturity model provide valuable insight into potential directions for purchasing strategy developments.

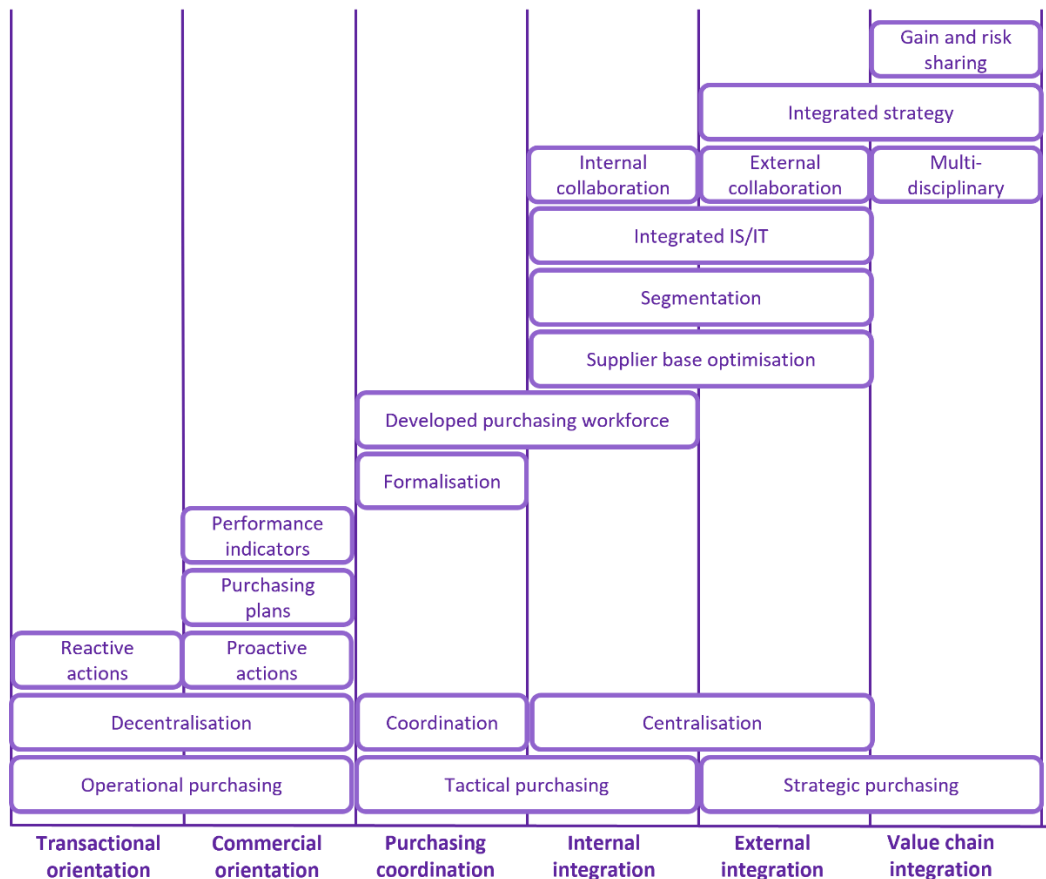


Figure 13. Development stages of purchasing maturity in construction companies. (Bemelmans et al., 2013)

Overall, it would appear that purchasing maturity models can be applied to the construction industry, however, they may require further modification to truly reflect optimal or even realistic purchasing practices within the industry. Moreover, as discussed in Chapter 2, practitioners should approach the application of such tools and models with the requisite understanding of the unique circumstances of their company or industry and adapt the frameworks as necessary. Nonetheless, these purchasing maturity models can act as starting points for the development of purchasing strategies within the construction industry.

3.6 Conclusion of Literature Review & Initial Roadmap Proposal

In the literature review, key purchasing and supply management concepts were defined on a general level, facilitating a deeper understanding of general purchasing principles and practices. The strategic significance of purchasing to overall corporate success was examined, and it was established that purchasing plays an important role in the overall profitability of a company. This emphasises the practical relevance of the research conducted in this study as the objective is to support construction companies in the development of purchasing strategies. The theoretical

understanding of purchasing strategy development and general purchasing practices was further developed in order to provide a strong foundation from which purchasing in the construction industry could be evaluated and understood.

One feature that stood out in the purchasing literature is the influence of various contingent factors on both the company and purchasing strategies. It is consequently argued that it necessary to develop and evaluate these strategies in alignment with the unique internal and external factors that affect the company. Therefore, it is proposed that an assessment of both the internal and external corporate environments should form the basis for the purchasing strategy development. Furthermore, the importance of the alignment between corporate and purchasing strategies stood out in the general purchasing strategy development literature. It is argued that the benefits offered by strategic purchasing cannot be fully exploited unless these strategies are aligned. Therefore, an assessment of the corporate strategy in connection with the internal and external environments is proposed in Phase 1 of the preliminary purchasing strategy development roadmap as presented in Figure 14. The roadmap builds upon purchasing strategy procedures suggested in the literature and emphasises the need for appropriate change management practices, as well as support and engagement from top management.

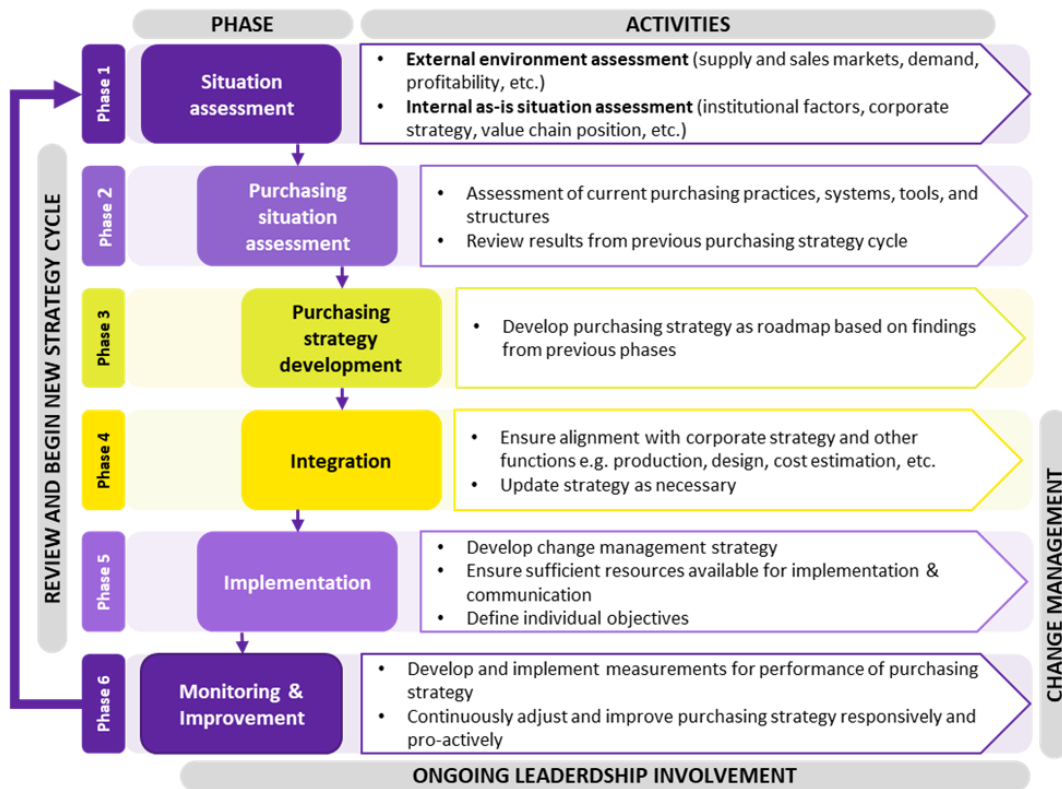


Figure 14. Preliminary purchasing strategy development roadmap.

Additionally, the literature distinguished between various levels of purchasing strategies, ranging from functional strategies in which purchasing practices and policies are defined to individual supplier strategies. With respect to this research, the objective is to design a roadmap for the development of a purchasing strategy on the functional level. Consequently, it is suggested that an understanding of current purchasing practices, processes, and tools on the functional level would be beneficial to the purchasing strategy development process. This is reflected in Phase 2 of the proposed roadmap. While Phase 1 provides contextual information for the development of the purchasing strategy, Phase 2 allows companies to understand the starting point for the strategy development.

In terms of the content of functional purchasing strategies for general contractors a number of topics stood out in the purchasing and construction industry literature. These include contextual factors such as developing an understanding of the current purchasing status through spend and market analyses, organisational factors, such as functional integration, the development of the purchasing workforce and competencies, as well as the organisational design of the purchasing function. Additionally, the development of purchasing practices and relationships through the integration of suppliers into company and value chain processes, as well as the active development of suppliers have been identified as relevant topics in the development of purchasing strategies for construction companies. In Phase 3 of the purchasing strategy development roadmap, the above topics are evaluated, and companies can select the most relevant topics to include in the development of the purchasing strategy. The suggested topics are summarised in Table 12. However, the list is not exhaustive and construction companies can include other topics according to their unique situations and corporate strategic goals.

Following the development of the purchasing strategy content, Phase 4 ensures the compatibility of the developed strategy with other relevant functions within the company as well as ensuring alignment with the overall corporate strategy. Furthermore, it was highlighted that alignment and integration should also be pursued between the purchasing and other internal functions, such as research and design or production in order to be able to fully capitalise on the insights and expertise provided by suppliers. This is also true for the construction industry, given that purchasing serves as an interface between the suppliers, production, and in certain situations also the designers. Consequently, integration is an important step in the roadmap as the function of purchasing is ultimately to support the construction site. Therefore, it is essential that the purchasing strategy and production strategies are functionally aligned. Additionally, purchasing should be in alignment with other corporate functions in order to facilitate improved results and corporate success.

Phase 5 is concerned with the implementation of the purchasing strategy. Here, it has been recognised in the literature that change management plays an important role in the successful adoption of the purchasing strategy and new practices. In the implementation phase it is also essential to ensure that sufficient resources are available and that the required competencies are at the disposal of the firm.

Table 12. Overview of potential topics for development in purchasing strategy.

Topic	Considerations
Spend & market analysis	<ul style="list-style-type: none"> - Are there processes for spend and market analyses? - How could these be improved?
Purchasing organisational structure	<ul style="list-style-type: none"> - Does the current organisational structure of purchasing support the operations of the company?
Partnerships/ Integration of suppliers	<ul style="list-style-type: none"> - To what extent are suppliers integrated into operations? - Do partnerships and supplier integration support the strategic goals of the company? - How could this be developed?
People & competencies	<ul style="list-style-type: none"> - What is the level of professionalism in the purchasing workforce? - Do purchasing staff have sufficient competencies and training?
Cross-functional integration	<ul style="list-style-type: none"> - To what extent are purchasing practices integrated with other functions? - Do the purchasing practices support the construction sites in the best possible way?
Supplier development	<ul style="list-style-type: none"> - Is there a process for supplier development? - How could supplier development be developed or improved to better support the strategic goals of the company?
Supplier segmentation	<ul style="list-style-type: none"> - To what extent and on what basis are suppliers segmented? - How does the segmentation of suppliers support the corporate strategy?
Supplier evaluation	<ul style="list-style-type: none"> - Is there a systematic process for supplier evaluation? - How can the evaluation of suppliers be developed to better support the strategic goals of the company?

Finally, in Phase 6, the performance of the purchasing strategy is monitored in order to ensure that progress is being made towards achieving the targets set out in the strategy. According to the progress made, the strategy can be adjusted and improved, as regarded necessary by the company. Furthermore, the strategy development process can be viewed as cyclical and the strategy may be updated and renewed according to the needs of each individual company, or as triggered by internal or external environmental factors.

Additionally, the literature review revealed a number of important cornerstones that should be considered throughout the diagnosis phase of this research. Firstly, it is necessary to understand the context of purchasing within the company and the construction industry from the perspective of general contractors in order to develop a strategy roadmap that is adaptable to these influencing factors. Secondly, the roadmap should be straightforward and understandable whilst maintaining the requisite level of detail. Finally, the roadmap should be prescriptive, however, it must retain enough flexibility in order to be applicable to the unique situation of individual construction companies.

3.7 Chapter Summary

This chapter has extended the literature review by focusing on the purchasing and supply management literature in the construction industry. Firstly, the characteristics of the construction industry and their effects on purchasing practices were examined, revealing a tendency towards transactional and short-term relationships with suppliers. Secondly, potential directions for development were reviewed, wherein the value of long-term, collaborative relationships and supply chain management philosophies were recognised as holding potential for increasing productivity and profitability in the construction industry. Thirdly, three main topics for developing purchasing operations in construction companies were introduced and discussed. These topics were the organisational design of the purchasing function, strategic partnering, and supplier development. Finally, an initial purchasing strategy development roadmap was proposed based on the findings from both of the literature reviews. The next chapter will present the research design employed in this study, laying the foundation for the development and testing of the final roadmap.

4 Research Design

This chapter describes and justifies the research design choices made to facilitate the design of a purchasing strategy development roadmap for construction companies. In this chapter, the philosophical and methodological approaches as well as data collection and analysis methods are outlined and motivated. An overview of this chapter and the research design choices are presented in Table 13. Finally, Section 4.7 describes the research process followed in this study.

Table 13. Overview of research design.

Aspect	Choice	Section
Research philosophy	Pragmatism	
Research purpose	Exploratory, Prescriptive	
Research approach	Abductive	
Research strategy	Design Science Research, Case Study	
Sample selection	Case company: Opportunistic Questionnaire: Convenience / Self-selection Interviews: Purposive/ Snowball Test: Purposive	
Data collection	Primary: Questionnaire, semi-structured interviews, unstructured participatory observation	
Data analysis	Template Analysis	

4.1 Research Philosophy

Research philosophies characterise the way in which studies are conducted, influencing methodological choices, research strategies, and data collection and analysis practices (Saunders et al., 2016). These philosophies contain assumptions relating to ontology, epistemology, and methodology (Bell et al., 2019). Ontology describes assumptions about reality, epistemology explores the nature of knowledge, and methodology defines methods and principles that are applied in a discipline to create and develop understanding (Manson, 2006).

As the objective of this research is to design a roadmap for the development of a purchasing strategy, emphasis is placed on the practicality of the outcome. Consequently, pragmatism was chosen as the philosophical frame for this study. In contrast to positivism, which is concerned with describing objective truth, or interpretivism, which is subjective in nature and seeks understanding, pragmatism focuses on the production of practical results (Saunders et al., 2016). Ontologically and epistemologically, pragmatism does not commit to a single system of reality; truth is regarded as what works and is not confined to either the positivist or interpretivist views (Frey, 2018). Pragmatists accept the existence of one reality without neglecting to recognise the importance of individuals' perceptions of this reality (Maarouf, 2019). According to Bishop (2015), pragmatists do not focus on whether the produced knowledge accurately reflects reality but rather on the "valuable external consequences" in the context of the researcher's goals.

As a result, the pragmatist research philosophy allows for a range of methods and types of knowledge to be employed without the significance of distinctions between qualitative and quantitative or subjective and objective approaches (Bishop, 2015; Kelly & Cordeiro, 2020). Pragmatism therefore allows the employment of all types of methods in the research design that best serve to answer the research questions (Maarouf, 2019). The selection of the research methodology and further aspects of the research design are motivated by the underlying philosophical assumptions discussed above.

4.2 Research Purpose

The purpose of the research is closely tied to the nature and phrasing of the research question (Saunders et al. 2016). Accordingly, the research can, for example, be exploratory, descriptive, explanatory, or evaluative in nature. As this study aims to discover how a general contractor can develop their purchasing strategy, the purpose of this research is initially exploratory. The exploratory approach is particularly effective in cases where new insights are sought, and the flexibility and adaptability of this approach serve as one of its main advantages Saunders et al. (2016). This flexibility relates to both the methods employed in the research and the direction of the research itself which is also compatible with the pragmatic philosophy. In practice this traditionally manifests as an initially broad focus that progressively narrows throughout the research process (Saunders et al. 2016).

Whilst initially explorative, the main purpose of this research is prescriptive. As the pragmatist philosophy values the production and utility of solutions, it follows that the primary purpose of the research should be to facilitate these outcomes. The participatory and solution-focused nature of prescriptive research is in alignment with these goals and underscores the ultimate objective of this study: the development of a roadmap that can be implemented by general contractors. According to Tsang (1997), one aim of prescriptive research is to improve organisational performance, which would naturally follow from an improved purchasing strategy. This further emphasises the practical relevance of the research and supports the choice of the prescriptive research purpose.

4.3 Research Approach

The approach to theory development adopted in this study is predominantly abductive, which combines both inductive and deductive reasoning (Suddaby, 2006). Inductive reasoning uses data from specific cases to form general theories, whereas deductive reasoning starts with a general theory and tests these in specific cases. In contrast to the sequential nature of induction and deduction, abductive reasoning moves back and forth between theory and practice (Figure 15), allowing each to influence the other (Dubois & Gadde, 2002a). This facilitates greater adaptability to respond to new theoretical and empirical discoveries that emerge as the research progresses (Dubois & Gadde, 2002a).

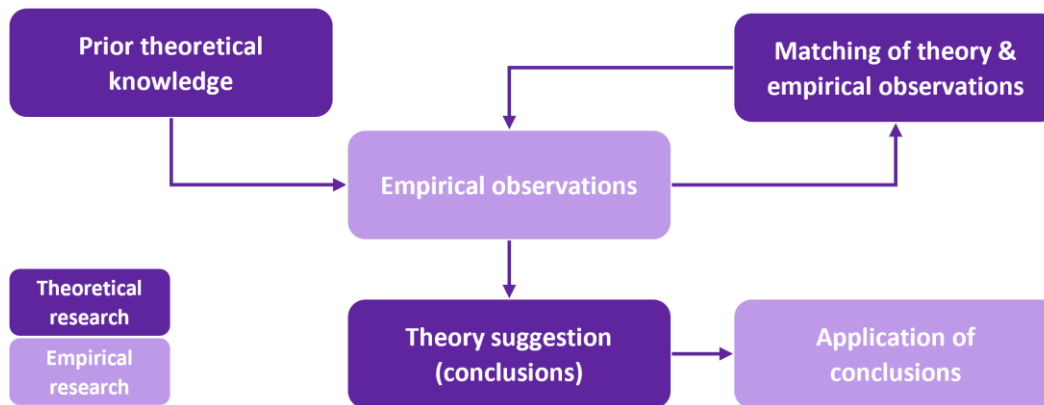


Figure 15. The abductive research process (Kovács & Spens, 2005)

With respect to this study, literature and prior theories inform the initial data collection. However, the iterative abductive approach allows the literature review and empirical data to work as an interactively developing entity, rather than two separate research elements. Thus, the research framework evolves responsively, is conducive to creativity (Dong et al., 2012), and encourages new discoveries (Dubois & Gadde, 2002a). Therefore, the nature of the research conducted for this study, which is centred around the creative design of a roadmap and the adaptation and extension of contemporary theories, lends itself to an abductive approach.

Moreover, according Saunders et al. (2016), abductive reasoning is particularly relevant to cases where there is a wealth of information available in one context, but a dearth in the context that is being researched. This is reflected in the wealth of literature that is available on procurement strategies and particularly supply chain management in other industries and the comparative scarcity thereof for the construction industry. Furthermore, Saunders et al. (2016) highlight the compatibility between abductive reasoning and the pragmatist research philosophy which has been adopted in this study. These arguments further justify the selection of abductive reasoning for this research.

4.4 Research Strategy

Strategy According to Saunders et al. (2016), the objective of a research strategy is to act as a guide for the researcher striving to answer their research question. Effectively, a research strategy provides a framework within which data is collected and analysed (Bell et al., 2019), and serves as a link between the philosophical standpoint of the research, the research question, and the choice of methods (Saunders et al., 2016). Given the nature of the research question as well as the research design, this study combines elements of two research strategies: Design Science Research and Case Study Research. These choices are motivated in the following sections.

4.4.1 Design Science Research

The primary research strategy adopted in this thesis follows the principles of the design science research paradigm, which facilitates the pragmatic development of

an artefact in close collaboration with practitioners. According to Lukka (2003), design science research produces scientific knowledge through the development of innovative artefacts, intended to solve practical, real-world problems. An artefact can be a construct, model, method, or instantiation (March & Smith, 1995), or, as defined by Peffers et al. (2007), “a design research artifact can be any designed object in which a research contribution is embedded in the design”. In addition to the creation of scientific knowledge, the proven utility and practical relevance of the designed artefacts are central to design science research (Hevner et al., 2004; Kuechler & Vaishnavi, 2008; Lukka, 2003; van Aken, 2004; Voordijk, 2009).

The process of knowledge creation in design science research involves the iterative cycling of designing, testing, and evaluating (Kuechler & Vaishnavi, 2008). While design science research includes certain procedural structures, Manson (2006) postulates that it is an entire research perspective that can comprise a variety of methods at different stages of the process, depending on the requirements of the research. This flexibility is mirrored in both the research purpose and approach of this study. Furthermore, Vaishnavi & Kuechler (2015) suggest that design science research naturally lends itself to a pragmatist philosophy combined with abductive reasoning.

As the aim of this research is to design a roadmap that can be implemented in the development of purchasing strategies for general contractors, the research strategy should ensure the practical relevance of the product in addition to its theoretical implications. Van Aken (2004) views a purely explanatory or descriptive approach as insufficient in ensuring practical relevance and identifies the wide-spread adoption of these approaches as one of the key underlying causes of the utilisation problem in management research literature. As a solution, Van Aken (2004) proffers prescription-driven, design science research, which, in contrast to descriptive research approaches whose goal is to describe, explain, and predict observable phenomena, aims to create reliable and valid knowledge that can serve as a foundation for devising solutions to problems. Holmström et al. (2009), Lukka (2003), and Stange et al. (2022) have also identified design science research as a bridge between theory and practice, allowing for both academic rigor and practical relevance. Figure 16 outlines the balance between theory and practice in design science research.

