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Supplier management with a contract in project purchasing

A case study for Hitachi Energy in Finland

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TIIVISTELMÄ:

Toimittajasuhteiden hallinta on ensiarvoisen tärkeää hankintaorganisaatiolle markkinoiden ja toimittajien hallinnan ja tuntemisen kannalta. Ylläpidetyt ja tiiviit toimittajasuhteet kehittää liiketoimintaa kaikille osapuolille ja mahdollistaa uusien innovaatioiden synnyn. Toimittajasuhteiden ylläpito ja strateginen tarkkailu on kuitenkin resursseja kuluttavaa toimintaa, joten kaikkien käytettävissä olevien toimittajien kanssa kommunikointi tiiviisti on mahdotonta. Toimittajat ovat eroavaisia myös ostomääriltään ja yrityksen kulutuksen kohdistamisen kannalta. Ostotilaukset toimittajaa kohtaan voivat olla kertaluontoisia tai vaihtoehtoisesti viikottaisia jollei jopa päivittäisiä. Samoin vuosittaiset kulut voivat vaihdella kymmenistä euroista useisiin satoihin tuhansiin euroihin.

Rajallisten resurssien käyttäminen mahdollisimman tehokkaasti toimitusketjun arvon lisäämiseksi on tarpeellista luoda työkalu toimittajien tarkastelemiseksi ja luokitteluun toimittajasuhteen tarpeiden arvioimiseksi. Lisäksi toimittajatyypien tunnistaminen ja sopimusten solmiminen asianmukaisesti toimittajien kanssa vähentää riskiä toimitusketjussa. Ensimmäiseksi tutkimuksessa täytyi kuitenkin tunnistaa kohdeyrityksen käyttämät toimittajat ja segmentoida ne luokkiin. Osa toimittajatyypeistä oli tunnistettavissa ilman erinäisiä kriteerejä, suurin osa materiaali- ja palvelutoimittajista pitää kuitenkin arvioida tutkimuksessa esitellyllä arviointitaulukolla.

Tutkimuksen tavoitteina oli kartoittaa toimittajien kanssa neuvoteltavien raamisopimusten ja kaupallisten ehtojen edut ja haitat tutkittavan yrityksen osto-organisaatiossa. Käytettyjen toimittajien määrä yrityksessä oli huomattavan suuri vuosittaisesti joten resurssien käyttämiseksi tehokkaasti tutkimuksen toisen tavoitteena oli identifioida ja segmentoida toimittajat valittujen kriteereiden perusteella. Segmentoituja toimittajia varten luotiin lopuksi malli jonka mukaan toimittajan kanssa tulisi luoda sopimus, riippuen onko se hyödyllinen osto-organisaatiolle.

Tapauksessa on käytetty menetelmänä toimintatutkimusta joka yhdistää organisaatiossa kerättyä ja opittua laadullista tietoa, sekä määrällistä dataa yhtiön toiminnanohjausjärjestelmästä. Tutkimus tuottaa yhtiölle mallin sopimuksellisten toimittajien valintaan, jollaista ei ole ollut vielä käytössä. Toimittajien eroavaisuudella ja toimittajasuhteiden muutoksilla on vaikutuksia sekä strategiseen että operatiiviseen ostotoimintaan. Tutkimuksen vaikutukset ostotoimintaan on sisällytetty sekä toimittajasuhteissa että organisaation hankintatoimessa. Ostotoiminnan ja järjestelmän kehittymisen seurauksena tulevaisuudessa mahdolliset jatkotutkimukset ovat käsiteltyinä tämän tutkimuksen lopussa.

AVAINSANAT: supply chain management, supplier relationship management

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ABSTRACT:

The management of suppliers and supplier relationships is vitally important for the procurement organization in terms of managing and knowing the market and suppliers. Maintained and close supplier relationships develop business for all parties and enable new innovations to emerge in the market. However, maintaining supplier relations and strategic monitoring is a resource-consuming activity, so communicating closely with all available suppliers is impossible when the number of suppliers in the supply base is large. The suppliers are also different in terms of their purchase volumes and in terms of targeting the company's consumption. Purchase orders to the supplier can be one-off or alternatively weekly, if not even daily. Likewise, annual expenses can vary from tens of euros to several hundred thousand euros.