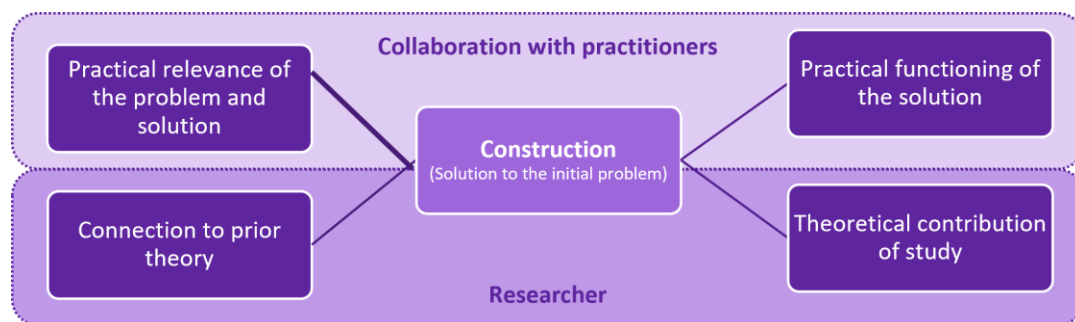


Figure 16. Central elements of design science research approach. Adapted from Lukka (2003).

Central to the design science research paradigm is collaboration with practitioners and researcher involvement which is also a cornerstone of action research (Järvinen, 2007). The practical and participatory approach to research is further supported by Eden & Huxham (1996) and Sein et al. (2011) who emphasise the value of being able to test and develop theories in practice, continuously reflect on learnings from the research process, and provide companies with results that can be taken into practice. Furthermore, this approach allows for knowledge generation and understanding to be developed on levels that the descriptive sciences would not be able to achieve based purely on observation.

Alsehaimi et al. (2013) and Azhar et al. (2010) have also recognised inadequacies of descriptive and explanatory research paradigms in construction management literature, in cases where the objective is to solve persistent real-world problems. Alsehaimi et al. (2013) suggests that particularly the development and implementation of innovative tools addressed at overcoming managerial problems in construction would best be facilitated by participatory research approaches such as action or design science research. Indeed, there are already a number of studies in construction management that have been conducted under the action or design science research paradigm. For example, Azhar et al. (2010), da Rocha et al. (2012), Lehtovaara et al. (2019), Tommelein (2020), and Oyegoke (2011) have all implemented active, participatory research strategies and confirm that this approach allows for the improvement of practices in the construction industry, encourages the uptake of new constructs and ways of working, and facilitates the development of innovative, yet theory-based solutions.

In addition to construction management research, design science has also been applied to the development of purchasing and supply chain operations, both within the construction industry and beyond. For example, Ballard & Elfving (2020) created a supplier development programme for a general contractor based on design science research. Bemelmans et al. (2013) employed design science research to develop a tool for assessing purchasing maturity in construction companies, and Wang et al. (2021) designed a blockchain enabled supply chain with a UK construction industry consortium, also through the application of design science research. Furthermore, Stange et al. (2022) also advocate for the wider application of design science in purchasing and supply management research, underscoring the solution focused nature and practical relevance of the outcomes as the main strengths of this paradigm. The previous studies and arguments therefore indicate that the design science research framework lends itself to research problems such as the one addressed in this thesis.

Research Process

As design science research is an applied discipline, there are a number of varied approaches and steps that can be followed. However, central to most design science research frameworks are an initial diagnosis of the problem, the development and proposal of an artefact or solution, testing the artefact in practical situations, and evaluating the outcomes and learnings. Figure 17 illustrates the design science

research process followed in this thesis, which is adapted from Lukka (2003). The research process is described in more detail in Section 4.7.



Figure 17. Research process and structure. Adapted from Lukka (2003).

4.4.2 Case Study

Given that design science research aims to create artefacts in close collaboration with practitioners, often within an individual organisation, the case study strategy provides a natural environment for research within the design science research framework. Yin (2018) defines a case study as the comprehensive examination of a phenomenon or topic in its natural, empirical setting. Within the anatomy of this research, the case study strategy provides a contextual understanding of the phenomenon in question, in this case purchasing strategies of general contractors and how these can be developed.

Case studies are often used for theory building or extension (Eisenhardt & Graebner, 2007) through the development of rich, empirical descriptions (Dubois & Gadde, 2002a). However, the purpose of the case study in this research is to provide a setting for contextual research clarification, the iterative development of the purchasing strategy roadmap as well as the evaluation of meeting industry success criteria. The reliability and validity of case study research in cases leaning more towards an interpretivist view such as this research can be described by the credibility of the account, evidence of reflexivity, transferability, and confirmability (Lee & Saunders, 2019).

According to Lee & Saunders (2019), case studies can be either orthodox or emergent in nature. Orthodox case studies typically begin with a literature review and define a rigid design of the study which is adhered to throughout the research. This approach tends to rely more heavily on quantitative methods and has a closer affinity to the positivist research philosophy. In contrast, emergent case studies are more flexible in nature as decisions about the direction and methods of the research emerge as more information is gathered as presented in Figure 18 (Lee & Saunders, 2019). Emergent case studies therefore also lend themselves to pragmatist philosophies and abductive research approaches. This thesis employs the emergent case study approach due to the flexibility that this lends the research process which is in harmony with the overall research design of this study.

Regardless of the case study approach selected, Lee & Saunders (2019) emphasise the need for keeping systematic records of the collected evidence. With respect to

evidence collection, Lee & Saunders (2019) also highlight that data can be gathered from a range of sources, facilitating a deeper, multidimensional understanding of the case. With regards to this study, the emergent approach allows the collected data to inform the literature review and research design and vice versa.



Figure 18. Case study approach (Lee & Saunders, 2019)

Case Selection

According to Yin (2018), case studies can be either single or multiple case studies (referring to the number of cases), and either holistic or embedded Emergent (referring to the unit of analysis) as presented in Figure 19. A holistic case study examines the target case as a whole, single unit. An embedded case study on the other hand, examines a set of subunits that occur within the case study (Lee & Saunders, 2019). While the case company for this study could lend itself to an embedded case-study approach due to the structure of the corporation with its subsidiaries, this research employs a holistic single case study approach. This is justified by the objective of the research which is to produce a roadmap for general contractors on the parent company level, rather than designing multiple roadmaps on the subsidiary level.

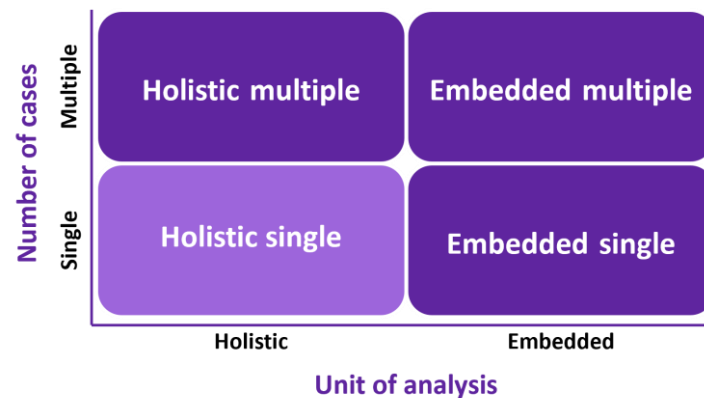


Figure 19. Case study typologies, adapted from (Yin, 2018)

The case company was selected opportunistically as defined by Lee & Saunders (2019). However, the selection was not made without consideration of the theoretical and practical implications of the choice, which according to Saarela-Kinnunen & Eskola (2001), is essential in case study selection. With respect to theoretical relevance, the company is a member of a university consortium within which this research is being conducted. Consequently, the outcomes of this study can be directly linked to current research in this field. With respect to the practical implications, this research aims to design a roadmap for the development of the procurement strategy of the company, demonstrating a practical relevance to conducting the research. The researcher, being an employee of the case company, is a further practical reason for the selection of this particular case. The direct involvement of the researcher facilitates the participatory nature of design science research, allowing the researcher to transition from an outside observer to an internal participant.

Despite the fact that this study consists of a single holistic case, there should still be an underlying desire to understand the phenomena on a more general level (Saarela-Kinnunen & Eskola, 2001). Therefore, a further factor in the selection of the case company is the type of case that it represents. Bell et al. (2019) define five different types of case studies, these include the critical case, the unique case, the revelatory case, the typical case, and the longitudinal case. This company was selected on the basis that it represents a fairly typical case of a medium to large sized general contractor in the Finnish market. This could therefore potentially increase the transferability and applicability of the outcome of this research to companies in similar positions. However, single case studies have been criticised for their vulnerability and lack of generalisability, at least from a positivist perspective (Yin, 2018).

4.5 Data Collection

Within the pragmatist philosophy, it is possible to employ a range of data collection methods, provided they further the practical goals of the research (Bishop, 2015). The use of multiple independent sources of data or data collection methods within one study is known as Triangulation (Cassell, 2015; Saunders et al., 2016). Triangulation can improve the validity and credibility of the research by reducing unfounded certainty that may arise from the application of a single data source or

collection method (Robson, 2002; Saunders et al., 2016). In this study triangulation is achieved through the application of semi-structured interviews, an industry questionnaire, documentary analysis, and unstructured participatory observation. The following sections outline the reasons and justifications for the data collection methods as well as their sampling techniques.

4.5.1 Primary Data

Industry Questionnaire

The questionnaire constitutes part of the diagnosis phase within the design science research process. The purpose of the questionnaire is to develop a deeper understanding of purchasing practices and developments in construction companies. While the majority of the primary data will be obtained from within the organisation, the questionnaire aims to collect views from practitioners throughout the industry. The objectives of the questionnaire are twofold. Firstly, the questionnaire aims to gather information on purchasing strategy content and development in the construction industry, inviting respondents to share best practices and lessons learned. The second objective is to identify candidates for external interviews in order to gain deeper insights into the development of purchasing practices and strategies in the construction industry.

According to Saunders et al. (2016), questionnaires can be employed in case study research and are traditionally quantitative in nature consisting mostly of closed questions. Nevertheless, given the exploratory purpose of the questionnaire within the context of this study, a more qualitative approach is taken. This is justified as the purpose of the questionnaire is not to confirm or deny a theory, rather, the objective is to collect insights from industry practitioners and their experiences. However, Saunders et al. (2016) caution that responses to open ended questions tend to be comparatively low which may limit the amount of data that can be gathered.

Several distribution methods have been proposed for questionnaires including postal questionnaires, telephone surveys, and e-mail questionnaires (Bell et al., 2019; Saunders et al., 2016). For this study, an internet questionnaire was deemed to be the most appropriate. This choice was motivated by a number of factors. Firstly, internet questionnaires can facilitate access to groups that may otherwise be difficult to reach. Secondly, geographical restrictions to the questionnaire are overcome, potentially allowing for a wider range of insights to be gathered. Finally, questionnaires are less resource-intensive than interviews which enables the collection of more data than would be possible through interviews alone. Similarly, the digital data format simplifies the evaluation process of the results. (Saunders et al., 2016) There are certain challenges associated with sampling in online questionnaires.

Depending on the distribution strategy, it can be difficult or impossible to determine the response rate (Bell et al., 2019). For example, if a link to the questionnaire is posted to online forums or social media platforms, it is impossible to calculate the total size of the population or know how many potential respondents have been reached. Therefore, it is important to acknowledge limitations to the generalisability

of results from online questionnaires administered by this method (Bell et al., 2019). Additionally, it can be argued that the sampling method in these cases is classified as self-selection, convenience sampling.

Semi-Structured Interviews

The purpose of conducting interviews in this study is twofold. Firstly, the interviews serve to build a comprehensive understanding of the current state of purchasing operations in the case company, and secondly, to gain insight into the perception of purchasing strategy development from within the case company. The information gathered from the interviews will provide contextual information for the designed roadmap as well as directly informing its development, aiding in answering the main research question.

One of the aims of the diagnosis phase of design science research is to develop a deep, practical understanding of the studied topic (Lukka, 2003). According to Lukka (2003), the objective is to obtain “profound insights into the original state of affairs in the target organisation”. Hirsjärvi, (2008) recommends the use of interviews in instances where the goal is to develop an overview of a situation whilst maintaining the possibility of discovering new connections between phenomena. In this study, the semi-structured interview was selected as the primary data collection method to achieve this goal.

Interviews are a widely used research method, their flexibility and adaptability make them a popular choice, particularly in qualitative research (Bell et al., 2019). Hirsjärvi (2008) recommend the application of qualitative research methods such as semi-structured interviews when the objective is to understand context-bound social situations where people and their experiences give meaning to the phenomenon. The context-specific and human-centric nature of this research phase therefore justifies the implementation of qualitative research methods.

Lee & Saunders (2019) recognise interviews as one of the most important data sources in case studies. There are three main types of research interviews: structured interviews, semi-structured interviews, and unstructured interviews. Of the three interview types, structured interviews are the most formatted, they are typically administered in the form of a questionnaire with standardised questions and pre-coded answers. The role of the interviewer is to ask the questions exactly as they are written and in a way that avoids bias and variance. The results of structured interviews are often quantifiable, and they are more appropriate for quantitative research designs. Unstructured interviews on the other hand do not follow a set format or even have predetermined questions. They are exploratory in nature and allow interviewees to speak freely on a topic, sometimes taking the form of a spontaneous discussion, rather than a pre-arranged interview. Semi-structured interviews fall in between structured and unstructured interviews. The researcher may have a list of themes or questions prepared for the interview; however, the format is flexible with respect to the order in which the questions are asked and whether questions are omitted, or new ones included. (Saunders et al., 2016)

The choice of the semi-structured interview for this study can be justified on a number of levels. Firstly, the flexibility of semi-structured interviews enables emerging themes to be explored as the research progresses, facilitating the collection of rich and descriptive data about the case (Cassell, 2015). This is particularly valuable in the diagnosis phase of the study as it allows participants to share their perspectives on the topic freely and for the research to adapt to new information as it is encountered, aiding in the development of a profound understanding of the initial state of the target organisation. Secondly, the theoretical and observational knowledge of the researcher can be exploited through the preparation of an interview guide. These predetermined questions and themes help to guide the interview in such a way that relevant information is collected on certain topics, without restricting the emergence of new themes and insights. These features of semi-structure interviews make them particularly compatible with case studies and abductive reasoning (Lee & Saunders, 2019), both of which are applicable to this study.

With respect to the sampling method, these can be divided into probabilistic and non-probabilistic approaches, the choice of sampling method depends on the research questions and strategy (Saunders et al., 2016). Given that the aim of the interviews was to gain a deep understanding of the current procurement operations of the case company and explore attitudes towards the development of purchasing strategies, non-probabilistic sampling was judged to be the more appropriate approach. Non-probabilistic sampling methods often contain an element of subjective judgement which can ensure that the most relevant participants, possessing knowledge closely related to the research questions and objectives, are included (Saunders et al., 2016).

A combination of purposive and snowball sampling was selected for this study. Purposive sampling allows the researcher to select cases that they consider to be the most resourceful in meeting the given objectives and is often employed in case studies or when working with very small samples (Saunders et al., 2016). In snowball sampling, the initially selected participants propose further participants who would be relevant to the given study (Bell et al., 2019). This process is repeated until knowledge saturation is achieved, no more participants are identified, or the sample has otherwise reached a sufficiently large number. The combination of these two sampling methods allows a narrowly focused group of participants, possessing the relevant experience and expertise to be selected, appropriately advancing the research goals.

Unstructured Participatory Observation

The primary application of unstructured participatory observation in this research is adopted in the context of demonstrating and testing the developed roadmap. Participatory observation allows the researcher to engage with the setting and obtain direct information about the behaviour and actions of individuals, teams, and organisations. Furthermore, Bell et al. (2019) recognise ethnography and participatory observation as valuable qualitative research methods, especially when a deeper understanding of the social context of the research problem is sought. Additionally, participatory observation has been recognised as a suitable method in cases where

the prediction of interactions between people and situations are difficult to make (Hirsjärvi, 2014). Given that the implementation of the designed roadmap relies on communication and interactions between participants, participatory observation is considered an appropriate data collection method.

Participatory observation can be divided into structured and unstructured observation. In structured observations information about predetermined topics and themes are collected throughout the observation period. In unstructured observation, on the other hand, observations are recorded as they emerge, and this method of observation is more suited to situations where it is not possible to predict and classify observations beforehand. With regards to this study, an unstructured approach is adopted given that no prior testing of the roadmap will have taken place whereupon predetermined observation tasks could be defined. Furthermore, the unstructured approach allows a more complete understanding of the situation to be developed as it is not restricted by a list of observations. However, the unstructured nature necessitates a strong focus on observing the situation as it occurs. Consequently, the recorded observations should not be analysed simultaneously, rather the analysis should not be carried out until after the observation period is complete. (Anttila, 2006)

Active participation of the researcher in the research process and observational context is common within design science research. With respect to the testing of the roadmap, the role adopted by the researcher in this study can be classified as *participant-as-observer* according to Gold's (1958) classification of roles in social field observations. According to Gold (1958), the *participant-as-observer* is a fully functioning team member of the social setting to be researched where their identity as a researcher is known to the participants. In this case, in addition to making observations, the researcher is involved in the process itself, also having a potential influence of the outcome of the process. One identified risk associated with the *participant-as-observer* role is an overidentification with the group that is to be observed which could affect the objectivity of the observations. However, given the pragmatic philosophical stance of this research, the level of objectivity in the observation of the testing phase should not compromise the results of the research.

4.5.2 Secondary Data

Documentary Study

A documentary study is conducted to supplement the information gathered from the internal interviews. The documentary study provides additional insight into purchasing practices and procedures in the case company and serves to facilitate a deeper diagnosis of the current situation. Documents related to purchasing were retrieved from the internal website, network drives, and personnel of the case company. The reviewed documents include the purchasing plan, the procurement system project plan, external training material provided by the CPO, and the company strategy.

4.6 Data Analysis

4.6.1 Template Analysis

Template analysis is often adopted in the analysis of detailed textual data and can be classified as a particular type of thematic analysis. Thematic analysis aims to define themes or patterns that can be identified within the data and subsequently organise these into structures that represent conceptual relationships between the identified themes (N. King & Brooks, 2017). Template analysis can be employed to analyse a single set of data (such as a series of interviews), or data from multiple sources (for example interviews, documents, and websites) (Saunders et al., 2016). Within the context of this research, template analysis allows the rich, contextual data gathered from the semi-structured interviews to be analysed in a flexible yet structured manner. The aim of the template analysis in this study is to identify the key themes and patterns that describe the current purchasing operations in the case company, as well as themes that should be addressed in the development of the purchasing strategy roadmap.

In template analysis, a coding template is developed and applied to the data set. The coding template is a hierarchical collection of themes, forming the fundamental analytical tool (Saunders et al., 2016). As a process, template analysis begins with becoming familiar with the collected data (N. King & Brooks, 2017). This could involve listening to recordings of interviews, transcribing, or translating the interviews, or reading through the gathered materials. Subsequently several cycles of coding, clustering, and template development ensue. Additionally, *a priori* themes, provisional themes that are defined in advance and based on pragmatic or theoretical reasoning, can be developed before the initial coding of the data. The initial coding involves taking note of data points that are relevant to answering the research questions or that support the *a priori* themes, typically from a subset of the original data. Once these themes have been identified, an initial template can be developed and applied. Throughout the process, the template can be amended to reflect the larger data set more accurately. Once the final template has been developed, it is applied to the full data set, acting as a foundation for the interpretation of the data. (N. King & Brooks, 2017)

Template analysis is not confined to certain philosophies or methodological approaches, rather, it is an analytical technique that can be applied in a wide range of studies. Within this research, the flexibility and practical applications of the technique justify its selection, especially within the pragmatic philosophy guiding this study. The flexibility of the coding structure allows the richest and most relevant areas of the data to be explored in great depth, without requiring the same level of detail in areas less relevant to the outcomes of the study or the research questions (N. King & Brooks, 2017). Furthermore, the use of *a priori* themes can help to ensure the applicability of the results to a real-world research problem (Brooks et al., 2015).

4.7 Research Process

The research process of this thesis follows the steps set out by the design science research framework. This section outlines the individual steps prescribed in design science research and describes their implementation within the context of this research. The research process and associated research strategies and data collection methods are summarised in Figure 20.

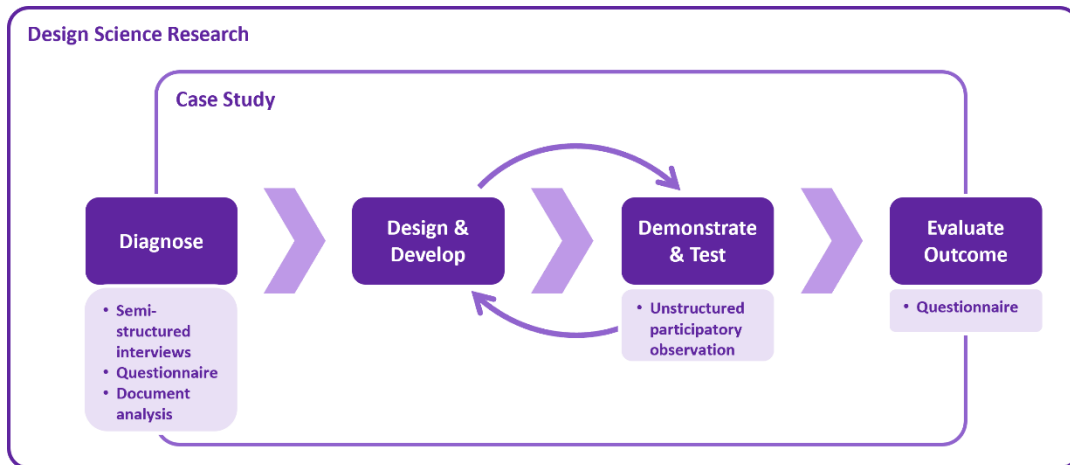


Figure 20. Summary of research process and design.

Step 1 Diagnose

The first step in the design science research process involves a diagnosis of the initial situation in line with the research questions posed. In this step a deep understanding of the topic area is sought, both practically, within the context of the case company, and theoretically, through the literature review (Lukka, 2003). The diagnosis should reveal the necessary theoretical and practical foundations for the design and development of the purchasing strategy roadmap.

Chapters 2 and 3 reviewed the purchasing and construction industry literature, forming the first part of the diagnosis. In the second part of the diagnosis, empirical data is collected from the case company about current purchasing operations and future purchasing requirements. This is accomplished through semi-structured interviews with case company employees and a documentary study. Additionally, wider insights into current purchasing operations in the construction industry are gathered through an industry questionnaire which help to inform the development of the roadmap. The second part of the diagnosis is presented in Chapter 5.