To use limited resources as efficiently as possible to increase the value of the supply chain, it is necessary to create a tool for reviewing and classifying suppliers to assess the needs of the supplier relationship. In addition, identifying supplier types and concluding contracts with appropriate suppliers reduces risk in the supply chain. However, the first step in the research was to identify the suppliers used by the case company and segment them into categories. Some of the supplier types could be identified without various criteria. However, the majority of material and service suppliers must be evaluated using the evaluation table presented in the study.

The objectives of the study were to map the advantages and disadvantages of framework agreements and commercial terms negotiated with suppliers in the purchasing organization of the company under investigation. The number of suppliers used in the company was considerably large annually, so in order to use resources efficiently, the second objective of the study was to identify and segment suppliers based on the selected criteria. Finally, a model was to be designed for segmented suppliers to identify to which supplier a contract should be negotiated with, depending on whether it is useful for the purchasing organization.

In this case, action research has been used as a method which combines qualitative information collected and learned in the organization, as well as quantitative data from the company's enterprise resource planning system. The research produces for the company a new model for the selection of contracted suppliers to answer the research gap. The diversity of suppliers and changes in supplier relationships have effects on both strategic and operational purchasing activities. The effects of the case study on the procurement function have been included regarding supplier relationships and the organization's purchasing activities. As a result of the development of the procurement function and supply chain management tools, possible follow-up studies in the future are discussed at the end of this study.

KEYWORDS: supply chain management, supplier relationship management

Contents

1	Introduction	7
1.1	Background	8
1.2	Scope of the study	9
1.3	Research methodology	10
2	Case company	12
2.1	Hitachi Energy	12
2.2	Procurement function	13
2.3	Project purchasing	14
2.4	Case study justification	16
3	Theoretical framework	18
3.1	Supplier relationship management	19
3.2	Kraljic matrix	21
3.3	Supplier types	25
3.3.1	Transactional supplier	26
3.3.2	Preferred/approved supplier	27
3.3.3	Critical supplier	28
3.3.4	Strategic/core suppliers	28
3.3.5	Group companies, internal suppliers	29
3.3.6	Outsourced provider	30
3.3.7	Subcontractor	30
3.4	Contracting	31
4	Study methodology	34
4.1	Data collection	35
4.2	Supplier identification	37
4.3	Supplier segmentation	37
4.4	Reliability	45
5	Supplier relationship management	47
5.1	The model	48

5.2	Contracts	50
5.3	Strategic	53
5.4	Volume	54
5.5	Routine	55
5.6	Bottleneck	57
6	Results analysis based on case study	59
7	Managerial implications	63
7.1	Impact on strategic purchasing	63
7.2	Impact on operative purchasing	64
8	Conclusions	66
8.1	Summary of the research	68
8.2	Future research	68
	References	70

Figures

Figure 1	Substation in Finland (Hitachi Energy, 2020)	13
Figure 2	Correlation of VIPER values to supplier relationship types (O'Brien, 2014)	21
Figure 3	Kraljic matrix (Sievo, 2022)	22
Figure 4	Segmentation phases	38
Figure 5	Generic segmentation criteria (O'Brien, 2014)	41

Tables

Table 1	Differences between supplier types	26
Table 2	Supplier segmentation framework	40
Table 3	Segmentation scoreboard	43
Table 4	Score table for supplier segmentation with examples	44
Table 5	Supplier relationship management model	49

Table 6 The model for supplier relationship management	52
Table 7 Differences between supplier relationship segments	59
Table 8 Case calculation of supplier distribution in the segments	61
Table 9 Benefits of supplier relationship management on strategic and operational purchasing	63

1 Introduction

Today's struggles in global supply chains recognize that it is essential to retain specialists at an operational level to ensure the efficient running of operational functions such as purchasing and transport. Rushton et al. (2022) state that there have been more extensive supply chain initiatives, including the need to rethink buyer-supplier relationships. The development of more robust and more positive partnerships that reflect the need for organizations within a supply chain to cooperate in order to achieve profitability is one key objective, as opposed to the traditional, occasionally combative arrangements that have occurred with buyer/seller price-led relationships. This, according to Rushton et. Al (2022) entails designing a system where the connection is established between more than the sales team and the purchasing team.

It was recognized widely in the 80s, the importance of supplier relationship management to purchasing function when Kraljics article was published, and information technology was utilized in supply chain management (Ahava et al., 1982). Splitting the purchases into four categories to develop strategic purchasing was, according to Ahava et al. (1982), done to aid a framework for large companies and their procurement functions to handle complex markets in the supply chains.

Cooperation between organizations can be systematically developed. When talking about procurement and suppliers, the terms measuring, evaluating, managing, and tendering suppliers have traditionally been used. Nieminen (2016) states that supplier relationship management and the development of genuine cooperation require changing the world of thought and vocabulary. Leaning more towards talking in terms of building together, sharing, strengthening, trusting, empowering, supporting, visioning, and improving enable the creation of an atmosphere where the development of genuine cooperation is possible. Good collaboration requires continuous contribution from both parties, and therefore the development of cooperation must be continuous. Regarding supplier relationship management, especially with critical and strategic suppliers above

mentioned change of atmosphere that Nieminen (2016) says is a crucial change from transactional supplier relationship.

However, as Vesalainen et al. (2017) state that businesses have difficulty integrating the strategy into practice and frequently choose a transactional business style, partly because they have been unsuccessful in persuading their business partners of the advantages of a relational approach. To gain a benefit from the supplier relationship, it must be implemented in a fitting scale to optimize the use of resources.

1.1 Background

The case company specializes in substation projects providing the customers with project management, financial planning, and quality components delivered and installed per requirements and specifications. Supply chain management ensures all substation components meet standards and project budget. There is no material-producing unit in the Grid Integration business units, all elements of the substation are sourced externally. Therefore, it is critical for the supply chain that the suppliers used are reliable and high quality with their product deliveries and services.

The case company ERP has open hundreds of vendors which can be used and additional vendors that have been blocked due to idle status for a certain period of time. The number of purchase orders appointed per vendor varies from one to hundreds, and the spend is irregularly divided amongst categories. Additionally, suppliers may deliver materials and services in multiple different product categories.

It would be inefficient and a waste of resources to try to negotiate a contract with every open supplier in company ERP. The study aims to simplify the process of contracting suppliers by creating a framework for supplier evaluation for a need of contract and the supplier relationship management of it. This also includes recognizing suppliers that contract or negotiation needs do not apply therefore making strategic purchasing decision-

making more efficient and the purchase process for those vendors to be according to general terms and conditions.

1.2 Scope of the study

The scope of the study includes the business units' suppliers, including direct and non-direct purchasing. Suppliers vary from material and component suppliers to service and human resources suppliers. Vendors include external suppliers from Finland and foreign countries. Other business units of Hitachi Energy Finland Oy are excluded from the study.

The thesis aims to answer the following research questions:

How will a contract develop a supplier relationship for the case company?

What kind of suppliers are identified in the case company?

What suppliers should the case company negotiate a contract with?