Step 2 Design & Develop

In the second step of the design science research process, the artefact itself is developed. Here, information gathered in the diagnosis phase is drawn upon to design a roadmap that meets the requirements of the case company.

The roadmap outlines the purchasing development process and provides topics and considerations for construction companies to incorporate into their purchasing strategy development. The design and development of the purchasing strategy roadmap is presented in Chapter 5.

Step 3 Demonstrate & Test

The third step of the design science research process involves the demonstration and testing of the designed artefact. In this step the designed roadmap is presented to members of the case company and elements of the purchasing strategy development process are tested according to the roadmap. This step serves to validate the proposed artefact as well as highlighting areas for development and improvement. In order to accomplish this, a demonstration and testing workshop is held within the case company and unstructured participatory observation is employed. The demonstration and testing process is described in Chapter 6.

Step 4 Evaluate

In the final step of the design science research process, the designed artefact is evaluated against the design objectives. Observations from the demonstrate and test step are used to inform the evaluation of the artefact in addition to separately collected feedback from purchasing professionals within the case company. Traditionally, the evaluation would inform the next iteration of development, testing and evaluation for the designed artefact. However, the testing of the updated roadmap is beyond the scope of this study. The evaluation of the roadmap is presented in Chapter 6.

Given the case-specific and context-bound nature of this research, it further recognised that systematic and thorough documentation should be executed throughout the research process (Collins et al., 2004). Additionally, detailed descriptions of each of the research processes and stages is essential to increasing the generalisability, repeatability, and validity of the research. Consequently, in addition to comprehensive descriptions, a research diary will be maintained through the data collection and analysis phase of the research.

4.8 Chapter Summary

This chapter outlined the theoretical and practical considerations involved in the research design for this study. The selected philosophical position of the research was explored and motivated, upon which the remaining research design was built. A description of the research strategy, based on the design science research paradigm was outlined, including the data collection and analysis methods. Overall, the development of the research design was inspired by the need to combine the practical relevance of the purchasing roadmap with a strong theoretical foundation.

5 Steps 1 - 2: Diagnose, Design & Develop

The purchasing and supply management literature was reviewed in Chapters 2 and 3 which formed the basis for the development of the initial purchasing strategy roadmap. This chapter presents the methods and results of the first and second steps in the design science research process, which serve to verify and develop the proposed roadmap in line with the needs of the case company. First, the data collection methods are introduced after which the data processing and analysis is described. Next, the results and discussion are presented, forming the foundation for the second step in the design science research process. Finally, the design and development of the roadmap is presented based on the results of the empirical findings

This chapter is organised as follows. Section 5.1 outlines the data collection methods for the industry questionnaire and semi-structure interviews. Section 5.2 details the data processing and analysis process. The results of the interviews and questionnaire are presented and discussed in Section 5.3. Finally, the design and development process of the purchasing strategy development roadmap is presented in Section 5.6.

5.1 Step 1: Diagnose – Data Collection

5.1.1 Questionnaire

The questionnaire was designed and administered through Webropol. The content of the questionnaire was devised based on preliminary findings from the interviews as well as an initial discussion with the CPO of the case company. Additionally, the questionnaire was complemented by findings from the literature. Furthermore, Levi et al. (2022) suggested that measures should be taken when designing online surveys in order to mitigate against potential survey fraud. Consequently, a bot catching question was included in the design of the questionnaire in order to identify potential automated respondents. The contents of the questionnaire are presented in Appendix A.

The questionnaire was distributed through two main channels, a university consortium and LinkedIn. Initially, members of the Aalto University-led Building 2030 consortium were contacted by email with a cover letter and a link to the questionnaire including a request to forward the email to construction industry purchasing professionals from within their professional networks. Additionally, a link to the questionnaire was shared on LinkedIn with the request for purchasing professionals from the construction industry to answer and share the questionnaire with their networks. In addition, the sales navigator tool provided by LinkedIn was employed to identify potential respondents who were contacted directly with a cover letter through LinkedIn InMail. LinkedIn and other social media were recognised by Mirabeau et al. (2013) as valuable platforms for identifying and soliciting respondents.

Respondents were incentivised with the option for requesting a summary of the survey results and the questionnaire was open for answers between 17.2.2022 and

27.3.2022. As discussed in the research design, it is almost impossible to calculate the response rate for surveys posted in online forums and channels (Bell et al., 2019). Consequently, no such statistic is provided for this questionnaire. Therefore, the results of the questionnaire should be regarded with the requisite caution regarding their representativeness. A total of 15 responses were submitted to the questionnaire of which 14 met the requirement of being employed by general contractors. The statistics of the questionnaire responses are presented in Table 14. Additionally, a breakdown of the experience in purchasing and job titles of the respondents are presented in Figure 21.

Table 14. Reponses to questionnaire.

Action	Total (n)
Submitted responses: Public weblink	15
Survey opened by respondents	57
Started responding	27

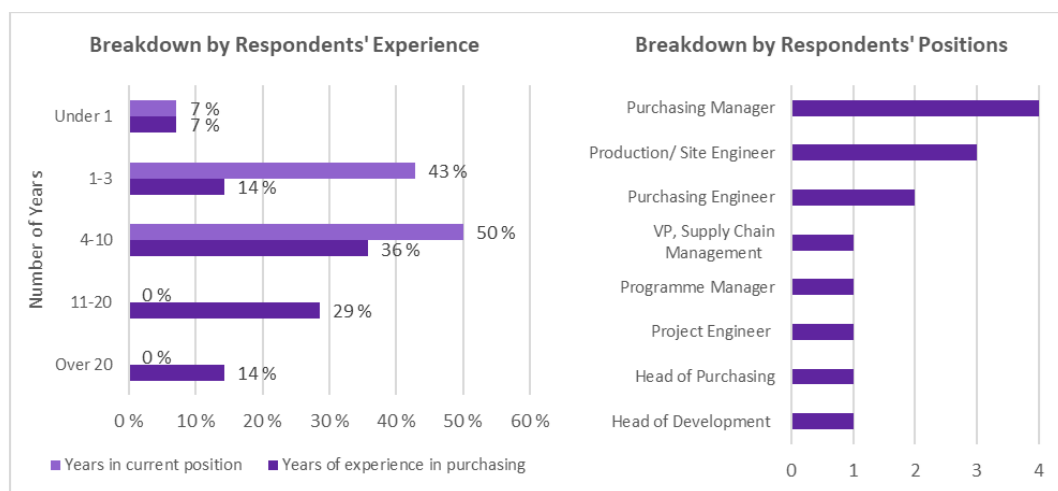


Figure 21. Breakdown of experience and job titles from questionnaire respondents.

5.1.2 Interviews

An initial purposeful sample was selected for the interviews including the Chief Procurement Officer (CPO), a Procurement Manager, and a Procurement Engineer. Further suggestions for participants were offered by the interviewees and their potential to offer new, relevant perspectives was evaluated when more than one suggestion was received. This process was continued until knowledge saturation was achieved and little new information was uncovered through the interviews. Based on these sampling methods, a total of 10 interviews were conducted with members of the case company. This number falls within the recommended minimum limit for semi-structured interviews as suggested by Saunders et al. (2016). Moreover, the interviewees contained representatives from each of the subsidiaries and covered functions throughout the organisational structure, ranging from Production

Engineers to the CPO. Additional unstructured interviews were also held with the CPO throughout the research process.

The selected participants were initially approached by email and all of the candidates agreed to take part in the research. Each participant was provided with a copy of the interview guide in advance as well as information about the study. This allowed the interviewees to reflect on their answers in preparation for the interviews, which can help to increase the dependability of the research (Bell et al., 2019). Interviewees were also informed that their provided information would be handled anonymously and that they had the right to withdraw from the research if they felt inclined to do so.

The interview questions were drafted based on an initial unstructured interview with the CPO from the case company about the relevance of the study, as well as findings from the literature. The interview questions were subsequently divided into the following topics:

- **Background and warm up:** questions about the background of the interviewee.
- **Current state of procurement:** questions concerning the current state of various procurement related topics within the case company.
- **Procurement strategy development:** questions inviting participants to share their views on topics related to the development of the procurement strategy at the case company.
- **Open discussion:** a chance for the interviewee to address further related topics and provide suggestions for further candidates.

The full interview guide is included in Appendix B. The same guide was presented to all of the interviewees with minor adjustments as the research progressed. However, the focus of the discussion varied between interviews, depending on the expertise and experience of the interviewee.

The interviews were held between January and March 2022. The first interview simultaneously acted as the pilot interview. Consequently, more time was reserved for this interview to allow for more follow-up questions and to ensure that the necessary responses could be recorded. When possible, the interviews were conducted face-to-face in the office, however, due to dispersed geographical locations and the prevailing global situation at the time, a number of interviews were conducted as Microsoft Teams meetings. Given the philosophical underpinnings of this study, the variation in the realisation of the interviews was not considered to diminish the knowledge and insights that could be obtained from them. An overview of the interviewees and the interviews is presented in Table 15.

In addition to the internal interviews, one interview was held with an external purchasing and supply chain expert from another Finnish general contractor. The purpose of the external interview was to gain deeper insight into purchasing related issues in the construction industry, allowing a wider perspective to be adopted. Furthermore, the external interview served to validate and expand upon some of the

findings from the internal interviews with respect to purchasing strategy development, allowing the design of a more comprehensive purchasing strategy roadmap. The interview was conducted face-to-face in English and a separate interview guide was devised for the external interview.

Table 15. Overview of interviews held.

Number	Title	Type	Date	Duration	Company
H1	Chief Procurement Officer	Face-to-face	31.1.2022	1h 25 min	Parent
H2	Procurement Manager	Teams	1.2.2022	57 min	DC1
H3	Head of Unit	Face-to-face	1.2.2022	56 min	DC2
H4	Procurement Engineer	Teams	2.2.2022	59 min	DC2
H5	Head of Unit	Face-to-face	2.2.2022	50 min	DC2
H6	Procurement Manager	Teams	3.2.2022	1h 2 min	DC2
H7	Procurement Manager	Face-to-face	3.2.2022	57 min	DC3
H8	Site Manager	Teams	7.2.2022	54 min	DC3
H9	Procurement Manager	Teams	7.2.2022	1h 2 min	DC4
H10	Production Engineer	Teams	9.2.2022	1h 25 min	DC1
E1*	VP supply chain management	Face-to-face	24.3.2022	55 min	External*

* Interviewee from external general contractor

With exception of the external interview, all of the interviews were conducted in Finnish, the native language of the interviewees. It was recognised that this would allow the participant to feel more comfortable and could also lead to a greater richness in the collected information. On the other hand, the fact that the native tongue of the interviewer was not Finnish could have affected the way in which the discussion was led and the follow-up questions that were asked. Nevertheless, the semi-structured format of the interview and the predetermined interview guide ensured that the necessary information was collected.

The interviews were recorded with the permission of the interviewees and under the assurance of their anonymity. The recordings served to improve the reliability of the data analysis phase by ensuring that an accurate record of the responses was created. Furthermore, the recordings allowed the researcher to engage fully in the interviewing process as the evidence did not rely solely on the notes taken during the interview. In the face-to-face interviews, the interviews were captured with a voice recording application on the mobile phone of the interviewer. The interviews conducted through Microsoft Teams were audio and voice recorded using the built-in recording feature of Microsoft Teams. The recordings were transferred to a hard-drive and several backup copies were created immediately after each interview.

5.2 Step 1: Diagnose – Data Processing and Analysis

The recorded interviews were transcribed as soon as possible following the interview. The first four interviews were transcribed manually from the recordings by the

researcher. The approach taken to the manual transcription was denaturalistic as the idiosyncratic elements of speech (pauses, stutters, non-verbals) were omitted (Cassell, 2015). The remaining six interviews were transcribed verbatim with the help of Microsoft Word's "Dictate" function, a voice-recognition software. The automatically transcribed interviews were subsequently formatted and corrected manually with the help of the original recordings. Consequently, each of the recordings was listened to in full at least once during the transcription process, allowing for a strengthened understanding of the collected material and later informing the analysis process.

The final data processing stage involved the translation of each of the internal transcripts from Finnish to English. This was considered a necessary step as it allowed the analysis of the data to take place in the native language of the researcher, facilitating a more comprehensive understanding of the material and connections found therein. Furthermore, the translation process necessitated a deeper engagement with the collected data through the interpretation of meaning in the responses of the interviewees. Care was taken to preserve the original meaning of the responses. However, certain parts of the interviews that were not related to the research questions or topic were omitted from the translations. This resulted in 101 pages of transcribed and translated interview material. With respect to the impact that the translation of the material has on the knowledge produced, it is recognised that some nuances may inevitably be lost. However, it was possible to refer back to the original transcripts in situations where further clarity was sought. Additionally, from a philosophical standpoint, the translation process should not significantly affect the integrity of the study, provided the final roadmap meets the practical requirements of the case company and industry in general.

Once the interview data had been fully processed, template analysis was employed to analyse the information gathered with the aim of identifying key themes describing the current purchasing operations in the case company. Additionally, topics that should be considered in the development of the procurement strategy roadmap were identified through the themes that emerged. The template analysis was conducted in ATLAS.ti, a software developed for this specific purpose. The external interview was not included in the template analysis due to its unique interview questions and purpose. The intensive data processing allowed the researcher to gain a deep understanding of the gathered material, based upon which extensive *a priori* themes were defined. The initial template was applied to a small subset of interviews; however, it was noticed that application of the preliminary template would not have been feasible within the constraints of this study. Consequently, more pragmatic *a priori* themes were determined and eventually applied to the entire data set, allowing for necessary modifications to the template. The final template is presented in Appendix C.

With respect to the questionnaire, the results were analysed and evaluated digitally. This was enabled by the fact that the questionnaire was administered as an online survey. Given the nature of the questions in the questionnaire, the results were analysed both quantitatively and qualitatively with a focus on the qualitative analysis.

5.3 Step 1: Diagnose – Results & Discussion

5.3.1 Purchasing in the Construction Industry: Questionnaire Results

The first objective of this questionnaire was to gain an insight into the development of purchasing operations in the construction industry. The questionnaire revealed that 93% of the respondents considered the purchasing function as holding a strategically significant position, suggesting that purchasing has a high impact on the company as a whole. With respect to the development of purchasing operations, respondents were asked to share the level of development of a number of concepts within their organisations on a scale of 1 (unaware of the concept) – 7 (evaluation measures exist). An overview of the results is presented in Table 16.

Table 16. Overview of developments in purchasing operations.

Question	Average	Median
Has your company incorporated the concept of strategic procurement?	3.7	3.0
Does your company have a centralised procurement unit?	4.9	5.0
Does your company regularly source from international suppliers?	4.8	5.0
Is your company systematically evaluating its suppliers?	4.7	5.5
Does your company have a supplier development programme?	2.9	2.0
Is your company developing partnerships with its suppliers?	4.5	4.0
Is your company using blockchain technologies in its procurement operations?	1.4	1.0
Does your company share integrated IT systems with its suppliers?	2.1	2.0
Does your company actively develop the competence of its procurement workforce?	3.6	3.0

1= Not aware of the concept, 2= The organisation is aware of the concept or issue, but no action has been taken, 3= An action is in the conceptual stage of development, 4= A formal action plan has been developed, 5= The action plan has been initially implemented, 6= The action plan is fully implemented, 7= Evaluation measures are in place to check the progress or success of the action plan

As shown in the table, the results suggest that within the companies responding to the questionnaire, supplier evaluation was the most developed, whilst blockchain technology and the integration of suppliers into shared IT systems were the least developed, with many of the respondents not being aware of the concepts. Only one of the respondents suggested that their company had initially implemented an action plan for the integration of suppliers into their IT systems, four of the respondents reported that a conceptual action plan had been developed, whilst the remaining respondents were either not aware of the concept or had no knowledge of action plans for the development of these operations. In contrast, seven of the respondents reported having fully implemented their action plans for supplier evaluation or were already monitoring the success and progress of the action plan. Therefore, it would appear that the evaluation of suppliers has been recognised by other companies as worth developing and should be taken into consideration in the purchasing strategy roadmap. Overall, the questionnaire provided valuable insight into the development of purchasing practices in the construction industry, which can be used as a

yardstick for the case company to assess how its purchasing operations compare to other companies in the industry.

The second objective of the industry survey was to gather information about how other construction companies have developed and implemented their purchasing strategies. Of the fifteen respondents, eight provided answers to the qualitative questions concerning purchasing strategy developments. Table 17 summarises the profiles of the respondents to these qualitative questions.

Table 17. Overview of respondents who answered the qualitative questions

Respondent	Job title	Years of experience in purchasing
R1	Purchasing Manager	10
R2	Project engineer/purchaser	6
R3	Purchasing engineer	15
R4	VP, Supply Chain Management	10
R5	Head of Purchasing	12
R6	Head of Development (Purchasing)	40
R7	Purchasing Manager	10
R8	Purchasing Manager	25

As shown in the table, respondents were asked to identify the greatest challenges in developing purchasing operations within their companies. R3 and R5 suggested that the characteristics of the construction industry, including traditional practices, act as a barrier to the development of the purchasing function. Within organisations, challenges such as a lack of commitment from management, organisational silos, change resistance, and a lack of resources were identified by R4 and R8. Furthermore, R7 recognised that:

“Development is always done in addition to one’s own tasks and requires additional energy from the organisation. ... Sometimes there are too many development projects at the same time in which case there is not enough energy for all of them and nothing gets ready. You often need to reserve the right kind of resources for the development with the correct competencies and enough time. It is often also challenging to get managers to commit to change management and have the requisite competencies. The permanent implementation of development actions is a science unto itself.” - R7

This extract underlines some of the challenges that can be faced in the implementation of purchasing strategies. The difficulties of implementing change and developments in the purchasing operations within the construction industry have also been recognised by Studer & de Brito Mello (2021), who recommend a strategic change management approach for developing the purchasing function. This highlights the importance of considering issues beyond the mere content of a purchasing strategy if the changes are to take hold permanently.

With respect to the factors that should be taken into consideration in developing and implementing purchasing strategies, respondents stressed the importance of realistic and clearly defined goals (R7), correct resources (R7), incentive systems (R4), continuous monitoring (R8), and the involvement of production in the development process (R8). Furthermore, the central role of management support and the consistency of the management was reiterated as a factor that should be considered in the development of purchasing operations (R7). Additionally, R4 suggested that in many cases, it could be worth starting with smaller pilot projects in order to demonstrate the benefits of the change. This approach was also suggested by the CPO of NCC, who advocated for the use of case studies to motivate change in purchasing operations and to demonstrate the benefits of new operational practices Axelsson (2005).

Additionally, respondents were asked what they would have done differently in the development of purchasing operations. R5 suggested that a clear definition of the goals before starting the development could have yielded better results or at least supported the implementation process. Similarly, R7 commented that good planning and ensuring commitment from management are essential for success. R4 recognised benchmarking visits to companies from other industries and recruiting from outside the construction industry as valuable measures to include in the development and implementation of purchasing strategies. Finally, R8 suggested that the selection of manager for the project is of great significance to the success and would opt for people with competence and enthusiasm to lead the implementation. Despite the recognition of what could have been done differently, R7 also highlighted how failed projects provide a valuable opportunity to learn and grow.

5.3.2 Purchasing in the Case Company: Current State

The recognition of purchasing as a strategic function within the case company has emerged in unison with the recent growth of the firm. This is evidenced by the hiring of the CPO two years ago and the introduction of Purchasing Managers within the subsidiaries. Currently, purchasing is still managed in a largely decentralised manner with high autonomy being granted on the subsidiary and project levels. However, efforts are being made to harmonise systems and purchasing procedures as well as to increase cooperation between the subsidiaries.

The cooperation between the subsidiaries is guided by monthly meetings between the CPO and the Procurement Managers as well as other procurement staff from the subsidiaries. The aim of the meetings is to review purchasing activities in the individual subsidiaries, increase cooperation and transparency as well as identifying potential opportunities for capitalising on purchasing volumes. Additionally, the monthly meetings act as a forum for sharing knowledge on current market issues and trends. However, cooperation between the subsidiaries generally remains reasonably light partly due to the differing purchasing practices and procedures of each division.

Consequently, a prominent area of focus within the purchasing operations of the group has been to develop a unified procurement system. It is believed that the

harmonisation of purchasing procedures, supplier registers, and archiving systems will facilitate greater knowledge sharing and cooperation between the subsidiaries. Furthermore, the system is being designed to support purchasing staff in their daily tasks, saving time and freeing resources for other project-related tasks. Indeed, the development of this integrated procurement system has been a strong strategic focus over the past year and is recognised by many of the purchasing staff as a positive addition to the IT infrastructure of the company. Moreover, digitalisation has been recognised as an important area of development within the purchasing operations of the company.

Despite the introduction of the unified procurement system, the harmonisation of operations between the subsidiaries is still identified as a challenge. Until recently, subsidiaries have had full autonomy over their purchasing operations, which has resulted in very different organisational structures and purchasing practices. Consequently, harmonisation of these activities will require the acceptance of change and new ways of working. Therefore, a well-designed purchasing strategy will be indispensable to the development of the purchasing function throughout the group.

Other challenges recognised in the interviews include the current market situation and the scarcity of human resources, both with respect to purchasing professionals and the construction industry in general. Recent history has had strong impacts on various commodity markets, which have affected the purchasing operations of the case company. Availability and price fluctuations have an influence on both project timetables and budgets. Consequently, it has been challenging to make the right orders at the right time. With respect to human resources, several challenges have been identified, including a general scarcity of professional purchasers in the construction industry, a lack of young and aspiring new purchasers and time pressure on existing purchasing resources. The challenges identified from the interviews are summarised in Table 18.

Table 18. Overview of greatest challenges in purchasing identified by interviewees.

Challenges faced	Interviewees	Frequency
Organisational structure (subsidiaries)	H1, H2, H6, H7, H10	8
Current market situation	H2, H3, H6, H10	5
Scarcity of Human Resources	H3, H4, H5, H9, H10	11
Other	H1, H6, H8	3

Frequency= number of times mentioned in interviews.

5.3.3 Purchasing Strategy

Several of the interviewees found it challenging to define the term *purchasing strategy* and what exactly it should encompass. Nevertheless, many suggested that the purchasing strategy should include concrete targets and act as a guide to show the direction in which developments are to be made (H1, H5, H6, H7, H10). Furthermore, it was recognised that it could be challenging to define a single purchasing strategy for the entire company due to the diversity of its operations (H5, H6, H7). Consequently, it was suggested that the purchasing strategy should not be too

detailed (H5, H7, H10), rather it should define operations and practices in broad strokes allowing for the requisite flexibility between subsidiaries and projects. However, the importance of harmonising purchasing practices and systems was also recognised by the interviewees. Thus, the purchasing strategy should encourage the company to achieve a balance between the requisite levels of autonomy and unity (H5, H7, H10).