Objectives for the study are the following:

- Identify benefits of contracting suppliers, including disadvantages
- Identify and segment suppliers
- Design a matrix for identifying contract supplier

Research questions are answered through theory and analysis of the case company's data. The first research question regarding the contract developing supplier relationship is answered within the theoretical framework by clarifying the benefits of contracting suppliers and combining the supplier segmentation to aim the procurement functions to use its available resources more effectively to contract and maintain supplier relationships. The second research question of supplier identification is resolved through supplier theories presented in the theoretical framework section and the case company's own sourcing classifications. Identification of supplier types in the case company is aided by material code practice for different services and materials, and through the supplier classification table introduced in this case study. The third research question about

choosing the contracted suppliers is answered on justification based on suppliers ranking in the model presented in this study, to use available resources effectively for a large number of suppliers. The model is also used to identify suppliers that should not be engaged within contract negotiations due to the limited resources of the procurement function.

Objectives of the case study are accomplished to benefit the procurement function of the case company. The disadvantages of contracting suppliers were focused on using procurement resources and the large number of suppliers in the supply base with variable and small spend value. Identification and segmentation of suppliers were made by combining theories of VIPER and Kraljic matrix to create segmentation criteria and four different segments to place suppliers into. The model created offered a matrix that includes recommended actions for the suppliers in the defined segment. Recommended actions also include the contracting requirement for the supplier relationship.

1.3 Research methodology

The methodology for the case study includes data collection from the case company's ERP system and other purchasing data available for the procurement function. The gathered data will be cleaned to identify suppliers to proceed with the segmentation of the suppliers. Segmentation of the suppliers is done according to the supplier types and criteria set in place to recognize supplier relationships.

The supply chain management strategy was discussed with the procurement function, and internal sourcing directives were reviewed to support data analysis and supplier recognition. Discussions had open-ended questions to gather a strategic approach to procurement development.

By combining quantitative and qualitative data, the case study is done using mixed methods research in an action study to bring an innovative and improved solutions, which can

be transferred to the different contexts within the procurement function. According to Ivankova (2015), through the strategic integration of various quantitative and qualitative data sources, mixed methods research contributes to a more thorough evaluation of the design solution.

The data used in the study was from the case company's own ERP system and supply chain management support tools from verified purchasing transactions, which were deemed reliable data sources and most relevant for the case study.

2 Case company

This thesis is done as a case for the Hitachi Energy Grid Integration unit in Finland. The company started business in November 2019 when the ABB Power Grids business function was sold to Hitachi. However, the Grid Integration unit has been in the substation business for over a hundred years with Asea and BBC brands and nowadays continues under the Hitachi Energy brand.

Hitachi Energy develops cutting-edge technologies that support the energy transition towards an electric, carbon-neutral future. The company enables access to electricity for hundreds of millions of people, clean wind electricity for millions, and the digital transformation needed to accelerate the green energy transition. As a company creating a sustainable future, it combines innovative solutions with a company culture that emphasizes diversity, is inclusive, and works together to create a more sustainable society for current and future generations.

2.1 Hitachi Energy

Hitachi Energy has around 550 employees in Finland working across three business units; Grid Integration, Grid Automation, and Transformers. Hitachi Energy employs approximately 38,000 people globally and generates a business volume of about \$10 billion USD. (Hitachi Energy, 2022)

Grid Integration delivers power quality systems for energy transmission and substation solutions to build a more reliable and energy efficient electric network for the future. A major part of executed projects consists of gas or air-insulated substations, for example, substation renewal in Imatra below in picture 1 was delivered by Hitachi Energy Finland's Grid Integration business unit to national grid company Fingrid in Finland to change existing solutions to the more reliable and sustainable substation. Service solutions offer

maintenance and upkeep of built systems but also for customers with previously installed solutions to keep them efficient and reliable.



Figure 1 Substation in Finland (Hitachi Energy, 2020)

Hitachi Energy has introduced its own supplier sustainability strategy to encourage and guide its suppliers for a more sustainable way of working in the future. The strategy has three main focuses. The first point handles responsible sourcing of the products and raw materials, which Hitachi supply chain management also takes action in everyday work. Secondly, Hitachi's Supplier Code of Conduct is highlighted for the importance of ethical business and all compliance areas. The supplier must accept the Supplier Code of Conduct to do business with Hitachi Energy. Lastly, it encouraged to move towards carbon-neutral operations, with the example set in Hitachi Energy's own commitment with action to have transitioned using 100% fossil-free electricity in all operations. (Hitachi, 2022)

2.2 Procurement function

The procurement function of the case company includes project purchasers, strategic purchasers, contracted services specialist, tender phase specialist, and logistics

specialists. The procurement function works closely with other departments of the business unit to ensure the technical details, delivery times, quality requirements, and budgets are met in the projects. Internal customers include project managers, engineers, finance controllers, and planners.

The procurement process begins in the sales tender phase to support the sales team in offer calculation and to provide available and valid quotations from suppliers. This is due to the scopes and technical specifications of projects being according to each end customer's own requests.

For the execution phase of projects, each project is assigned a responsible project supply chain manager who oversees the project procurement plan, requests for quotations and evaluation of those and places, and follow up of purchase orders. Contract works are tendered and contracted by a specialist in cooperation with the project manager and civil engineers. Project design engineers and the project manager provide technical specifications for materials procured. The project logistics specialist is in charge of material deliveries from suppliers and shipments to the project site.

The procurement function also serves service units operating on customer sites and spare part sales. The scale of procurement needs and service projects is smaller than the previously described project executing unit. Service unit deliveries are procured and delivered in shorter timespan due to maintenance materials required time being often urgent.

2.3 Project purchasing

Project purchasing in the case company is focused on delivering custom appliances and solutions to end customers. Projects consist of varying scales of substation and power quality solutions. To support project business, there is a service unit for upkeep and

maintenance of existing customer plants and repairing of defective power distribution on-site in customer locations spread across the country.

For projects, the upcoming purchases are known beforehand as the project is sold and handed over to the execution team. Because of projects oriented business, procurement forecasts for the more extended time period, for example, two years, cannot be known for certain. Therefore, the procurement function cannot use annual production plans or similar forecasts to negotiate future needs with suppliers to ensure supplier relationships further.

Procuring for the service unit differs from traditional project purchasing. Purchased materials are urgently needed and need to be according to existing customer solutions, which might only be available through one specific supplier. Lack of supplier selection cuts off leverage in pricing and negotiation for purchases in the fast paced procurement process. A wide array of suppliers open in case organizations' ERP benefits the service unit.

The case company does not keep material storage to hold components for spare parts or tender phase projects. This disables the possibility of procuring materials in larger batches which could have an effect on decreasing pricing. However, this results in savings in storage costs and resources saved for storage handling and balancing.

Storage spaces available are used for ongoing project materials, which are to be sent to sites in larger batches. The outgoing batches are preplanned according to project timetables with the project procurement plan, including deliveries from different suppliers. The logistics function arranges shipments from storage when all goods have arrived, and the project site is ready to receive the materials.

2.4 Case study justification

Currently, the procurement function is negotiating contracts and frameworks with suppliers where the need for a contract has been noticed or requested. There needs to be a methodical rule for picking suppliers with whom contracts or framework agreements are to be negotiated. The procurement function has also noticed the number of suppliers to be too large to manage all suppliers with a contract or engage in negotiations.

The procurement function has recognized the need for a more systematic approach to supplier contracting to get more value from its supplier base. After becoming a new company and changing the business under the Hitachi Energy brand, suppliers have had challenges recognizing the new organization from the previous. Old entities are still being mixed up during procurement processes.

The systematic approach to the supplier base will aid in the development of the strategic purchasing of the procurement function. Focusing on the expertise in the procurement function and utilizing their knowledge with the suppliers will benefit the contracting and follow-up process and development with the chosen suppliers. With improved strategic sourcing and the contracting of the suppliers will improve the operational purchase process with agreed frameworks.

With further supplier development, the supplier base can be improved and used more efficiently by cutting back the number of suppliers to concentrate spend value to preferred and classified volume suppliers. The procurement function saw the hundreds of open suppliers at the time of this study as a too large number of suppliers used annually. The procurement function has identified supplier registration in the ERP to be too often used, causing the number of used suppliers to be more than wanted. Suppliers added to ERP were often used once, not classified, and divided the spend into the other categories from the preferred suppliers.