“On the one hand there need to be clear things, but on the other hand the strategy can’t be too shackling to anything. So it should need to give the general direction, what the main points are.” -H10

“But of course, we have the organisations and the project delivery methods, there is some variation between them, so we can’t, in my opinion, just announce one single strategy for everyone and say that this is how we are doing things always.” -H5

“Clear enough but not too detailed. I wouldn’t want it to follow the model that people then only have their small square to take care of, or that they wouldn’t be able to use their own brains in the work.” -H7

These extracts highlight the issues discussed above and demonstrate some of the challenges associated with the development of purchasing strategies in construction companies. H5 also suggested that it could be beneficial to gather comments on the purchasing strategy from a variety of people throughout the company, such as superintendents and site managers who might be able to provide insights that may otherwise have been overlooked. It was recognised that ultimately, the function of purchasing is to support the construction sites and to ensure the continuity of the operations (H1, E1). This was also reflected in the questionnaire results by R2, who suggested that the perspective of the construction site should never be overlooked in the development of purchasing operations.

While the purchasing strategy must serve to facilitate the operations on site, H1 also recognised the importance of aligning the purchasing strategy to the overall strategy of the company:

“The meaning and role of the procurement strategy is that it must support the strategy of the company, of course.” -H1

This is in line with findings from the literature, as the importance of the strategic alignment between the corporate and purchasing strategies has been identified as a critical factor to company success (e.g., Baier et al., 2008; Carter & Narasimhan, 1996; González-Benito, 2007). The literature also suggests that the recognition of purchasing as a strategic function by the top management and a commitment to the development of purchasing operations is significant to corporate success (Ellram & Carr, 1994; van Weele, 2010; Watts et al., 1992). Similarly, H1 and H6 suggested that support and commitment from top management are critical to the successful development and implementation of purchasing strategies. This was further supported by R3, R7, and R8, who stressed the importance of management commitment to purchasing development projects.

With respect to the content of the strategy, several key topics, were identified by the interviewees and are presented in Table 19. In the questionnaire, respondents were asked to evaluate the importance of a given set of topics with respect to the development of purchasing strategies. The scale ranged from 1 (*very unimportant*) to 5 (*very important*). The results revealed that most respondents considered risk management to be the most important topic with an average of 4.8. This current focus on risk management could potentially be explained by the recent global pandemic and its effect on supply chains as well as political unrest in near geographical regions. The questionnaire results on strategy content are presented in Table 20.

Table 19. Overview of topics to be covered by purchasing strategy, interviews.

Strategy focus	Interviewees
Definition of operational practices	H1, H3, H4, H5, H6, H7, H9, H10
Digitalisation	H1, H2, H3, H6
Competence	H1, H2, H3, H4
International purchasing	H1, H2, H5
Growing supplier network	H1, H3, H5
Corporate responsibility	H1, H5
Encourage innovation	H5

Table 20. Importance of topics to purchasing strategy, questionnaire.

Topic	Average importance
Risk management	4.8
Supplier management & optimisation	4.6
Total quality management	4.6
Digitalisation	4.5
Cost reduction	4.5
Sustainable purchasing	4.2
Global sourcing	3.8
Centralisation of purchasing operations	3.6

Various suggestions were presented by the respondents for developing a purchasing strategy for construction companies, including partnerships and long-term collaboration with suppliers (R5) as well as supporting the productivity of construction sites (R4). Additionally identified topics included the introduction of category management, the training of purchasing staff, and a real-time understanding of the supply markets.

Finally, the issue of communicating the purchasing strategy was raised within the interviews. Many of the interviewees admitted that they were unaware of the current purchasing strategy or whether the company has explicitly defined a purchasing strategy (H4, H6, H7, H10). Therefore, it was suggested that the strategy could be communicated more strongly to the purchasing staff with an emphasis on ensuring that it is both understood and implemented (H7, H10). Furthermore, H7 suggested that it would be beneficial to communicate to the purchasing staff not only the

justifications for the choices but also the strategic directions in order to “make it easier for the changes to take hold”. This was also reflected in the questionnaire by R7, who suggested that the flow of information and justification for developments affecting the whole organisation should be an important factor in the success of purchasing strategy development:

“The better the whole company knows the reasons for the change, the easier it is to implement. It is also worth involving the organisation in the stages of the development project, in that case commitment comes as a by-product.” -R7

5.3.4 Spend and Market Analysis

One of the main areas of focus with respect to the strategic development of the purchasing function at the case company over the past years has been centered around spend analysis (H1). Digital tools were introduced to monitor and follow spend data. The introduction of these tools allowed the case company to develop a better understanding of its purchasing activities and identify differentiated areas of spend with respect to suppliers, subcontractors, and commodities. Furthermore, the introduction of the spend analysis tool allowed the company to divide its 2800-3000 suppliers into three spend categories through an ABC-analysis. These spend categories enable the company to develop differentiated approaches to supplier management and support fact-based decision making (H1).

Market analysis practices have also been receiving a growing focus over the past years at the case company. According to H1, issues related to supply market changes and situations are discussed with purchasing staff in monthly meetings. An understanding of the market is regarded as important knowledge for the purchasing staff. Nevertheless, regular, detailed or commodity-specific market analyses are not yet common practice at the case company.

Spend and market analyses have also been identified in the literature as significant contributors to the development of the purchasing function. For example, Schiele (2007) includes both spend and market analysis in the developed purchasing maturity assessment framework, highlighting the importance of automated spend analysis and an understanding of the supply market. Similarly, Kraljic (1983) argues that it is essential for buying companies to understand the supply market and includes market analysis as a central element for the development of his purchasing portfolio. Furthermore, in the case study presented by Axelsson (2005), the CPO of NCC also argued that a strong understanding of the supply market is an essential foundation for purchasing staff. Category management was suggested as a solution, allowing purchasing staff to focus their market analyses on smaller groups of commodities, thus increasing their professionalism and expertise in their given category. This can also facilitate stronger performance in negotiations based on an understanding of the price structures of the particular commodities and the market situation. The value of category management in terms of developing a deeper understanding of the supply markets and price structures was also highlighted by E1.

Overall, it would appear that both the interviews and the literature agree that spend and market analyses are important to the development of the purchasing function. A knowledge of purchasing spend can support the fact-driven management of suppliers and purchasing decisions. Equally, a deep understanding of the supply markets can strengthen the negotiation position of the buying company and facilitate more informed purchasing decisions. However, typical purchasing organisational structures in the construction industry, which are often project, rather than commodity-focussed, might not enable the depth of market analysis proposed in the literature. Additionally, the recognised scarcity of purchasing professionals in the Finnish construction industry (E1, H1, H3) and fast-paced project environments often require purchasing staff to focus on operational purchasing activities, with little time to conduct in-depth market analyses. Nevertheless, it is suggested that spend and market analysis should be included in the purchasing strategy development of general contractors.

5.3.5 Organisational Design of Purchasing

In the initial discussion with the CPO, the organisational design of the purchasing function emerged as a topic of interest to the case company. A degree of centralisation had already taken place within the company through the introduction of the group-level CPO and increased cooperation between the subsidiaries. Furthermore, certain processes and contractual terms have been harmonised throughout the group and these are set to be developed further through the implementation of the purchasing system as mentioned above (H1). H1 summarised the objectives of the case company with respect to the purchasing organisational structure as follows:

“In both our general strategy and the purchasing strategy the starting point is that we get it too be managed centrally and work decentralised.” -H1

This extract suggests that there is a balance to be found between centralised and decentralised purchasing operations. Furthermore, the quote implies that H1 recognises the value of a hybrid approach to purchasing organisation over a completely centralised or decentralised structure. Despite this recognition, finding the right balance between centralised and decentralised purchasing remains challenging.

Several of the interviewees identified purchasing structures with varying degrees of centralisation within the individual subsidiaries (H1, H2, H6, H7, H9). It was also noted that there are many differences in the organisation of the purchasing operations and responsibilities between the subsidiaries. For example, one subsidiary might have a single, central Procurement Manager who is supported by project-based site engineers (H1, H2, H9), whilst another might have a central Procurement Manager, several central Purchasing Engineers, and a number of project-based site engineers (H1, H6). With respect to the division of purchases, many of the larger contracts, such as HVAC, concrete elements, painting, and foundations are purchased by the Procurement Managers of the individual subsidiaries (H1, H5, H6, H8). On the other hand, smaller and more labour-intensive purchases are often carried out by the projects themselves (H1, H5, H6, H7, H8).

One of the main advantages identified in association with an increased centralisation of purchasing operations was the opportunity to take advantage of economies of scale by combining volumes across the group (H4, H6, H7, H9, H10). Another advantage identified by H9 and H10 involved the potential reduction of the workload for Site Engineers. With framework agreements or annual offers, for example, prices and terms are agreed upon centrally. In such cases, Site Engineers would need only to place the orders, which would allow more time for other site-related tasks (H9, H10). According to H5, further benefits of a more centralised procurement structure include the development of professional purchasing competencies in procurement staff, the potential harmonisation of production methods, and increased trust from suppliers and subcontractors. A summary of the benefits, drawbacks, barriers, and solutions associated with an increased centralisation of the purchasing function are presented in Table 21.

Table 21. Summary of benefits, drawbacks, barriers, and solutions of centralised procurement.

Theme, Comments	Identified by
Benefits	
The workload for project purchasers is reduced	H9, H10
Economies of scale can be achieved through the combination of purchasing volumes	H4, H6, H7, H9, H10
Professional competence of purchasing staff grows	H5
Harmonisation of production methods	H5
Increased trust from subcontractors and suppliers through increased consistency	H5
Drawbacks	
Loss of local, project-related knowledge	H5, H10
More difficult for chemistry between supplier and site manager to develop pre-contract	H4, H8
No one takes responsibility for the purchases of individual projects	H6
Barriers	
Project delivery method / customer involvement limits autonomy in purchasing decisions	H2, H5, H7, H10
Habits and attitudes of site and purchasing staff resistant to change	H7
Subcontractors lack the capacity to serve more than one project at a time	H4
More complicated flows of information with more parties involved	H4
Savings might not be as significant as expected in individual cases	H3
Commercial projects unique in nature	H1, H3
Solutions	
Hybrid structure with only certain procurements handled centrally	H5, H10

Loss of local, project-specific knowledge was cited as the main drawback to more centralised purchasing organisations (H5, H10). Interviewees emphasised that certain essential information and requirements for the purchases are more easily

obtained through close involvement with the site in question (H5, H10). Furthermore, it was suggested that in completely centralised purchasing models, the lack of local responsibility for purchases could raise concerns with respect to the accuracy of orders and commitment to the individual projects (H6).

In addition to the drawbacks, several barriers to the centralisation of purchasing operations were suggested throughout the interviews. The main barriers identified were associated with project delivery methods and the extent to which the customers or developers are involved with purchasing decisions (H2, H5, H7, H10). The case company carries out contracts under a variety of delivery methods ranging from projects with high autonomy where the case company acts as both the developer and general contractor to projects with high customer/developer involvement, such as those delivered under CMR or alliance delivery methods. Many projects with high levels of developer involvement are limited in their degree of centralisation. This is mainly due to joint purchasing decisions which are made together with the developer and require sufficient levels of decentralisation and project-level autonomy from the general contractor (H2, H5, H7, H10):

“In that sense in CMR and alliances we work very closely with the developer, especially with respect to procurement. And often those things are agreed upon on site ... So, the starting point for the model is that the procurements are done on site together with the developer’s supervisor at least, who then blesses [the purchases] and approves them.” -H5

Another example of project delivery method that was recognised in the interviews as requiring project-specific tendering are those delivered under the “competitive tendering” method:

“the majority of our projects are competitive tendering projects, so we need to have the possibility for free tendering there. But ... there are beginning to be less competitive tendering delivery method projects and more of our own developed projects and in those it is easier to take advantage of those kinds of [centralised] contracts.” -H7

These extracts highlight the influence of the project delivery method on the potential level of centralisation. On the one hand, developers can influence the choice of sub-contractors and suppliers, and on the other, it may be necessary to tender for individual projects under the competitive tendering delivery method in order to ensure that the most competitive prices are being offered. It was suggested that a completely centralised purchasing function may not be the most suitable organisational design in the cases outlined above (H2, H5, H7, H10). Nevertheless, it was recognised that project delivery methods with higher general contractor autonomy, such as develop-build, or design-build could benefit from a higher degree of centralisation in the purchasing operations.

The project delivery method was not the only barrier to the centralisation of purchasing operations identified in the interviews. The uniqueness of projects,

particularly in commercial construction was also highlighted as a hinderance to the complete centralisation of the purchasing function (H1, H3):

“Commercial projects are often so unique that we have to send out requests for every case anyway. We don’t order the same kind of windows, we don’t order the same kind of doors, same facades, even though the materials are more or less the same,” -H3

The above extract suggests that it would be challenging to achieve economies of scale though the centralisation of purchasing operations as the required purchases are often specialised and unique to the given project. Furthermore, the efficiencies associated with the centralisation of purchasing may not come to fruition, as project-specific goods and services would need to be procured, nonetheless. In contrast, opportunities for centralised purchasing were identified in residential construction, where many of the projects share similarities that can be capitalised on, such as flooring, windows, and doors. This highlights another issue with purchasing in the construction industry associated with the supply chain level from which goods and services are acquired. For example, it is currently quite typical for subcontractors to purchase the required materials for the contracts themselves. Therefore, the case company often has little opportunity to bundle and manage material purchases (H1). This further serves to limit the benefits that could be achieved from a higher degree of centralisation.

With respect to solutions to the barriers and drawbacks outlined above, three of the interviewees suggested that a balance between centralised and decentralised purchasing operations, a hybrid organisation, could be an appropriate approach (H1, H5, H10):

“the balance between these could probably be the best solution. ... or it's a good model to have a manager at the head office and have a procurement engineer at every construction site who's really inside that construction site” -H5

The extract emphasises the value of local project knowledge whilst acknowledging that there are benefits to more centralised procurement practices. The suggestion of a hybrid purchasing organisation agrees with the findings presented by Frödell et al. (2013), who discovered that complete centralisation may not be the most suitable approach to purchasing organisation in the construction industry. Similarly, Ballard & Elfving (2020) advocate for an appropriate degree of centralisation, arguing that the implication of policies and new purchasing practices require adequate central authority and organisation. Moreover, Frödell et al. (2013) suggest that the clear divisions of tasks and responsibilities within the purchasing organisation is necessary to achieve the increased efficiency of hybrid purchasing models. These considerations are reflected in the case company through the introduction of the CPO and the goal of harmonising purchasing processes and structures as well as increasing cooperation between the subsidiaries.

Many of the benefits of centralised purchasing identified by Frödell et al. (2013) were also identified by interviewees in the case company. These include taking

advantage of purchasing volumes, enforcing purchasing practices and procedures, and developing purchasing expertise. However, contrary to Bemelmans et al. (2013), who associated centralised purchasing with higher purchasing maturity in construction, the interviews highlighted difficulties associated with the complete centralisation of purchasing operations in construction companies with a diverse range of projects and delivery methods. Interestingly, there is little discussion in the literature about the effect of construction delivery methods on the organisational design of purchasing operations in general contractors. Nevertheless, both the empirical evidence from this study and the literature agree that the organisational design of the purchasing function is of strategic significance and should therefore be considered in the development of a purchasing strategy (Leenders et al., 1994). Furthermore, the empirical evidence suggests that construction companies should consider how the structure and nature of their operations affect the potential organisational designs for their purchasing functions.

5.3.6 Category Management

There was reasonably strong consensus within the case company that category management would not be an appropriate sourcing structure for their context (H1, H3, H4, H6). In contrast, the external interviewee, with a background of purchasing in both the electronics and, more recently, the construction industry suggested that category management was “the only way” (E1). This topic highlighted clear differences in opinion with respect to the suitability of category management for the construction industry.

On the one hand, E1 suggested that with category management, purchasing professionals are able to develop a far deeper understanding of the supply markets and commodity price structures. This can give purchasing professionals an edge in negotiations and supplier performance can be measured against criteria that are most beneficial to the category, rather than focusing solely on price (E1). On the other hand, H1 argued that from their experience, purchasing staff can become “one-dimensional in their capabilities” and that category purchasing is very work intensive:

“The amount of work increases immediately if we have say 10 category procurement managers and we need to inform all of them of a change in the schedule or that the plans have changed” -H1

Similar concerns about category management were also voiced by more operational purchasing staff:

“It does make things easier for the firm, but more difficult for the procurer ... it is extremely mind-numbing and monotonous work because in Finland there are relatively few of those suppliers.” -H4

These extracts suggest that careful consideration should be given to the introduction of category management as this could potentially have negative effects on the workload and motivation of purchasing managers. Nevertheless, the potential and value of category management were recognised in certain situations by the case company. For example, H1 and H3 suggested that category management could be more

suitable in residential construction due to the higher level of standardisation in the products, materials, and solutions. Furthermore, E1 highlighted the possibility of aligning purchasing categories with lean construction practices to reduce waste, suggesting that:

“A category needs to be the bridge between the construction site and what their needs are and how the supplier market is formed.”

-E1

This can then facilitate the development of category strategy planning in the long-term, rather than focusing on short-term cost reductions. Additionally, E1 emphasised the future need to reduce CO₂ emissions in the construction industry and suggested that category management could facilitate this through the increased expertise of category purchasers.

However, E1 also recognised that the construction industry is still far behind other industries with respect to category management and suggested that the formation of meaningful categories is a challenge that is yet to be overcome. Another factor that might complicate the formation and introduction of purchasing categories is related to the acquisition of the materials and whether these are purchased directly by the construction company or if they are procured by the subcontractors. In an additional informal interview, the CPO of the case company suggested that the mass purchasing of commodities lends itself more naturally to the introduction of category management than the contracting of labour.

Nevertheless, H9 suggested that a purchasing strategy involves the categorisation of purchases in any case, at least into volume commodities, hardware store products, and subcontracting. Indeed, it would appear that certain categories emerge naturally and are managed differently, such as HVAC, windows, or interior furnishings. These are often managed more centrally within the purchasing organisation of individual subsidiaries, depending on the type of construction and project. However, no formal category management or commodity group approach has been introduced at the case company. Additionally, E1 stated that they have tried to develop several models for categorisation and reported that “They’re all bad and they’re all good”. E1 suggests that there are an infinite number of ways in which categories can be formed and that they require careful consideration and testing in order to find a model that provides categories that are able to support the production.

Little literature has been published on the issue of category management in the construction industry and in general (Heikkilä et al., 2018). Nevertheless, from the past professional backgrounds of the interviewees, it would appear that there is at least an interest in the construction industry in adopting category management in the strategic development of purchasing operations. One case study presented by Axelsson (2005) describes the renewal of purchasing operations including the introduction of category management to a construction company operating in the Nordic region. Axelsson’s (2005) case study reveals that a key consideration in the adoption of category management is the supply chain level at which the contracts are being formed. This was also recognised by the CPO of the case company of this study, who recognised that category management might be a more appropriate approach if the

company were to procure a higher share of goods and materials directly from the manufacturers or distributors, rather than in connection with the subcontractors.

Overall, the key considerations connected to category management as a strategic direction for the development of purchasing operations can be summarised as follows. Firstly, careful consideration should be given to the benefits, drawbacks, and barriers of introducing category management. The interviews revealed a general resistance towards the idea of category management as a solution for the case company. Consequently, should it be decided to introduce category management as part of the strategic development of purchasing operations, change management measures should also be employed to ensure the successful transition. Secondly, category management requires a certain degree of centralisation for the development and enforcement of new purchasing practices and policies. And finally, categories should be defined in such a way that they support both the needs of the company and purchasing function as well as the needs of the projects and construction sites.

Case example: HVAC

One class of purchases that stood out in the interviews as being managed both more centrally and similarly to a category as proposed in category management was HVAC. Several of the interviewees identified HVAC as a group of products that is often procured by the purchasing unit, rather than the individual projects (H1, H2, H3, H5, H6, H8, H9). The most frequent reason given for the more centralised management of HVAC purchases was the recognition of the financial significance of such purchases, as HVAC often accounts for a large portion of the costs in construction projects (H1, H5, H6). Additionally, H1 stated that the complexity of HVAC and requisite specialist knowledge contribute to the distinction of HVAC as an individual purchasing category compared to other commodities and services:

“Someone could then specialise in HVAC which is quite common- HVAC is so challenging that there are quite often- we have the HVAC specialists who are specialised in the HVAC procurements. ... It is its own area of engineering, and it develops very quickly.” - H1

This extract suggests that while construction companies may not have employed category management as a policy, there could be certain situations where categories emerge naturally. With respect to the development of purchasing strategies, it is therefore suggested that opportunities for similar natural categorisation are considered. Provided the purchasing structure of the construction company is able to support such differentiated purchasing models, it could be beneficial to regard certain purchases requiring a higher level of specialisation as categories and manage these accordingly. This approach to category development could hold potential benefits for construction companies, even if it is decided that a comprehensive category management approach to purchasing is not of strategic advantage to the construction company in question.