In the future, if the supplier management proves to be successful, it could be a tool to aid to cut back the supplier base as it keeps on growing and is too big and inefficient to be managed with contracts and frameworks with every single supplier according to the purchasing organization. However, first the supplier base must be segmented, and contracts must be prioritized with the model created in this case study.

Effective strategic and efficient operative purchasing ensure the profitability of the business. When the supplier base is managed correctly, and supplier relationships are beneficial, the procurement function can function on a high level and achieve the best purchasing deals and agreements. Ensuring profitability in the executing phase of projects is a task for the procurement function by getting value out of the supplier base.

3 Theoretical framework

The supply chain's purpose is to boost generated net value. It is referred a supply chain surplus when a supply chain cost is reduced from the final product value to the customer. (Chopra, 2019, p. 17) Decision making in supply chain management affects business revenue generated and the incurring expenses. Therefore, managing the supply chain successfully will increase profit with high-level product availability and quality at low costs.

Coordinating the supply chain to maximize total supply chain profits means aligned actions must be taken at all stages of procurement to get information shared and to consider what impacts other steps with changes bring to the process (Chopra, 2019, p. 261). Chopra (2019) adds that trust in the supply chain decreases if no coordination is in place and which leads to repair actions and responsiveness in the supply chain being brutal after the decrease.

It is typical for purchasing organizations, particularly ones with a global reach, to engage with several suppliers to get the components, materials, and services they need (Vesalainen, 2017, p. 178). This is rationalized, for example, to maintain bargaining power toward suppliers with multiple available suppliers and offers to negotiate with. It's crucial to decide which of the available suppliers best fits a specific supply need in a context with several suppliers. An established method for evaluating requirement fit in specific, individual instances must therefore exist in the purchasing organization when making a procurement decision. Such a procedure must make it possible for the purchaser's procurement staff to gain access to all accessible information regarding the specifications of the purchased components as well as the complementary capabilities and other relevant qualities of the available suppliers, according to Vesalainen (2017).

Supplier selection is part of the supply chain's sourcing process and decisions (Chopra, 2019, p. 71). Supply chain managers are responsible for supplier selection and evaluation for different categories. Evaluation includes choosing the criteria for supplier qualification and approval. Keeping suppliers for the same category with similar prices and

efficiency could be more efficient. Chopra (2019) continues that for urgent cases typical to project purchasing, it would serve a purpose to have options for different scenarios that need responsiveness rather than a price reduction.

The lack of a system for identifying and segmenting suppliers for established supplier relationship management creates the research gap for this case study. The case company does have general terms and conditions and contract templates to use with various suppliers and purchases, including materials and services. However, it is not specified with which suppliers a contract or a framework agreement is to be made, excluding those with whom there are already agreements in place. Due to a lack of resources for negotiating supplier contracts and an excessive number of vendors providing goods and services for the procurement function, this issue needs to be resolved.

The procurement function of the case company is primarily responsible for direct purchases of the business unit. Direct purchases are orders placed on materials or services directly addressed to a project or a service order. Direct purchases can for example be main components, installation materials, subcontracting, and maintenance inspections. Indirect purchases are materials and services not related directly to projects or service orders. Indirect purchases include for example office supplies, facilities, work clothes, and tools. Indirect purchases of the case company are managed globally in other purchasing organizations.

3.1 Supplier relationship management

Supplier relationship management is the segmented and strategic approach to maintaining a supply base. It focuses on maximizing value while minimizing risks (Skill Dynamics, 2022-a). Vesalainen's (2004) study showed that productivity in industrial exchange relationships could be significantly increased by developing a cooperative relationship. In three cases out of four, the strengthening of the relationship towards a partnership had even helped the positive development of the companies' joint order-delivery process.