5.3.7 Partnerships

The topic of partnerships revealed significant differences in opinions between at least two subsidiaries. While a number of interviewees acknowledged the benefits of partnerships and strongly advocated for their development (e.g., H1, H5, H7), others were more cautious (e.g., H8, H9), some even arguing that partnerships would not be suitable to their operations (e.g., H3). Most of the resistance towards partnerships originated from the subsidiary focusing on commercial construction and can be partly traced back to the diversity of the projects, which often require specialised materials and labour (H3). Additionally, it was recognised that the project delivery method can have an effect on the implementation of partnerships, especially when the customers or developers are involved with supplier selection (H2, H5, H7, H10). Furthermore, several of the interviewees cited over-dependence on a single supplier and the potential for prices to rise above market rates as reasons to be wary of the development of more permanent and involved relationships (H2, H3, H4, H5, H6, H8). In contrast to this, H7 suggested that from their experience, the best prices were often negotiated with partners and companies with a longer history of cooperation rather than from new or unknown companies. For example, H5 stated

“We have to maintain competition so that our pricing doesn't run away, and the price stays moderate. It is constant balancing, that we still get a realistic price and are tight in our cost calculations, through partnerships it can easily get lax if you just trust your partner.” -H5

In contrast, the views of H7

“I see that the partnership thinking - in a sense that you usually also get the cheapest price from the partner who works well-... so if there is a contractor that we work with, when we want to work with them and the contractor wants to work with us, then we get continuation there and that is then in the long run always the best and even cheapest option.” -H7

These two extracts demonstrate stark differences in opinion and experience with partnerships, juxtaposing the views expressed more on the commercial construction side with those experienced in residential construction. This contrast is similar to the findings concerning organisational design, where the type of construction project might influence the applicability or at least ease of adopting certain purchasing structures. Indeed, it was recognised that the benefits of partnering may be easier to realise within residential construction, especially as the share of projects designed by the case company itself increases:

“I would say that the residential construction is the furthest with partnerships, they are needed, there we get the greatest advantage from them. So, when we have our self-designed projects, then we can bring their knowledge and expertise into the design process. Then we can save money and increase the quality and we also improve the customer experience in that way.” -H1

This extract underlines the influence of the delivery method on the potential benefits and possibilities of partnerships for the case company. Delivery methods where the case company is responsible for the design of the product allow the integration of suppliers in an earlier phase of the project (H1, H7, H8, H10). It was recognised that the input and expertise of suppliers and subcontractors could lead to cost saving solutions and increased constructability as well as the adoption of best practices (H1, H7, H10). However, many associated the topic of involving suppliers and subcontractors in the design phase with temporary, project-specific partnering, rather than partnerships that would span the entire group (H8, H10). Nevertheless, some interviewees also recognised the value of forming long-term partnerships (H1, H7, E1). Particularly knowledge transfer and joint learning were cited as benefits of long-term partnerships (E1).

Despite the recognition of the value of partnerships and supplier integration, the case company currently has very few contractual partners (H1, H5). This is, in part, due to the relatively young age of the company with much of the growth having taken place fairly recently (H1). Nevertheless, the development of partnerships has been identified as a strategic goal for the purchasing function of the case company (H1). However, H1 also recognised that the development of partnerships takes time and that the main strategic focus for the coming years would be to address more basic purchasing operations, such as deploying the purchasing system.

The issue of partnerships was also recognised in the questionnaire. Firstly, it was suggested by R2, R5, and R7 that partnerships with suppliers are important to consider in the development of purchasing strategies for construction companies. Furthermore, R5 and R6 also reported positive experiences from the expansion of their partnership programmes. For example, R6 stated that the partnering programme with subcontractors was easy to implement and was received well. Moreover, R6 described the results of the partnership programme as achieving genuine cooperation in the offer and construction phases and that the company was able to guarantee delivery times and price commitment. The questionnaire illustrated a practical case of the successful implementation of partnerships in the construction industry and underlined its strategic significance to purchasing operations.

The interviews and questionnaire reveal similar findings with respect to the concept of partnerships in construction as the literature. For example, Gadde & Dubois (2010) discovered a dominance of short-term project partnerships over long-term strategic partnerships in the construction industry. This is echoed in the empirical evidence, as many of the interviewees were more comfortable with the concept of project partnerships rather than strategic partnerships. An underlying reason for this is the reluctance to become too dependent on single suppliers, which is reflected in both the literature and the interviews (e.g., Gadde & Dubois 2010). Furthermore, interviewees revealed a fear of partners increasing their prices due to the reliance and trust bestowed upon them by the construction company. This is in line with Noorizadeh et al. (2018), who identify opportunistic behaviour of suppliers, due to increased trust, as a risk of closer relationships in the construction industry. Nevertheless, the value of partnerships with respect to customer value, increased learning, and reduced costs as well as throughput times have been recognised in both the

literature and the interviews (e.g., Black et al., 2000; Bresnen & Marshall, 2000; Gadde & Dubois, 2010).

Similar to organisational design, an issue that was brought to light in the interviews but was barely addressed in the reviewed literature are the effects of the project delivery method and project type on the development of partnerships. The interviews indicate that certain project delivery methods are more restrictive with regards to supplier selection, especially where there is high developer or customer involvement. This issue was also identified by the case company studied by Noorizadeh et al. (2018), but was not the focus of the study. Construction companies may wish to consider the influence of project delivery method in the development of their purchasing strategies, as the portfolio of projects delivered under different methods could potentially affect the development of partnerships.

5.3.8 Cross-Functional Integration

The interviews revealed a close involvement between purchasing and a number of other functions in the construction company. The main functions with which purchasing collaborates include design management, cost calculation/bidding, production, and post-calculation (H3, H5, H6, H8, H9, H10). The relationships between the functions and the associated flows of information as summarised from the interviews are presented in Figure 22.

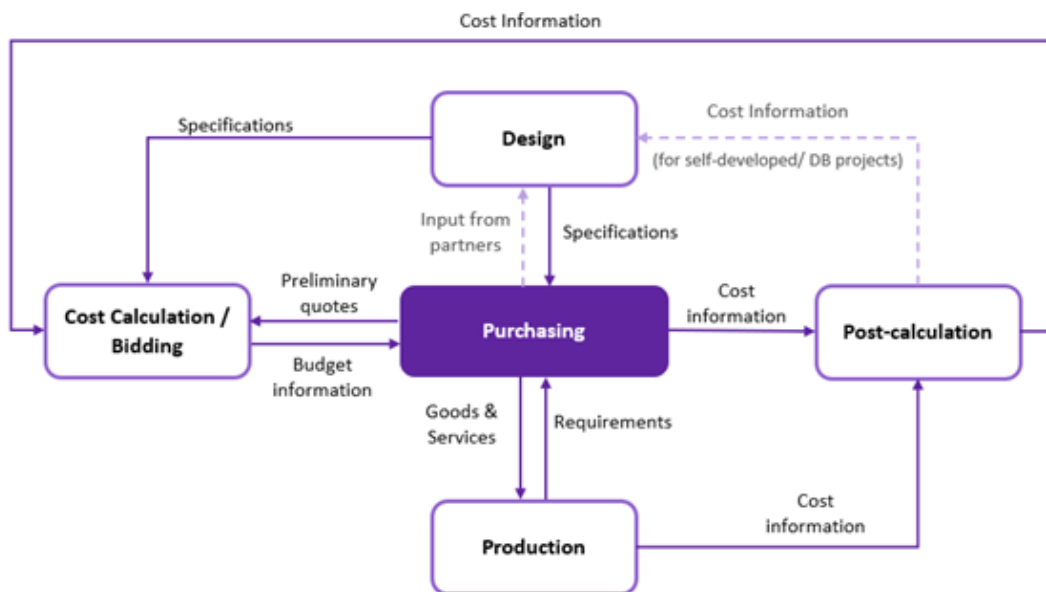


Figure 22. Relationships and flow of information between purchasing and other functions.

Most of the interviewees recognised the importance of the integration between the purchasing units of the subsidiaries and the construction sites (H4, H5, H6, H8, H10). For example, it was highlighted that close cooperation between purchasing and the projects is essential with respect to logistics (H6). Additionally, interviewees H8 and H10 suggested that it is often valuable to include site management in

negotiations with suppliers to ensure that all necessary aspects are agreed upon in the contract. Furthermore, H10 emphasised that the purchasing staff should support the site management if conflicts or differences of opinion should arise with a supplier or subcontractor:

“... and maybe it is also how we support the construction site when there is a conflict, you definitely need to support the superintendent in those cases.” -H10

This extract underlines the importance of good collaboration between purchasing and the site, especially as purchasing can lend further authority to the site management in cases of dispute. In addition to supporting the sites, purchasing is also sometimes involved with the cost calculation for bids placed by the case company (H6, H9). For example, purchasing staff may send preliminary Requests for Quotes (RFQs) to suppliers and subcontractors in order to obtain price information (H6). Despite much of the cross-functional cooperation working well, the case company recognised that there is potential for improvement. For example, the development of the new purchasing system is believed to facilitate a higher degree of cross-functional integration through the increased accessibility of information and reporting (H1, H2).

As discussed in the previous section, the cooperation between purchasing and design can have noticeable impacts on the outcome of the project (H1). It was recognised that the early involvement of suppliers and subcontractors could serve to reduce project costs and increase value for the customers (H1). Consequently, purchasing plays an important role in the acquisition of suppliers and the integration of these into the early design phase of projects.

Additionally, while many of the interviewees focused on how purchasing could support other functions, H5 suggested that other functions could also support the purchasers:

“Although we have appointed procurement people, they cannot be experts in everything. I believe that the purchasing of frames, for example, needs expertise from design management, site managers, unit managers. So, we just have to support whoever makes the purchase so that we can use all the information that is available in the firm. So that we would get enough support for the procurer from the entire company.” -H5

This extract highlights that functional integration can go both ways and that internal collaboration could serve to support the purchasing process. H3 also noted that professional input from construction managers and superintendents could greatly support purchasing staff. Given the large impact of purchased goods and services on the profitability of construction companies, it could be worth considering functional integration both with respect to what purchasing can offer the company, as well as how the company can support purchasing.

Cross-functional integration was mentioned in the questionnaire by R7 and R8, particularly with respect to the development of the purchasing strategy. Both respondents underlined the value of involving production in the strategy development. R7 suggested that the involvement of the wider organisation in the strategy development would naturally increase the commitment to the changes that are to be adopted. R7 also recognised the wider significance of cross-functional integration:

“The most important thing is a mutual understanding and shared goals with the production organisation. When that works, the next thing is collaboration with design management and cost calculation. Construction means working together and, in any case, purchasing is a support function for the production.” -R7

In general, the importance of cross-functional integration between purchasing and other business areas has also been recognised in the literature. Indeed, several purchasing strategy frameworks emphasise the importance of integration and compatibility across various business functions (e.g., Nollet et al., 2005; Virolainen, 1998; Watts et al., 1992). Furthermore, Schiele (2007) emphasise the importance of cross-functional integration to the maturity of purchasing operations and suggest that higher cross-functional integration could increase the ability for organisational learning. The findings from the interviews and questionnaire are in line with the literature and suggest that there are many opportunities for cross-functional collaboration and integration in the construction industry. Therefore, it could be of significant strategic value for construction companies to consider cross-functional integration in the development of purchasing strategies.

5.3.9 Supplier Selection

Without formalised supplier evaluation processes, the case company selects suppliers based on a number of factors. Most of the interviewees identified relationships and previous experience of working with the supplier or subcontractor in question as the most significant factor in supplier selection, as presented in Table 22. This was closely followed by price with factors such as reliability, quality, and schedule only being addressed in a few of the interviews.

Table 22. Current factors influencing supplier selection.

Selection Criteria	Identified by	Frequency
Relationships/ previous experience	H1, H3, H4, H5, H6, H7, H8, H9, H10	11
Price	H2, H4, H5, H6, H7, H8, H9, H10	10
Reliability	H2, H4, H6, H10	4
Quality	H1, H2, H4	3
Schedule	H3, H4	2
Other	H3, H5, H10	3

The heavy reliance on suppliers which the company had worked with previously was regarded unfavourably by some of the interviewees, as it was believed that this has a negative impact on the competitiveness of the offers and ultimately the projects

(H1, H6). Consequently, the case company aims to expand their supplier base in order to avoid over-reliance on a few select suppliers and to invite the opportunity for learning (H1, H3, H6).

“And with the supplier database the hope is that we would then be able to search for the suppliers and hopefully be able to expand our supplier base and who the requests for quotes are sent to, because that always guarantees that the competition will be stronger and generally costs are decreased through competition.” -H1

This extract demonstrates that while the narrow supply base and current supplier selection criteria are regarded as problematic, measures are being taken to increase competition and improve the costs. The expansion of the supplier base and increased focus on price as a selection criterion may appear contrary to the partnership mentality and consolidation of the supply market. However, it could be argued that partnerships should be formed tactically rather than opportunistically or out of habit without previously developing a balanced understanding of the supply market and other supplier capabilities. In this respect, supplier evaluation and development could prove to be valuable tools for construction companies in achieving a balance between competition and collaboration.

Price was also recognised as a key factor in supplier selection. Some interviewees even suggested that this was more important than past experiences with suppliers (H4, H7, H8). However, it was also noted that the price should not come before quality and that the cheapest price may not always be the best option (H1, H2, H3, H4):

“Of course, there you need to remember that we can’t necessarily always go for the cheapest...” - H4

On balance, it would appear that equal weight was given to previous experience of the supplier and price, even if the order of these two criteria varied between interviewees.

Similar to the results from the interviews, price has been recognised as one of the most significant criteria for supplier selection in the construction industry purchasing literature (e.g., Ferreira et al., 2015). However, while Ferreira et al. (2015) argue that price-based supplier selection processes are responsible for the short-term focus and transactional nature of relationships in the construction industry, very few of the interviewees suggested that price should be a secondary criterion for supplier selection in the future. Indeed, some even expressed the view that price should be considered over past experience with the suppliers. The significance of previous experience with suppliers is also in line with findings from the literature. For example, Arantes et al. (2014) recognise interpersonal relationships and past experience as playing a decisive role in the selection of suppliers.

An interesting contrast between the interview results and the literature is the focus of the case company on expanding the supplier base. This is in direct contradiction to the actions and aims of the construction companies presented in Ballard & Elfving

(2020) and Axelsson (2005). However, it is important to consider both the size and lifecycle-phase of the companies. Both Skanska and NCC have operations throughout the Nordic region and are far larger and older than the case company with 26,000 and 74,000 suppliers of goods and services respectively (as reported at the start of their consolidation programmes). In contrast, the case company currently only operates in Finland and has a total of 2800-3000 suppliers. At this stage, the consolidation of the supplier base may not be the most beneficial action for the case company to take with respect to offering competitive prices. Nevertheless, the introduction of the purchasing system and a supplier evaluation process could facilitate a profitable expansion of the supplier network based on informed supplier selection.

5.3.10 Supplier Segmentation

Supplier segmentation was only mentioned in one interview, H1. Currently ABC-analysis is the only method employed for supplier segmentation at the case company (H1). Suppliers are divided into three classes (A, B, and C) based on the amount spent on the supplier in question. This allows a rudimentary division to be made between suppliers and differentiated strategies can be applied based on these categories. Nevertheless, a number of more comprehensive supplier segmentation methods have been suggested in the literature (e.g., Ballard & Elfving, 2020; Kraljic, 1983; Noorizadeh et al., 2018), that could offer the case company a stronger foundation for differentiated sourcing strategies. Furthermore, these segmentation processes could aid in the identification of suppliers suitable for development or the building of more collaborative relationships. Therefore, it is suggested that supplier segmentation methods are evaluated within the purchasing strategy development process, provided that these support the company in achieving its overall strategic goals.

5.3.11 Supplier Evaluation

Supplier evaluation was widely recognised as an area with potential for improvement (H1, H2, H3, H4, H6, H7, H8, H9, H10). Current supplier evaluation practices are ad-hoc in nature and vary between the subsidiaries. An overview of the various supplier evaluation methods currently employed are presented in Table 23. Current evaluation measures involve free-form comments on suppliers and no specific evaluation criteria have been defined in the case company at the time of this study. Particularly the harmonisation of supplier evaluation processes and the sharing of information between the subsidiaries were identified as important targets (H1, H4, H6, H7, H10). These issues are planned to be addressed in the development of the supplier database and procurement system which will allow the systematic evaluation of suppliers in an accessible format (H1, H4, H6, H7).

Table 23. Overview of current supplier evaluation methods.

Means of supplier evaluation	Interviewees	Frequency
Phone calls	H2, H3, H6, H8, H9, H10	6
Word of mouth	H1, H2, H3, H8	4
Meetings	H3, H10	3
Excel	H10	2
Other	H3	2

The content and scope of the supplier evaluations were also raised as issues to be considered within purchasing strategy development by a number of interviewees (H1, H2, H4):

“Currently construction companies usually do the evaluation once the job is done, in the final report. The downside to this is that memories fade over time and it needs to be so that the evaluations come in while the work is being performed. Or even that we would start evaluating from the sending of the RFQs onwards, we can evaluate whether they answer on time, did they respond in line with the request? Then in the negotiations there would be what kind of representative there was, was the contract process good, was there an initial inspection when they came to site, did they fulfil the requirements before coming to site? Then how did it go on the site itself and also how did it go once the job was finished, for example annual maintenance, how complaints were handled and those kinds of things. It is necessary to capture the whole process, that we start evaluating the supplier from a very early stage.” -H1

Based on this extract, it would appear that there is a vast potential for supplier evaluation throughout the lifecycle of a project. Furthermore, the extract suggests that cross-functional input would be a valuable asset to supplier evaluation, allowing the experience of purchasers, production teams, and guarantee period employees to be recorded. These practices could further serve to support cross-functional integration between the purchasing department and other functions. Nevertheless, interviewees also emphasised the importance of fast, simple, and straightforward evaluation systems (H1, H5, H8, H10):

“It would have to be as simple and quick as possible, so roughly from 1 to 5 quickly evaluate and click to say what kind of experiences you have of the company. If you start having to evaluate and analyse things too much, then no one will write anything.” – H5

It was highlighted that time spent on evaluations is time spent away from completing production-related tasks in the case of site staff (H10). Therefore, it is suggested that careful thought should be given to the development of evaluation criteria and methods, balancing between the breadth and depth of the gathered data as well as the available time and commitment from individuals. A further issue that was raised regarding evaluation criteria involves the subjectivity of the evaluations. It was

recognised that personal chemistry plays an important role in the perception of supplier performance and that certain prejudices may have an effect on the evaluation process (H2, H3). Consequently, it could be beneficial to consider both qualitative and quantitative measures in the evaluation of suppliers.

Finally, it was also suggested that it could be advantageous to invite suppliers to give feedback on the performance of the case company (H6):

“...we can get an understanding of what their view is of how well the conditions have been met for them to carry out their contract.”
-H6

This extract suggests that receiving evaluations from suppliers would allow the case company to understand how well the suppliers and subcontractors are supported throughout the various processes and how well the required conditions have been met. Consequently, areas for improvement in the purchasing and production operations of the case company could be detected and strategies devised to develop these areas. These two-way evaluations could furthermore encourage cooperation between the case company and its suppliers through the opening of communication channels.

The results from the interviews with respect to the processes and considerations involved in supplier evaluation are similar to those described by Ballard & Elfving (2020). For example, Ballard & Elfving (2020) reported that both the production and procurement staff were involved in supplier performance evaluation at Skanska. Furthermore, the need to optimise the scope of the supplier evaluation process in order to ensure its effective adoption in practice is also recognised. Ballard & Elfving (2020) address this issue through the numerical evaluation of critical subcontractors based on a given set of criteria.

One aspect of supplier evaluation discussed in the literature that was not mentioned in the interviews was the impact of changing operating environments on supplier performance. Noorizadeh et al. (2019) highlighted the challenges associated with evaluating supplier performance in the construction industry due to the variable nature of projects and environments. Whilst not discussed in the case company, it could still be beneficial for construction companies to consider the effects of changing operating environments on the evaluation of suppliers in the development of a procurement strategy.

5.3.12 Supplier Development

Supplier development was identified as a long-term goal for the case company however, it was not considered an immediate area of concern within the development of the purchasing strategy (H1). Given the size, turnover, and overall maturity of the company, it was suggested that the feasibility of supplier development at this stage would be low. Nevertheless, the value of such programmes was recognised by H1 and certain processes enabling the eventual adoption of supplier development are being developed, even though they are not explicitly linked.

“As I said, we always need to take the size/ lifecycle stage of the company into consideration and in a way also the maturity. We aren’t at that lifecycle stage yet, or at that maturity here.” -H1

The recognition that the case company may not currently have the capability or requisite maturity to implement supplier development practices supports Schiele’s (2007) concept of purchasing absorptive capacity to an extent. Schiele (2007) suggests that there is a minimum level of purchasing maturity that is required before the benefits of the application of best practices can be taken advantage of. In this context, the company has recognised that certain prerequisites are lacking and that the purchasing strategy developments should focus on attainable goals and more immediate priorities. Nevertheless, certain elements identified by Ballard & Elfving (2020) as integral to supplier development, such as the reduction of risk through prequalification and issues concerning supplier evaluation and selection are considered by the case company as being of more immediate strategic concern within the purchasing development goals.

5.3.13 Risk Management

Many interviewees identified background checks on suppliers as significant to risk management (H1, H2, H3, H5, H6, H7, H8, H9). Construction companies are legally obliged to ensure the legitimacy of the companies with which they conduct business. This can be achieved by checking that legal requirements have been met through Vastuugroup¹, for instance. Currently, the risk management practices are labour intensive, especially in the RFQ stage, as each supplier has to be checked individually (H2). Consequently, legal and financial background checks might not be performed until the beginning of negotiations. Risk management has therefore been suggested as an area of improvement. Additionally, the development of a supplier register, which automatically incorporates background information from Vastuugroup and financial information from providers, such as Asiakastieto² has been identified as a priority:

“Once again, the procurement system, if we would get the Asiakastieto and Vastuugroup links there then it would make things a lot easier.” – H2

It was also suggested that the case company could benefit from clearly documented procedures or measures to be taken in situations where the financial risk ratings of potential suppliers are elevated (H6).

Whilst not as comprehensive as the pre-qualification process suggested by Ballard & Elfving (2020), the introduction of the background information of potential suppliers into the supplier database could serve to eliminate high-risk suppliers and thus consolidate the supply-base. Given the high impact of purchased goods and services on the financial performance of the company as well as the schedule and

¹ A Finnish service provider, offering data on companies, ensuring that these have met the legal requirements.

² A Finnish service provider, offering financial information on companies.

quality of projects, it is suggested that risk management should be considered in the development of purchasing strategies. A future goal for the case company could be to introduce pre-qualification questionnaires to further reduce risks associated with suppliers and aid in the selection of the most qualified candidates.

5.3.14 International Sourcing

International sourcing was a topic that emerged in the initial discussion with the CPO as being of interest to the case company. Many interviewees recognised that the Finnish supplier market is relatively small (H1, H2, H3, H4, H5) and that expanding the supplier base to include companies from overseas could present new opportunities (H1, H2, H5). However, currently very little is purchased directly from abroad. Indeed, H7 stated that the procurement of goods from overseas has largely taken place through the subcontractors, limiting the need for international purchasing operations at the case company. Nevertheless, H1 and H4 recognised that there could be advantages to procuring goods from overseas directly.