The study described and analyzed by function the collaborative process of the companies, which starts with the customer's procurement and ends when the necessary goods are on the customer's production line or at its customer.

The '5 Cs' are core values for defining what an organization needs and expects from its supplier base. (O'Brien, 2014) The 5 Cs represent clarity, confidence, closeness, contribution, and collaboration. Supplier relationship management explores these values within each supplier to aid the organization's strategy. Transparency means organizing supplier information and data to point out the core and preferred suppliers to interact with. Confidence assures controls and confirms the right actions to secure supply and the capacity of the supply chain. Closeness with previous suppliers is coordinating the relationship of involved parties. The contribution of suppliers to bring success and innovation to product development is valuable to business and strategic goals. Collaborating with core suppliers makes a difference to better for the business. A rise in commitments is only one example of how the typical characteristics of switching from a traditional supplier relationship to a new strategy with suppliers have changed the nature of the partnership between businesses (Östring, 2004).

VIPER is a model to establish values and inputs from the supplier base to the organization. It stands for Value, Innovation, Performance improvements, Effectiveness, and Risk, which are requirements and reasons to prompt action in the supplier relationship management (O'Brien, 2014). Bringing value is a shared benefit from working together for both parties. Innovations, performance, and effectiveness are bringing continuous improvement to the organization with new ways of operating and ensuring the continuation of the business. Risk is associated with the protection of the brand and preventing and securing supply. These five values correlate to natures in different supplier relationship types, as illustrated in figure 2.

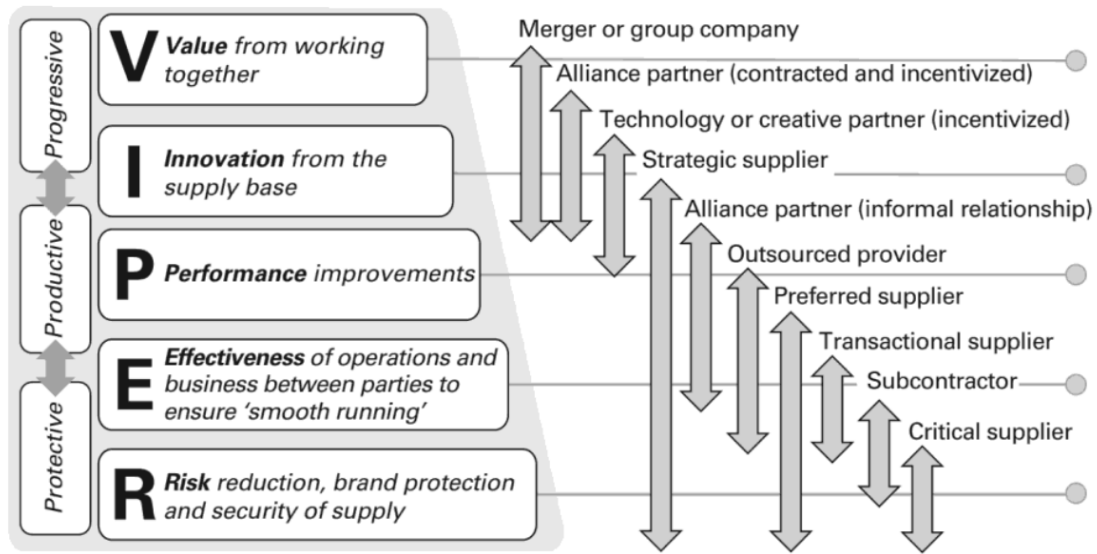


Figure 2 Correlation of VIPER values to supplier relationship types (O'Brien, 2014)

Considering the above mentioned values, the supplier relationship type can be estimated according to Fig. 2 and the suppliers' contribution to the supply chain. When analyzing supplier relationship management and the power dynamics between the supplier and the buyer, the hierarchy of suppliers is essential. Suppliers must be managed in accordance with their hierarchy within the supplier matrix, just as high-priority consumers must be closely linked to the business. The business must place a heavy emphasis on managing its relationships with its significant suppliers while putting fewer resources on its lesser-significant suppliers (Hofmann et al., 2012).