Currently, the limited purchases that do come from overseas have been focused on the Baltic states (H1, H3, H4, H6) and have often provided superintendents who are able to speak Finnish, at least for contracts involving labour (H3). Indeed, language was identified as one of the most significant barriers to increasing purchases from overseas (H1, H3, H6, H8, H10). Although it was recognised that the purchasing process would require communication and documentation in English, perhaps the largest barrier was identified in connection with the construction sites:

“In the previous production meeting – because we talk about international procurement from time to time – I asked the site managers who would be willing to work in English on site with some contractor and not a single hand was raised.” -H6

This extract highlights that while the purchasing unit might be willing to procure from abroad, there is still reluctance among the site managers to work in English. H6 suggested that this reluctance is particularly noticeable in the older generations and that a change in attitude would be required on the construction sites. Nevertheless, H6 also recognised that younger site managers might be more willing to operate with English speaking personnel.

A number of requirements that should be met in order to facilitate the expansion of the supplier base into international markets were identified by the interviewees. For example, H6 suggested that all the necessary documentation should be made available in English in order to avoid the need for extensive translations during the purchasing process. This is one way in which the group could support and facilitate international procurements. Additionally, both H2 and H9 reported that their previous employers had made use of local market researchers abroad and a dedicated “contact person”, who was responsible for international relationships. H2 and H9 recognised the value of an expert who is able to scout potential companies and conduct background checks and suggested that this could also be considered by the case company in order to encourage an increasing share of international procurements.

Other considerations addressed in the interviews included the need for comprehensive purchasing plans (H1), the geographical remoteness of Finland (H1, H3) as well as local regulations and legal requirements (H1). Furthermore, H5 emphasised that it is only worth purchasing from overseas if the savings are significant enough. Additionally, H1 and H6 recognised that Finland is a relatively small market compared to other European countries and that it might therefore be challenging to find suppliers willing to supply relatively small volumes:

“When I was still at [my previous employer], we had a discussion with a certain German furnishing company, so we asked how much for example 60 000 kitchens would cost to manufacture and they weren’t particularly interested because they produce 60 000 kitchens in a week. In Finland, for some Novart or someone, then that would be two months of work for them and that would be a godlessly large order. In Finland ... our volumes are so small compared to the central European factories.” -H6

While a number of risks and barriers were identified in association with the internationalisation of purchasing operations, several interviewees regarded international purchases in a positive light (H1, H2, H5, H6). The quality of products was stated as one of the largest risks associated with purchasing goods from abroad (H3) and language barriers as well as quality of work for labour contracts from abroad (H7). Overall, however, it would appear that the support and development of international purchasing could be worth considering within the purchasing strategy of general contractors in Finland.

5.3.15 People, Competence, and Training

People, competence, and training were identified by seven interviewees (H1, H3, H4, H5, H9, H10 and E1) as essential to the success of the purchasing operations and ultimately the projects and the company. This can be attributed to the significant impact of purchasing on the turnover of projects and the company as a whole (H1, H3, H4). Indeed, H1 identified the training of purchasing staff as integral to the development of purchasing operations at the case company in the near future. Furthermore, both H1 and E1 suggested that in general, the level of professional training and competencies of purchasers in the construction industry is too low. Many purchasing staff in the construction industry progress directly from construction sites to purchasing operations and lack the formal training and skills required for a higher level of professionalism in purchasing (E1).

“Procurement is an important topic to us. And with good procurement we can ensure the result of the construction site and often also improve the results, but with bad procurement we can also completely disrupt the entire project or the project’s finances. So there, at the centre, once again is the competence and know-how.” -H3

Good, professional procurement relies on a wide range of skills and knowledge including psychology for negotiations, law for devising contracts, economics for

understanding pricing structures and markets, and engineering to understand the designs and what needs to be procured (H1, H3, H5, H9). It was also highlighted that it is important to distinguish between “buying” and “procuring”, and that there are marked differences between the two (H9):

“There are those who don’t understand what buying is and what procurement is. The thing about procurement is that you know, you first examine the pictures, the designs that are supposed to be built, and then you look at the very last details of the contents of the offers.” -H9

This extract not only demonstrates that there are differences between buying and purchasing, but also supports the notion that purchasing requires certain skills and a higher level of understanding. However, one challenge that was identified is the scarcity of resources, both in the company and the construction industry in general (H3, H4, H5). Consequently, there is often significant time pressure on project purchasers, and young, fresh recruits may have to take on greater responsibilities than their experience or training would be suited to (H3, H5). Furthermore, one of the respondents to the questionnaire, R1, suggested that many people might not even be interested in developing themselves or their professional competencies.

The recognition of people, competence, and training as a contributing factor to the purchasing strategy and success of purchasing operations is in line with findings from the literature. Indeed, purchasing competence is considered as a driving factor for higher purchasing maturity in at least three separate models (Monczka et al., 1993; Schiele, 2007; van Weele, 2010). Furthermore, Carr & Smeltzer (1997) identify purchasing competence as integral to the development of strategic purchasing operations. Moreover, the competence and professionalism of the purchasing workforce is also recognised as integral to the strategic development of the purchasing function within the construction industry. This is demonstrated, for instance, by Bemelmans et al.’s (2013) purchasing maturity tool and a case study of the development of purchasing operations at the Nordic Construction Company (NCC) presented by Axelsson (2005).

5.4 Step 1: Diagnosis – Summary of Results & Discussion

Most of the results were in line with findings from the literature, supporting the topics included in the preliminary roadmap. Six topics have been identified from the literature as being important for purchasing: spend and market analyses, organisational structure, integration of suppliers, people and training, functional integration, and supplier development. Based on the results from the interviews, all of the above topics were recognised as being relevant to the strategic development of the purchasing function in construction companies from a practical perspective. However, a number of issues were highlighted that deviated from the recommendations in the literature were identified.

Firstly, with respect to the organisational design of the purchasing function it was recognised that contrary to some of the proposed purchasing maturity models, the

complete centralisation of purchasing operations may not be the most beneficial for all construction companies. Secondly, it was recognised that project delivery methods and characteristics might limit the integration of suppliers in each of the subsidiaries. Finally, while supplier development was recognised as an important strategic goal for the purchasing function, it was also suggested that a certain basic functions should be implemented before supplier development becomes entirely feasible.

In addition to the topics included in the initial purchasing strategy roadmap from the literature review, a number of further topics were identified. Therefore, this thesis proposes that risk management, supplier selection, international purchasing, sourcing strategies and structures, as well as IT and infrastructure should be included in the strategy development roadmap. While a number of these topics were also addressed in the literature, the interviews and questionnaire served to verify their inclusion. However, it is also recognised that the identified topics are not exhaustive and are limited to the perspective of this particular case company and questionnaire respondents.

So far, this chapter has presented and discussed the results from the interviews and industry questionnaire. The discoveries from the literature review were verified and extended with insights from industry professionals. The combined insights obtained from the literature review and interviews will form the basis for the purchasing strategy development roadmap. Therefore, the next section describes the development of the roadmap and describes the results of the second step in the design science research process.

5.5 Step 2: Design & Develop

The previous section presented the results from the interviews and industry questionnaire. The relevance of the topics proposed for consideration in the development of purchasing strategies for general contractors as identified in the literature were largely confirmed. In addition to these topics, a number of further issues were recognised in the interviews and questionnaire as being worth including in the purchasing strategy development process. This chapter presents the designed roadmap and supporting tools for the development of purchasing strategies in construction companies.

5.6 Step 2: Purchasing Strategy Development Roadmap

The core of the initially proposed purchasing strategy development roadmap from the literature review remained unchanged. However, prompts were added to the roadmap in order to support practitioners in the execution of each of the phases as presented in Figure 23 (See also Appendix D). Additionally, the purchasing strategy development process itself in Phase 3 was described in more detail based upon an unstructured interview with the CPO as presented in Figure 24 (See also Appendix E).

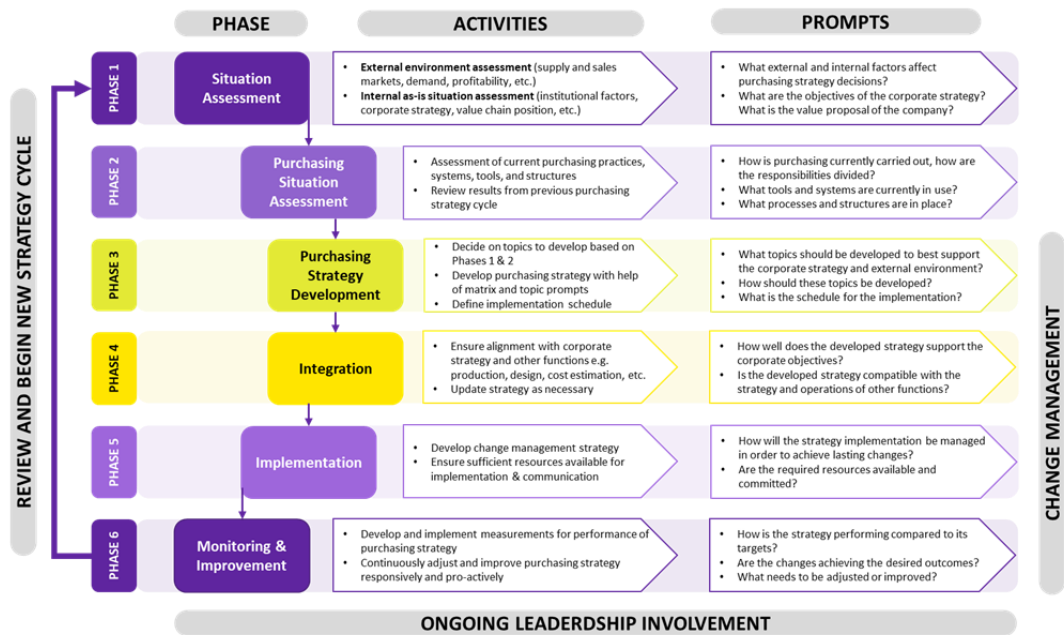


Figure 23. Purchasing strategy development roadmap. (Also see Appendix D)

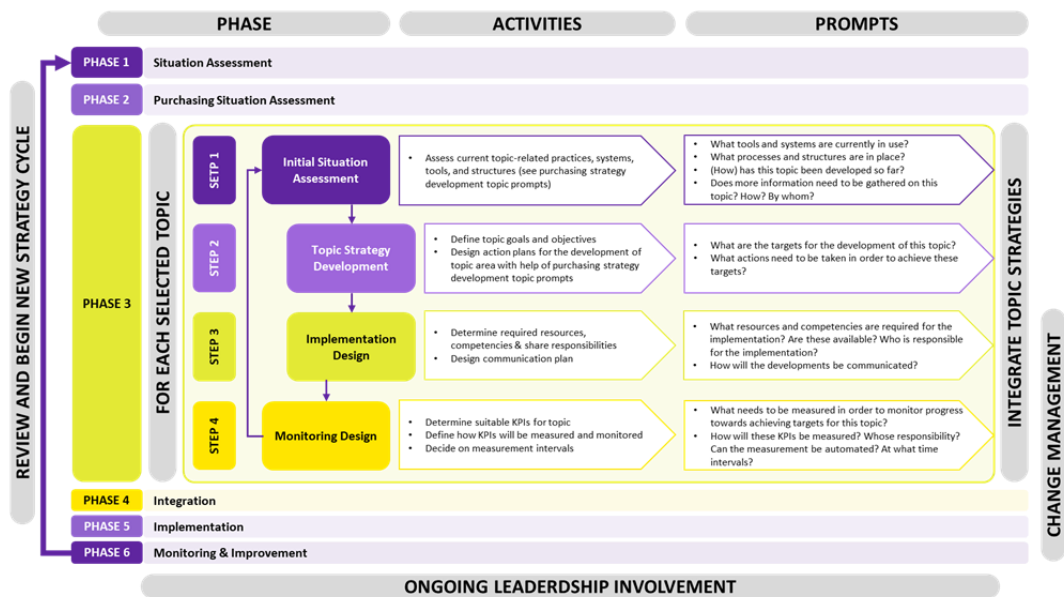


Figure 24. Purchasing strategy development roadmap Phase 3. (See also Appendix E)

Phase 3 begins with the selection of the topics that are to be included in the purchasing strategy. Based on the literature review and empirical research, a list of potential topics has been suggested as presented in Table 24. These topics are also presented on the y-axis of the purchasing strategy development matrix in Appendix F and in the topic prompts presented in Appendix G. For each of the topics, the strategy development roadmap prescribes four stages consisting of an initial assessment of the topic, the development of a topic-specific strategy, implementation design, and the

design of monitoring and improvement measures. The combination of the individual topic strategies forms the overall purchasing strategy and consideration should be given to the priorities of these developments based on the external environment and overall company strategy.

Table 24. Overview of suggested topics for purchasing strategy development.

Topic	Source
Spend analysis	Literature review / interviews
Market analysis	Literature review / interviews
Sourcing strategies	Literature review / interviews
- Sourcing structure & segmentation	Literature review
- International sourcing	Interviews
Supplier selection	Literature review / interviews
Supplier evaluation	Literature review / interviews
Supplier development	Literature review / interviews
Risk management	Interviews
Organisational structure	Literature review / interviews
IT & Infrastructure	Interviews
People & training	Literature review / interviews
Functional integration	Literature review / interviews
Partnerships/ supplier integration	Literature review / interviews

In Phase 3, Stage 1, an assessment of the initial situation regarding the specific topic is performed. This differs from the purchasing situation assessment in Figure 23, as the focus is now upon the specific topic that is to be developed. For example, it could be valuable to develop an overview of current topic-related processes, tools, practices, and competencies in order to gain an understanding of the starting points. In Phase 3, Stage 2, the topic strategy is developed by firstly defining goals and objectives for the topic and secondly developing action plans with help of the purchasing strategy development topic prompts (see Appendix G). The topic prompts are based on findings from the literature and interviews and are intended to encourage discussion amongst practitioners as well as offer considerations with respect to the direction in which each topic could be developed. Phase 3, Stage 3 involves a detailed implementation design for the topic, covering issues such as the resource requirements, the assignment of responsibility and an assessment of the requisite competencies as well as a communication plan. Next, Key Performance Indicators (KPIs) are defined in Phase 3, Stage 4 along with measurement methods and intervals. Finally, once the individual purchasing topic strategies have been developed, these are combined to form the purchasing strategy, thus completing Phase 3 of the purchasing strategy development roadmap.

5.7 Chapter Summary

This chapter presented the updated version of the purchasing strategy development roadmap based on both the literature review and the results of the interviews and industry questionnaire. Phase 3 of the purchasing development roadmap was discussed in detail and the purchasing strategy topics were introduced. In the next chapter the purchasing strategy development roadmap is tested in practice and in theory, constituting the third phase of the design science research methodology.

6 Steps 3 - 4: Demonstrate & Test and Evaluate

In this chapter the proposed strategy development roadmap is demonstrated, tested, and evaluated within the case company. This stage represents an essential step in the design science research process and seeks to demonstrate and validate the proposed artefact. The testing of the roadmap provides valuable insights into its applicability for the case company as well as highlighting potential areas for development. The proposed roadmap is then evaluated both on a conceptual level and on the basis of the test results.

This chapter is organised as follows. Section 6.1 describes the data collection and processing procedures for the demonstration and testing workshop. In Section 6.2, the workshop preparation and design are presented. Section 6.3 reports the progress and results of the workshop. Finally, the demonstration and testing step is summarised in Section 6.4.

6.1 Step 3: Demonstrate & Test – Data Collection & Processing

The testing of the proposed roadmap was conducted as a purchasing strategy development workshop. Unstructured participatory observation was employed to record relevant information from the workshop process and assess the functionality of the proposed roadmap. Data was collected in the form of notes taken by the researcher during and prior to the testing process from both the workshop and individual conversations with workshop participants. Contrary to the semi-structured interviews conducted in Step 1 of the design science research process, the gathered data from the demonstration and testing phase was not analysed thematically. Instead, developments and suggestions were addressed as they arose and incorporated into the strategy development roadmap. Additionally, following the workshop, participants were provided with an evaluation questionnaire in which feedback and suggestions for the development of the purchasing strategy roadmap were collected.

Workshop participants were selected purposively and consisted of the CPO as well as the Procurement Managers from three of the subsidiaries. Additionally, the Quality Manager was present at the beginning of the workshop as an additional observer. The participants and their roles are summarised in Table 25.

Table 25. Overview of workshop participants and roles.

Participant	Role in Workshop
Researcher	Facilitator, participant, observer
Quality Manager	Observer
Chief Purchasing Officer	Strategy developer/ participant
Procurement Managers	Strategy developer/ participant

6.2 Step 3: Demonstrate & Test – Workshop Preparation and Design

The designed purchasing strategy development roadmap encompasses a comprehensive and long-term process of strategy design, implementation, and monitoring. Given the constraints of this study, it was therefore not possible to test the entire strategy development process as proposed in the roadmap. Consequently, the workshop was designed to include a conceptual presentation of the developed roadmap, combined with the practical testing of Phase 3 as applied to a topic of interest to the case company. This approach allowed the roadmap to be evaluated on a conceptual level whilst still including practical elements for more detailed testing and evaluation.

Participants were provided with a copy of the purchasing strategy development roadmap prior to the workshop, facilitating an initial understanding and familiarisation with the central concepts before testing. Additionally, the participants received the workshop schedule in advance as well as the topic that was to be examined in the workshop. The first 15 minutes of the workshop were dedicated to the presentation of the purchasing strategy development roadmap designed in Chapter 5. The remaining time was dedicated to the development of a strategy for the selected topic, progressing through the suggested stages of Phase 3 in the purchasing strategy development roadmap. The topic for development in the workshop was selected by the CPO as one of interest to the case company. The chosen topic was risk management in purchasing operations which was motivated by the effects of the current external environment and global political situation on supply chains and commodity prices. Due to the restricted availability of the participants, feedback on the purchasing strategy development roadmap and the topic strategy development process was collected after the workshop in the form of a questionnaire.

6.3 Step 3: Demonstrate & Test – Workshop

The workshop was held on the 4.5.2022 from 9:00 – 11:15 in the corporate head office in Helsinki with one participant joining through Microsoft Teams. The hybrid model of the meeting presented certain challenges and it was noted that the facilitator should encourage and ensure the inclusion of the remote participant. The first 15 minutes of the workshop were dedicated to the demonstration and presentation of the purchasing strategy development roadmap. In the remaining two hours, a topic strategy for risk management in purchasing operations was developed. Despite the limited scope of the practical test for the purchasing development roadmap, it was recognised that in the actual application of the roadmap, more time would be dedicated to the development of the topic strategies. Consequently, the outcomes of the workshop should be regarded as indicative of the process rather than conclusive. The rest of this section reports the content and progress of the workshop.

6.3.1 Motivation and Background

Following the presentation of the purchasing strategy development roadmap, the CPO held a short introduction on the chosen topic. The relevance of purchasing risk management in the current global climate was discussed. Furthermore, the CPO stressed the importance of risk management in supporting the case company to achieve its strategic goals, relating the development goals of the workshop to the corporate strategy. Essentially, this initial presentation acted as a proxy for Phase 1 in the purchasing strategy development roadmap, however, it was focused specifically on risk management in purchasing rather than taking a holistic view of the external and internal circumstances. Furthermore, the presentation provided an insight into the issue and the significance of purchasing risk management at the case company. A total of 10 minutes was dedicated to the motivation and background of the topic.

6.3.2 Stage 1: Initial Situation Assessment

The objective of the initial situation assessment was to gain an overview of current purchasing risk management practices, processes, and tools at the case company. In this stage of the strategy development workshop the Me-We-Us framework was employed in order to encourage a fuller engagement with the topic and deep thinking. Initially, participants were given two minutes to write down everything that came to mind on the topic of current purchasing risk management practices at the case company. Following this, the participants were divided into two groups and invited to discuss their thoughts with each other for five minutes. Finally, eight minutes were reserved for an open discussion with the entire group. This stage yielded engaging discussions about current risk management tools and practices and resulted in a comprehensive overview of the current state of purchasing risk management at the case company. The first stage lasted 15 minutes as planned and each of the participants contributed actively to the discussion. The discussion stayed on topic without intervention from the facilitator.

6.3.3 Stage 2: Topic Strategy Development

The second stage, topic strategy development, was divided into two parts, each lasting about 20 minutes. The first part involved determining concrete goals for the development of purchasing risk management operations. This was completed as a group task by all of the participants, who were provided with a goal matrix where the minimum and ideal goals for the development of purchasing risk management practices could be recorded. Following this, the targets were ranked in order of importance. The second part involved outlining action plans for achieving the identified goals. Given the nature of the workshop and the short timespan within which to complete this task, the action plans were rough indications of what could be done to achieve the goals. Participants were aware that in its normal application, more time would be available for the development of the action plans, allowing for a higher level of detail and integration. Nevertheless, preliminary action plans were outlined for the most important targets as identified by the participants.

This stage lasted for around 40 minutes as planned. The discussion was predominantly led by the CPO, however all of the Procurement Managers also participated constructively in the development of the topic strategy. The discussion remained on topic with a little prompting from the facilitator. However, it became apparent through the discussion that issues associated with the development of purchasing risk management are also closely related to other areas of strategy development, such as IT & Infrastructure. It was therefore recognised that it may be beneficial to develop strategies for related topics simultaneously in order to ensure integration and compatibility.

6.3.4 Stage 3: Implementation Design

The third stage covered the implementation design of the selected topic. As in Stage 2, this stage was also organised as groupwork with 20 minutes to ideate the design of the implementation. In this stage, participants discussed topics including resource requirements and responsibilities. Due to the time constraints on the workshop, discussions about communication plans and implementation schedules remained on a general level and no detailed plans were produced. Nevertheless, the participants recognised implementation design as an important component of the purchasing and topic strategy development process.

The full 20 minutes dedicated to this stage was used by the group. The facilitator ensured that everyone in the group was heard and had the opportunity to contribute their ideas. Most of the allocated time was dedicated to the discussion of the topic at hand, although the facilitator was occasionally required to steer the conversation back to the planning of the implementation design. It was recognised that a clearer presentation of the stage to be executed could have supported a more focused discussion. One participant noted that it could have been beneficial to present one stage at a time in the workshop PowerPoint to ensure that the focus remained on the given stage, rather than moving between the stages.

6.3.5 Stage 4: Monitoring Design

In the fourth stage, KPIs were defined for each of the identified targets from Stage 2 and intervals for the measurements were discussed within the group. Particular focus was given to the timespan for reaching the targets. It was decided that the first measurements should take place at the end of 2023, with the final measurements corresponding to the end of the current strategic cycle of the entire company.

This stage yielded good discussions amongst the participants and remained on topic throughout. A total of 20 minutes were spent defining and discussing potential KPIs for each of the identified targets. The discussion was mainly led by the CPO for this topic and the remaining participants supported the suggestions put forth by the CPO. Additionally, some of the participants suggested alterations to certain KPIs and targets which were then discussed further.

6.3.6 Closing the Workshop and Next Steps

The final minutes of the workshop were dedicated to summarising the findings and evaluating the process. However, due to time limitations on the participants, it was decided that the evaluation of the process and purchasing strategy development roadmap would take place in the form of a questionnaire that would be distributed to the participants after the workshop. Nevertheless, participants reported that it was valuable to discuss the selected topic in detail and that the results of the workshop would be useful in developing a strategy for risk management in the purchasing operations. A summary of the workshop results is presented in Figure 25.

PURCHASING STRATEGY DEVELOPMENT MATRIX FOR PHASE 3			
TOPIC	STAGE 1 Initial Situation Assessment	STAGE 2 Topic Strategy Development	STAGE 3 Implementation Design
Risk management	<ul style="list-style-type: none"> - Vastuugroup - Asiakastieto - Spend analyysi - Forecon + Castle consulting - Faktnet - Intran ohjeistus - Pro3 <p>Parannettavaa:</p> <ul style="list-style-type: none"> - Toimittajarekisteri - Vakuuksienhallinta - KV-yhdyshenkilö - Tilauskanta - Hankintaohjeistus- ja rajat 	<p>Tavoitteet:</p> <ol style="list-style-type: none"> Toimittajarekisteri <ul style="list-style-type: none"> - Kaikki toimittajat rekisterissä - Toimittajat ylläpitävät Hankintajärjestelmä <ul style="list-style-type: none"> - Kaikki hankinnat järjestelmän kautta Ohjeistus: <ul style="list-style-type: none"> - Interaktiivinen ohjeistus - Järjestelmässä <p>Toimenpiteet:</p> <ol style="list-style-type: none"> <ul style="list-style-type: none"> - Rekisterin kehitys - Viestintä rekisteristä - Mahtikäsky <ul style="list-style-type: none"> - Toimittajat järjestelmään - Koulutus - Integraatio <ul style="list-style-type: none"> - Prosessikaavioiden kehitys - Päätetään mihin ohjeet laitetaan 	<ol style="list-style-type: none"> <ul style="list-style-type: none"> - Resurssit firman sisältä - Koulutetaan pääkäyttäjät - Viestintä intran kautta <ul style="list-style-type: none"> - Tarpeeksi resurssit käyttöönottoon, sisältä - Tiedottaminen intran kautta <ul style="list-style-type: none"> - Palkataan 1hlö laitamaan ohjeistukset kuntoon - Integroidaan ohjeet järjestelmään
			<p>2023</p> <ol style="list-style-type: none"> <ul style="list-style-type: none"> - 100% käytössä - 80% yrityksistä järjestelmässä <ul style="list-style-type: none"> - 80% käytössä <ul style="list-style-type: none"> - 100% ohjeistus kirjoitettu ja saatavilla

Figure 25. Results of purchasing strategy development roadmap workshop.

With respect to the next steps regarding the developed risk management strategy, it was acknowledged that more time would be required to define detailed action plans and schedules for the implementation. Furthermore, it was recognised that the development of other relevant topic strategies and the integration of these into a single purchasing strategy would be beneficial in order to ensure that sufficient resources and time would be available for the implementation. These observations are in line with the purchasing strategy development roadmap, thus validating these elements of its design.

6.4 Summary of Demonstration and Testing

So far, this chapter has reported the demonstration and testing process of the proposed purchasing strategy development roadmap. Valuable insights into the operating principles of the roadmap were gained and significant considerations were highlighted. For example, the importance of integrating topic strategies with one another in order to develop a cohesive and implementable purchasing strategy was

emphasised. The next section evaluates and discusses the proposed roadmap based on the feedback from the workshop participants.

6.5 Step 4: Evaluate

The evaluation of the roadmap consisted of both conceptual and practical elements. The practical elements were based on the experiences of the purchasing professionals in the workshop described in the previous sections. The conceptual evaluation applied to the roadmap in its entirety, including the elements that could not be tested in the workshop due to the limitations on time and resources. Additionally, the suggested topics and guiding questions were evaluated by the practitioners and suggestions for improvement were shared.

With respect to the overall purchasing strategy development roadmap (including the topic matrix and topic prompts), the purchasing professionals agreed that it provided a thorough and valuable tool for developing the purchasing strategy within the case company. Furthermore, it was observed that the proposed roadmap fulfilled the requirements defined within the scope of this thesis. Features, such as the clarity of the roadmap, applicability, and thoroughness, were highlighted positively by the CPO and Procurement Managers. Particularly the link to corporate strategic goals and the external environment were emphasised as important properties of the roadmap. Finally, it was recognised that all of the suggested topics were appropriate and that the topic prompts were relevant, presenting concrete and practical points for discussion in order to determine how certain topics should be developed within the purchasing strategy.

Despite the positive evaluation of the purchasing strategy development roadmap, accompanying matrix and topic prompts, a number of improvements were recommended. Firstly, it was proposed that supplier selection, evaluation, and development could be combined under a single topic heading “*supplier management*”, which would simplify the strategy development process for practitioners. Secondly, it was suggested that three further topics should be added: social responsibility, environmental responsibility, and quality management. These suggestions are reflected in the final purchasing strategy development matrix and topic prompts (Appendix F and Appendix G). However, the research and development of topic prompts for the three new topics are beyond the scope of this study.

Overall, no major changes were suggested to the purchasing strategy development roadmap itself. This could be due to the fact that it was not possible to test the roadmap and strategy development process in its entirety within the scope of this study. Nevertheless, on a conceptual level, the evaluation and feedback of the proposed roadmap suggests that the defined objectives have been met.

6.6 Chapter Summary

This chapter presented the demonstration, testing, and evaluation of the purchasing strategy development roadmap. The test demonstrated that elements of the proposed roadmap and topic strategy development processes worked well within the context of the case company. Furthermore, the evaluation revealed that, on a conceptual level, the presented roadmap fulfils the purchasing strategy development requirements of the case company. Simultaneously, three new topics were added to the purchasing development matrix, based on the insights provided by the purchasing professionals. Further evaluations of the outcomes of this study are presented in the next chapter.

7 Evaluation of Research Outcomes and Conclusions

This chapter will conclude the study by outlining the key research findings in relation to the research objectives and questions, followed by a discussion of the value and contribution thereof. Subsequently, the research method will be evaluated. Finally, the limitations of the study will be reviewed and opportunities for further research will be proposed.

7.1 Key Findings and Research Questions

This research was guided by one main research question and three sub-questions. This section presents and evaluates the answers to each of these questions. First, the sub-questions are evaluated, as these combine to answer the main research question.

The first sub-question was phrased as follows:

How are purchasing operations currently being developed by general contractors and what are the best practices and lessons learned?

This question was predominantly addressed through the interviews with the case company as well as the industry questionnaire. Additionally, the literature review provided some insight into measures taken by general contractors to develop their purchasing operations, particularly in Sections 3.3, 3.4 and 3.5. The results indicate that many general contractors are striving to improve the coordination of their purchasing operations, for example, through the organisational design of purchasing operations, the harmonisation of purchasing practices, or the development of long-term partnerships with suppliers. Furthermore, a number of general contractors highlighted *IT infrastructure*, *supplier development*, and *category management* as areas of development.

While these findings present general areas for purchasing development within construction companies, it is recognised that the focus and priority of these developments are likely to vary between individual construction companies. This stresses the importance of contextual factors that should be considered for the development of purchasing operations. Particularly, the lifecycle phase of the company and available resources should be taken into account, as was emphasised in the interviews.

With respect to best practices and lessons learned, the industry questionnaire and external interview provided the richest insights. As a best practice, it was suggested that small pilots should be implemented when driving a larger change in the development of purchasing operations. This would allow companies to demonstrate the value and success of the changes to employees and change-resistant individuals. Furthermore, the involvement of cross-functional teams in the strategy development process was highlighted as a valuable pursuit, especially as it was recognised that this can encourage a higher commitment to change. Additionally, clear

communication was emphasised as a best practice within the purchasing strategy development and implementation process. On the other hand, lessons learned included the importance of defining clear goals with respect to developing areas within purchasing operations as well as ensuring the commitment and support from management.

The second research question was formulated as follows:

What factors should be taken into consideration in the development of a purchasing strategy of a general contractor?

This question was addressed throughout the literature review, interviews and in the questionnaire. In the context of this research, *factors* referred to topics that were considered relevant to purchasing in construction companies, as well as wider, contextual factors, such as the strategic goals of the company and the external environment. Important topics that emerged within this study included *spend & market analysis, sourcing strategies, supplier management, organisational structure, and competence*. A complete list of the topics included in the purchasing strategy development roadmap based on the literature review and empirical results are presented in Appendix F. Despite the wide range of topics regarded by general contractors as central elements for purchasing strategy developments, it was recognised that it would not be feasible to develop all the identified topics simultaneously. Consequently, general contractors should be equipped to prioritise the topics, considering not only the initial level of development in each of the topics, but also the wider contextual factors affecting strategic choices within purchasing.

With respect to the wider contextual factors, the importance of alignment between the purchasing strategy and the overall corporate strategy was strongly emphasised in both the literature and the interviews. The impact of purchasing practices on organisational performance has been gaining recognition over the past decades, however, it has been argued that the best results can only be achieved when the strategies are aligned. Additionally, attention was drawn to the importance of aligning the purchasing strategy to other functional strategies, such as design, production, and cost calculation. This was especially emphasised in the literature reviewed in Section 2.3.1. The alignment and integration of these strategies could facilitate greater cooperation between the functions and ensure that purchasing can fulfil its supporting role to the other business functions.

Additional factors that should be taken into consideration in the development and implementation of purchasing strategies include the level of *commitment from top management*, the *availability and competence level of resources*, and *change management*. Throughout the study, it was recognised that the commitment from top management plays a crucial role in the successful implementation of purchasing strategies and permanent acceptance of change. Consequently, the level of top management engagement would likely influence the extensiveness of the changes introduced through the development of the purchasing strategy. Additionally, interviewees recognised that the availability and competence level of resources should be acknowledged in the development of purchasing strategies and that it would be

important to consider further training of purchasing staff or the addition of capable resources. Furthermore, the importance of change management was highlighted in connection with the successful design and implementation of purchasing strategies, especially within the context of the construction industry due to its conservative nature.

The final sub-question was formulated as follows:

How can a general contractor account for these factors in its purchasing strategy?

This question was answered through the design of the purchasing strategy development roadmap, presented in Section 5.6. The roadmap outlines a process for the development of purchasing strategies for use by general contractors. In the first and second phases of the roadmap, construction companies develop an overview of internal and external factors, which could be expected to affect choices concerning the contents of the purchasing strategy. These factors include the *current market situation, company strategy and goals* as well as *current purchasing operations* within the company. Based on this overview and understanding, construction companies then select the most relevant topics to include in their purchasing strategies. The topics and associated considerations identified within this study are presented in Appendix G (Topic Prompts). Once the topics most relevant to the construction company are selected, strategies for each topic can be devised following the stages outlined in Appendix E. These topics are then integrated to form the preliminary purchasing strategy.

As discussed above, it is important to ensure the functional integration of the purchasing strategy. Therefore, Phase 4 of the roadmap involves confirming that the proposed strategy is in alignment with both the corporate and other functional strategies. Finally, the roadmap guides practitioners in implementing as well as monitoring and evaluating the new strategy in Phases 5 and 6, respectively. In these phases, construction companies are prompted to incorporate elements of change management, ensure the sufficiency of resources, and devise clear communication strategies to facilitate successful implementation. Additionally, the cyclical and dynamic nature of strategy development is incorporated into the roadmap, and practitioners are encouraged to reflect on the progress made in achieving the strategic goals and to make necessary adjustments to the strategy. Finally, ongoing leadership is emphasised in the purchasing strategy roadmap as a guiding principle for developing and implementing changes in purchasing operations.

The three sub-questions combine to answer the main research question, particularly through the use and application of the purchasing strategy development roadmap:

How can a general contractor develop its purchasing strategy in alignment with the strategic goals of the company?

7.2 Contributions to Theory

The literature review revealed a number of gaps concerning purchasing strategy development in the construction industry. For example, while development frameworks, such as maturity models, have been proposed in the general purchasing and supply management literature, these have not yet been adapted to reflect the specific characteristics and nature of the construction industry. Furthermore, to the knowledge of the researcher, no comprehensive purchasing strategy development tool has been proposed or applied in the literature focusing on purchasing and supply management in the construction industry.

This study attempted to address these gaps, simultaneously making a number of contributions. Firstly, the study extends and adapts the purchasing strategy development models proposed by Nollet et al. (2005) and Virolainen (1998). In addition to confirming the importance of information gathering with respect to the internal and external business environments, the results also highlighted that elements such as monitoring and improvements, ongoing leadership involvement, and change management are central to the development of purchasing strategies. Consequently, it is suggested that the purchasing strategy development process should be extended to include these elements. Furthermore, this study proposes a detailed process for topic-level strategy development, which was tested in Step 3 of the design science research process.

Secondly, this study contributes to development of purchasing theory in the construction industry by considering industry-specific characteristics and accounting for environmental factors in the development of purchasing strategies. The proposed purchasing strategy development process includes topics and considerations identified by industry experts related to the peculiarities of the construction industry. Furthermore, in contrast to existing purchasing maturity models, the developed roadmap does not prescribe the adoption of any particular practices, thus allowing the unique position of each company to be considered in the strategy development process.

Thirdly, as proposed by design science researchers (e.g., Lukka, 2003), the novel artefact itself constitutes a contribution to the literature. Therefore, the designed purchasing strategy development roadmap is also considered a central contribution of this study. Additionally, this research served to support the application of the design science research paradigm within construction management research, as advocated by Alsehaimi et al. (2013).

7.3 Managerial Implications

The results of this research provide general contractors with a tool to aid in the development of purchasing strategies. In contrast to maturity models prescribing certain steps and goals for the development of purchasing operations, the proposed purchasing strategy development roadmap requires managers to invest in establishing an understanding of the context within which purchasing operations are to be

developed. Equipped with this understanding, managers should be in a better position to make informed decisions with respect to the strategic development of purchasing operations. Furthermore, this proposed approach allows practitioners to ensure compatibility and alignment between the strategic goals of the company and the development of purchasing operations, which has been identified as a central contributor to corporate success.

Additionally, this research highlighted relevant topics for construction companies that should be considered by managers in the purchasing strategy development process. However, the project-centred nature of construction also led to the discovery of certain barriers to the implementation of a number of purchasing practices from other industries. Most importantly, managers should consider the portfolio of project types and project delivery methods with respect to the limitations that these place on the development of certain purchasing practices. Particularly, this work has also highlighted the differences between *commercial* construction, with highly unique projects, and *residential* construction, with more standardised solutions, as well as their effects on purchasing practices. Additionally, this work emphasised that project delivery methods with higher customer or developer involvement can influence the development of purchasing strategies to an extent, since construction companies often do not have the authority to make purchasing decisions independently in these cases.

7.4 Evaluation of Research Method

Quantitative research is generally evaluated in light of its validity, reliability, and generalisability (Bell et al., 2019; Saunders et al., 2016). Validity refers to the integrity of the conclusions drawn from a piece of research; reliability is concerned with the replication and consistency of the results, and generalisability examines the extent to which the results of a study can be generalised beyond the specific research context (Bell et al., 2019). However, the nature of the research in this study is predominantly qualitative in nature. Consequently, this study applies the four criteria proposed by Lincoln & Guba (1985) for evaluating qualitative research: *credibility*, *transferability*, *dependability*, and *confirmability* (Bell et al., 2019). These criteria are also compatible with the pragmatist philosophical underpinnings of this research as they refute the existence of a single and absolute account of social reality (Bell et al., 2019).

Credibility is comparative to internal validity in quantitative, or positivist studies. It is concerned with ensuring that the intentions of the participants are accurately interpreted and represented (Saunders et al., 2016). A number of measures were taken to increase the credibility of this research. Firstly, triangulation of data and research methods was included in the research design to eliminate the over-reliance on a single source which could lead to unfounded certainty in the results (Bell et al., 2019; Saunders et al., 2016). Secondly, the interview results were sent to the participants for respondent validation in order to ensure that the accounts were interpreted and represented correctly. Finally, the position of the researcher within the case company facilitated a lengthy research involvement and the building of trust and rapport with participants. This in turn supported the collection of sufficient data.

Furthermore, the confidential nature of the interviews allowed participants to speak honestly and openly, improving the credibility of the results. Despite these measures to ensure the credibility of the study, the credibility could have been further improved through the engagement of a neutral external party with whom findings could be discussed and reflected upon.

Transferability can be considered equivalent to generalisability within quantitative studies. The context-bound nature and contextual uniqueness of this study naturally limit the generalisability and applicability to settings beyond those presented in this research. Nevertheless, Lincoln & Guba (1985) argue that providing rich and detailed descriptions of the research questions, design, context, findings, and interpretations allow readers to make judgements about the transferability of the study to other settings (Bell et al., 2019). This study has striven to provide thick descriptions throughout the research in order to support an understanding of the transferability of the research, at least to other construction companies within the industry. The extensive literature and theoretical background further serve to support the transferability. Nevertheless, the transferability limitations associated with the research design of this study are recognised and further testing within the case company and other construction companies would be required before the overall generalisability of the outcome could be assessed.

Dependability has been suggested as the qualitative parallel to reliability (Saunders et al., 2016). Due to the emergent nature of this research, it is important that dependability is considered. Dependability can be improved through the accurate documentation of any changes made to the research focus throughout the process (Saunders et al., 2016). Furthermore, keeping meticulous records of all research phases, including documentation of the problem formulation, interview transcripts, data analysis decisions, can increase the dependability of the research (Bell et al., 2019). The researcher has retained all of the materials and field notes, as well as interview guide and template analysis updates related to this study. Furthermore, a research diary was kept throughout the empirical phase of the research, recording observations, thoughts, and the development of the research. The dependability of the study could have been increased by an auditing process, whereby the research process and outcomes are assessed by a peer based on the gathered materials. However, this was not feasible within the constraints of this study.

Confirmability is associated with the objectivity of the research (Bell et al., 2019). While it is acknowledged that complete objectivity is not attainable in business research, the researcher should be able to demonstrate that personal values or beliefs have not influenced the research conduct or research findings (Bell et al., 2019). Measures were taken in this study to separate the personal opinions of the researcher from the study itself. For example, the questions presented in the interviews and questionnaire were validated by the thesis supervisor. Furthermore, an effort was made in the interviews not to elicit specific answers from participants or influence their responses by phrasing additional questions as neutrally as possible.

7.5 Limitations and Further Research

This study was subject to a number of limitations, which in turn also provide interesting avenues for further research. Firstly, this research was conducted as a single-case study in collaboration with a Finnish general contractor. Additionally, the responses to the industry questionnaire all originated from within Finland. As discussed in Section 7.4, this limits the generalisability of the findings. Future research could therefore consider general contractor purchasing strategy development from a wider geographical base and from the perspective of multiple general contractors.

Secondly, the scope of this study was limited to production-related purchases and did not include the procurement of designers, or other internal purchases, such as travel or equipment. Practical and temporal constraints on this study required a narrower focus in order to facilitate a deeper understanding of the topic. Consequently, future research could be extended to include the purchasing of non-production related items in the purchasing strategy development process.

Thirdly, the scope of the research could not accommodate the testing of the entire purchasing strategy development process as proposed in the roadmap due to temporal constraints. Therefore, one avenue for further research could be the testing of the proposed purchasing strategy development process within one or multiple construction companies. Additionally, the applicability of the proposed roadmap to other industries could also offer a potential avenue for further research.

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Appendices

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Appendix A: Industry Questionnaire

Procurement in the Construction Industry: Questionnaire

Consent

Thank you for your interest in my research. Before you participate, I need to make sure that you know what my research is about, what your involvement will be and that you consent to take part. You can view the accompanying cover letter [here](#).

By clicking the **NEXT** button to begin the questionnaire I understand that:

1. I am participating in a research study.
2. The research I am about to participate in has been explained to me, and I know what is involved in my participation.
3. My participation in this research is voluntary and I am free to withdraw at any time without giving any reason.
4. My identity cannot be linked to my data and all information I give will remain anonymous.
5. The research is being conducted through [Aalto University](#) and sponsored by [Jatke Oy](#).
6. I have been given the name and email address of the researcher, Daniela Schenk (daniela.schenk@aalto.fi) to contact if I have any questions about this research.

Background information

Please provide us with some background information to help us better understand the context of your answers.

1. I confirm that the organisation that I represent is a general/main contractor.

Yes No

2. Please fill in the following information about your background

Job Title Country you work in

3. Please fill in the following information about your background and the background of the company you work in.

Years in current position Years of experience in procurement

Number of employees in company Age of company

4. Construction services provided by your company:

Residential Commercial Infrastructure Other: _____

Procurement Strategy

Please answer the following questions on procurement strategies and challenges.

5. What, in your opinion, is the strategic importance of procurement?

High: it has a high impact on the company as a whole

Medium: it has an impact, but is not very important

Low: it has a limited impact and is not very important

Other: ____

6. How important are the following factors in the development of a procurement strategy?

Very unimportant, Slightly important, Neutral, Quite important, Very important, No opinion

Cost reduction

Risk management

Sustainable purchasing

Supplier management & optimisation

Global sourcing

Total quality management

Centralisation of procurement operations

Digitalisation

7. In your opinion, are there any factors missing from the list above? If so, please state them.

8. What, in your opinion are the greatest challenges in procurement from a general contractor's perspective in the construction industry?

9. Please skip this and move on to the next question. Do not click on any of the scale items.

This is just to screen out random clicking and catch potential bots.

Best Practices and Lessons Learned

Please answer the following questions about your experience of the development of procurement operations.

10. The following questions request that you respond with an answer from a scale of 1-7. The numbers in the scale correspond to the following definitions.

1. Not aware of the concept

2. The organisation is aware of the concept or issue, but no action has been taken

3. An action is in the conceptual stage of development

4. A formal action plan has been developed

5. The action plan has been initially implemented

6. The action plan is fully implemented

7. Evaluation measures are in place to check the progress or success of the action plan

Has your company incorporated the concept of strategic procurement?

Does your company have a centralised procurement unit?

Does your company regularly source from international suppliers?

Supplier Management

Is your company systematically evaluating its suppliers?

Does your company have a supplier development programme?

Is your company developing partnerships with its suppliers?

Digitalisation

Is your company using blockchain technologies in its procurement operations?

Has your company implemented the use of SGTIN in its supply base? (*)

Does your company share integrated IT systems with its suppliers?

Resource management

Does your company actively develop the competence of its procurement workforce?

* SGTIN (Standardised Global Trade Item Number) is a standardized global unique number created by each company and assigned to each unique product. SGTIN enables labelling with unique barcodes that can be used for identifying products and be used for, for example, logistics and in management.

11. Please select all of the areas that you are / have been involved with developing:

Centralising procurement operations	Strategic procurement
Internationalisation of procurement operations	Blockchain
Supplier development programme	Supplier evaluation systems
Developing partnerships with suppliers	Implementation of GTIN
Integrated IT systems with suppliers	Other
Workforce development and training	None of the above

12. Please describe what the greatest challenges have been in developing / implementing the concepts that you have been involved with from question 11.

13. Please describe what factors need to be taken into consideration in the development / implementation of the areas that you have been involved with from question 11.

14. Please describe what worked well in the development / implementation of the areas that you have been involved with from question 11.

15. Please explain what you would do differently if you could start over with the development / implementation of the areas that you have been involved with from question 11.

16. Please describe the results/impacts of the development / implementation of the areas that you have been involved with from question 11.

17. Is there anything else you would like to share which might help us to understand the development and implementation of procurement strategies in the construction industry?

18. I would be willing to participate in an interview to discuss these topics further:

Yes

No

Please send me an email at daniela.schenk@aalto.fi to inform me of your interest in participating in a follow-up interview or if you would like a summary report of the results.

Appendix B: Internal Interview Guide

Step 1 interviews: Internal Purchasing Employees

Preamble:

I will ask some questions for my master's thesis about your views and experiences of current purchasing operations at the case company and how you think these could be developed.

There are no right, or wrong answers and your name will not be used in any of the write-ups, and it will be ensured that no quotes can be traced back to you.

I would like to record this interview in order to transcribe it later. Only I will listen to and read the interviews. Is this okay with you?

Background

1. How long have you been working at this company / in your current role?
2. Tell me briefly about your role and how it is related to procurement?

Current procurement practices

3. How have the procurement practices developed whilst you have been at this company? Have they improved/ gotten worse?
4. What are the key challenges that the company faces regarding procurement?
5. What works well currently in the purchasing practices?
6. How does the current procurement strategy support the company's overall strategy?
 - i. How could the synergy between the procurement strategy and the company's overall strategy be improved?
7. What kind of procurements are carried out by the project team and what kind by the purchasing department?
 - i. What is your view on the centralisation of procurement operations? What should be and what shouldn't in your opinion?
 - ii. What could be improved in project-specific procurement processes?
 - iii. What could be improved in centralised procurement processes?
8. What kind of digital tools & systems are currently in use in procurement operations?
 - i. How could these be improved? / developed

9. What are the driving factors for supplier selection currently?
 - i. Should these be changed? If so, how?
10. What kind of relationship does the company have with its suppliers & sub-contractors?
 - i. How could this be improved
 - ii. How do you think the company could improve its image from the perspective of the supplier?
11. How are the risks surrounding suppliers managed?
 - i. What should be developed with regards to this?
12. How is supplier performance measured/evaluated?
 - i. How could this be developed/ improved?

Purchasing strategy development

13. What, in your opinion is the role of a procurement strategy and what should it cover?
 - i. What characterises a good procurement strategy?
14. What should be taken into consideration in the development of a procurement strategy?
 - i. Which of these is the most important?
 - ii. In what order should these be addressed/ developed?
15. How are purchasing practices at the company set to be developed in the near future?
 - i. Do you know if there is a concrete strategy vision for this?
 - ii. Does the company support this development, in what way?
16. From your past experience, what practices are worth introducing to the purchasing operations?
17. From your past experience, what practices are not worth introducing to the purchasing operations?
18. What do you understand by the term supply chain management?
 - i. In your opinion, what is the role of procurement within supply chain management?
 - ii. How can purchasing best support the operations on site?
19. What are your views on long-term partnerships and collaboration with sub-contractors/suppliers?
 - i. What should be taken into consideration?
 - ii. How do you think the company could improve in this respect?

20. What are your thoughts on purchasing goods and services from abroad?
 - i. What risks and opportunities do you see in the internationalisation of purchases?

Open answers, wrapping up

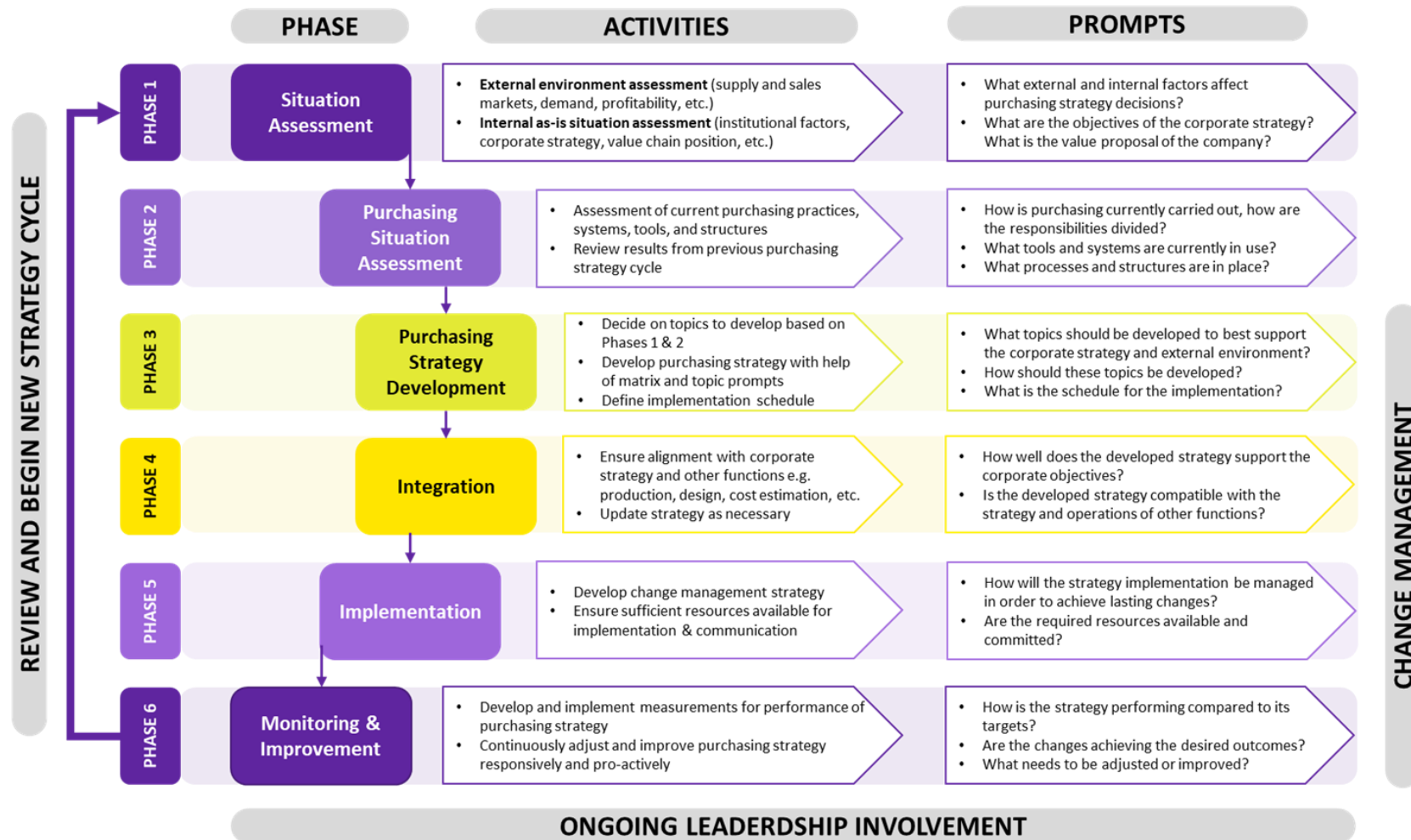
21. Do you have any other thoughts regarding this topic that you would still like to discuss?
22. What is your opinion on the approach of this research? How could it be improved?
23. Who else is it worth interviewing?
24. Is there anything else you would like to talk about? Is anything still unclear?

Appendix B: Analysis Template

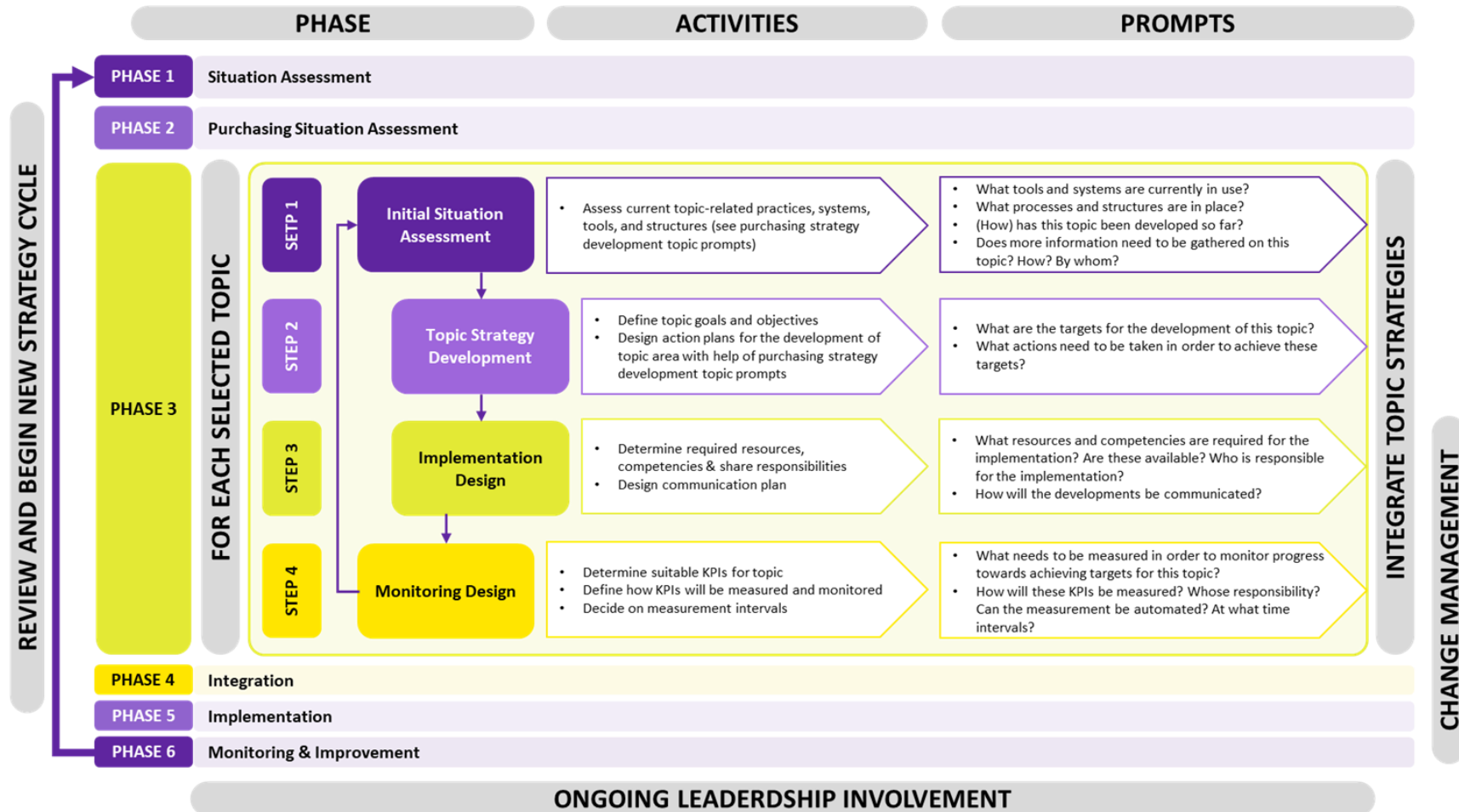
Background

1. Developments so far
2. Challenges faced
 - 2.1. Daughter Companies
 - 2.2. Market situation
 - 2.3. Resources
3. What currently works well/ Should be kept
4. Procurement processes/ Practices
 - 4.1. Current
 - 4.2. Future developments
 - 4.3. Considerations (include differences)
5. Instructions/models
 - 5.1. Current
 - 5.2. Future developments
 - 5.3. Considerations
6. Training & competences
 - 6.1. Current
 - 6.2. Future
 - 6.3. Considerations
7. Cooperation and transparency between daughter companies
 - 7.1. Current
 - 7.2. Future developments
 - 7.3. Considerations
8. Supplier Selection
 - 8.1. Current
 - 8.2. Future developments
 - 8.3. Considerations
9. Supplier Evaluation
 - 9.1. Current
 - 9.2. Future developments
 - 9.3. Considerations
10. Relationships with suppliers
 - 10.1. Current
 - 10.2. Future developments
 - 10.3. Considerations
11. Partnerships
 - 11.1. Current
 - 11.2. Future developments
 - 11.3. Considerations
12. Internationalisation
 - 12.1. Current
 - 12.2. Future developments
 - 12.3. Considerations
13. Digital tools
 - 13.1. Current
 - 13.2. Future developments
 - 13.3. Considerations
14. Procurement Strategy
 - 14.1. Current
 - 14.2. Future developments
 - 14.3. Considerations
15. Other relevant topics
 - 15.1. Peculiarities of construction industry

Appendix C: Purchasing Strategy Development Roadmap



Appendix D: Purchasing Strategy Development Roadmap: Phase 3



Appendix E: Purchasing Strategy Development Matrix
 (Supplier management grouping added after Step 3: Demonstrate & Test)

PURCHASING STRATEGY DEVELOPMENT MATRIX FOR PHASE 3				
TOPIC	STAGE 1 Initial Situation Assessment	STAGE 2 Topic Strategy Development	STAGE 3 Implementation Design	STAGE 4 Monitoring & Improvement Design
Spend analysis				
Market analysis				
Sourcing strategies				
Supplier Selection				
Supplier evaluation				
Supplier development				

PURCHASING STRATEGY DEVELOPMENT MATRIX FOR PHASE 3				
TOPIC	STAGE 1 Initial Situation Assessment	STAGE 2 Topic Strategy Development	STAGE 3 Implementation Design	STAGE 4 Monitoring & Improvement Design
Risk management				
Organisational structure				
IT & infrastructure				
People & training				
Functional integration				
Partnerships				

Additional topics following roadmap demonstration and testing workshop:

PURCHASING STRATEGY DEVELOPMENT MATRIX FOR PHASE 3				
TOPIC	STAGE 1 Initial Situation Assessment	STAGE 2 Topic Strategy Development	STAGE 3 Implementation Design	STAGE 4 Monitoring & Improvement Design
Social responsibility				
Environmental responsibility				
Quality management				

Appendix F: Topic Prompts

Purchasing Strategy Development Topic Prompts	
TOPIC / SUBTOPIC	Questions / Prompts
Spend analysis	<ul style="list-style-type: none"> - What spend and cost analysis tools are currently in use? - How well do these tools support the spend analysis needs of the function? - How automated are the spend analysis tools? - How integrated are the spend analysis tools across the business units? - How can the spend analysis be developed or improved? - Is the development of spend analysis a priority for the company and in alignment with the corporate strategy?
Market analysis	<ul style="list-style-type: none"> - How are market analyses currently carried out? - What tools are used for carrying out market analyses? - Are there sufficient tools and resources for conducting a market analysis? - Is the market analysis process documented? - Who is responsible for carrying out market analyses? - Is the market analysis process standardised across business units? - How can market analysis practices be developed or improved? - Is the development of market analysis a priority for the company and in alignment with the corporate strategy?
Sourcing strategies	<ul style="list-style-type: none"> - What are the current sourcing strategies? Do these support the strategic objectives of the company? - Are the sourcing strategies documented? Are the sourcing strategies regularly reviewed and updated? - Is the sourcing process documented? - How are relationships with suppliers managed and what kind of relationships are pursued? How could this be improved / developed? - Who is responsible for developing the sourcing strategies (corporate level, business unit, project-based)? - How do project delivery methods affect the sourcing strategies? (e.g., framework agreements, partnerships, project-based suppliers, early involvement) - How could sourcing strategies be developed to better support the corporate strategy? - How is sustainability taken into consideration in the sourcing strategies? - How should this be developed?
Sourcing structure	<ul style="list-style-type: none"> - How is sourcing structured? Are sourcing strategies based on commodity categories? Purchasing portfolio matrices? - What level of the supply chain are goods and services being sourced from? (e.g., are materials provided by trade contractors or sourced separately?) - How can the sourcing structures be developed to better support the corporate strategy? - How responsive are current sourcing strategies to external environmental factors? (e.g., supply chain resilience, risk distribution, etc.)
International sourcing	<ul style="list-style-type: none"> - What percentage of goods and services are sourced from abroad? - What are the risks and opportunities of increasing/decreasing the percentage of goods and services sourced from abroad? (e.g., price, transport costs, vulnerability to international conflicts etc.) - Do the projects have the capacity to operate in a more international environment? - What resources would need to be available in order to increase/introduce more international suppliers into operations?

<p>Supplier selection</p>	<ul style="list-style-type: none"> - Is there a systematic process for supplier selection? - Is the selection process clear, documented and well defined? - Are the requirements and selection criteria documented, transparent and clearly defined? - Who is responsible for supplier selection? (e.g., production, procurement, cross-functional teams) - Do the current selection criteria support the overall strategic goals of the company? - Do the selection criteria provide suitable suppliers for the projects? - How can the supplier selection process be developed or improved in order to better serve the strategic goals of the company and the operation of the projects?
<p>Supplier evaluation</p>	<ul style="list-style-type: none"> - Is there a systematic process for supplier evaluation? - Is the supplier evaluation process documented and communicated clearly? - Which parties are involved in the evaluation of suppliers? (e.g., purchasing, production, designers) - Are the supplier evaluations documented, easily accessible by all involved parties? - Are the supplier evaluations used to inform future contracts and cooperation? - Are the evaluation results communicated to suppliers? - How can the supplier evaluation process be developed or improved in order to better serve the strategic goals of the company?
<p>Supplier development</p>	<ul style="list-style-type: none"> - Is there a strategy for supplier development? - Is there a process for defining which suppliers to develop? - Is there a systematic process for supplier development that is communicated clearly within the company? - Are the supplier development plans informed by the supplier evaluations? - Are site visits to suppliers carried out on a regular basis? - Are trainings and workshops held for suppliers? Are resources made available for developing suppliers? - Are the company goals clearly communicated with suppliers? - How can supplier development be developed or improved to better support the strategic goals of the company?
<p>Risk management</p>	<ul style="list-style-type: none"> - Is there a process for identifying supplier related risks? (e.g., financial performance, tax evasion, ability to perform/deliver) - Is there a process for identifying commodity related risks? (e.g., vulnerability to price fluctuations and availability in extraordinary conditions, i.e., pandemics, international conflicts etc.) - Is there a strategy for supplier related risk management? - Is the risk management process clearly defined, documented, and communicated? - Are there practices in place to mitigate risks? (e.g., quality, delivery time, etc.) - How responsive are the purchasing operations to the external environment? (How quickly can changes be made in exceptional circumstances?)
<p>Organisational structure</p>	<ul style="list-style-type: none"> - To what degree are purchasing operations centralised /decentralised? What decisions are made centrally and what decisions are made within the projects? - On what basis is the purchasing function organised? (e.g., project based, central purchasing unit, category based, process based, etc.) - Is the current organisational structure in alignment with the corporate strategy? - How much autonomy do projects have in their purchasing decisions and strategies? - What strategies are developed at each level of the purchasing organisation structure? - Are the responsibilities of each structural segment of the purchasing organisation clearly defined and documented? - Who does purchasing report to? (e.g., production managers, business unit managers, corporate management, etc.) - How could the organisational structure be developed or improved to better support the corporate strategy?

<p>IT & Infrastructure</p>	<ul style="list-style-type: none"> - What IT systems and tools are currently available in supporting purchasing operations? Do these tools fully and effectively support purchasing operations? - Are the current tools and systems being used to the full extent of their capacity? - Does the purchasing department have a fully integrated IT system spanning functions and business units? - Are future technological developments and opportunities considered in the development or implementation of new IT tools? (e.g., blockchain, GTIN, etc.) - Are the IT tools and systems integrated within the IT infrastructure of the company? - To what extent is information sharing automated? - Are suppliers integrated into shared IT platforms and systems for information sharing and process optimisation, for example? - How can the available IT tools and infrastructure be developed or improved to better support the corporate strategy?
<p>People</p>	<ul style="list-style-type: none"> - What level of technical competence do purchasing staff possess? Is it sufficient? - Does the purchasing workforce have sufficiently technical and varied competencies in order to meet the demand of the purchasing organisation? - To what extent are training programmes for purchasing staff available and implemented? - Do training programmes include target development and feedback? - Are employee-level targets defined and discussed? - Do the current incentive systems encourage behaviour that supports the strategic objectives of the company? - Are purchasing staff exposed to purchasing organisations from different industries with respect to benchmarking and learning? - How can workforce related practices be developed or improved to better support the corporate strategy?
<p>Functional integration</p>	<ul style="list-style-type: none"> - To what extent are purchasing processes and practices integrated with other functions? (e.g., cost estimation, bidding, design, production, etc.) - How is information shared between purchasing and other functions? - Do current purchasing practices support the productivity of the construction sites? How could this be improved? - Does purchasing (or through its suppliers) participate in the design phase? To what extent? - Is information from the purchasing function used in the cost estimation process? - How could the cross-functional integration be developed in support of the corporate strategy?