3.2 Kraljic matrix

The Kraljic matrix was first introduced in 1983 by Peter Kraljic in the Harvard Business review article "Purchasing Must Become Supply Management". It is a tool for the procurement function to analyze and distinguish product and material categories to develop strategic purchasing. It has been applied widely for supplier base categorization after its introduction due to similarities in criteria, but it was not originally created for supplier relationship management (Iloranta & Pajunen-Muhonen, 2018, p. 114). The Kraljic

matrix is ideal to use for re-evaluation of the business's procurement strategies on a regular basis, like quarterly (Richards & Grinsted, 2013). The model is a 2 x 2 matrix with two factors to measure and therefore creates a classification in four categories: non-critical, leverage, bottleneck, and strategic items, as illustrated in Fig. 3. The factors measured are the Complexity of the supply market and supply risk, and the profit impact.



Figure 3 Kraljic matrix (Sievo, 2022)

When the supply market's complexity and supply risk are low in the Fig 3 shown on the x-axis; the material is technically simple or standardized, recurringly procured, ready for installation, or does not require product support. When the risk for the factor is high, it means the material or service procured is designed for individual projects, is technically complex, is first time procured, is challenging to install, or needs product support. When considering these factors against supplier base and segmentation, it simplifies to that when the risk of complexity is low, there are more available suppliers in the market, and it is beneficial to the purchasing organization (Iloranta & Pajunen-Muhonen, 2018, p. 117). Similarly, when the complexity is high, the more scarce available supplier base is.

The purchasing organization becomes more dependent on the supplier, who may know their negotiation position in the market.

The other factor is profit impact and the value to business shown in Fig. 3 y-axis. When the factor is considered low, the investment is minor, the quantity is small, the impact of purchase is short-term, organizational adjustments are not needed, or the impact to the organization's financial performance is insignificant (Iloranta & Pajunen-Muhonen, 2018, p. 117). Likewise the factor is considered to be high when investment is significant, is large in quantity, has long-term consequences, requires organizational adjustments, or impacts the organization's financial performance considerably. To make the profit impact factor more straightforward for decision making, there should be a value threshold to be considered and set out by the procurement function. The value could be for material group or component specific but when considering supplier segmentation, overall spend per supplier over a certain period of time could be compared. To guide the threshold of the profit impact factor in the Kraljic matrix, it is recommended to implement Pareto to the subject to comprehend which suppliers are having most financial importance (Richards & Grinsted, 2013).

Leverage purchases are procured in large quantities, and orders are placed often. This is supported by a broad selection of suppliers in the market and supply base. For this quadrant in the matrix, it is feasible for the purchasing organization to use traditional negotiation tactics to lower prices and create savings. Cost savings in leverage purchasing impact the organization's financial performance due to its large total volume. For this study, the quadrant was named 'volume' to describe this attribute better.

Non-critical quadrant includes a large variety of purchases in multiple material categories, which only adds up to a small amount financially. A large variety of items and services have a supply base including numerous competing suppliers, which makes the use of traditional pricing negotiations possible. However, typical for this quadrant is that purchasing process has more costs than the purchased items, due to small-scale value and

cost saving impact on financial performance. Automated or end-user orientated procurement is a resource efficient way to procure non-critical items such as installation materials or office supplies, possibly through vendor managed inventory or price catalog.

The bottleneck quadrant is placed on the right side of the Kraljic matrix, as shown in Fig. 3, meaning that the supply risk is high. For the supply base, this indicates that there are only few, sometimes just one, possible suppliers for the material or service. Even though the value of the purchase is low, the material may pose a risk of delays or bottleneck in purchasing organizations' business. Bottleneck quadrant items are recommended to be sought out for alternative items and suppliers, and the current supplier is devised to be in contract with to minimize the supply risk (Richards & Grinsted, 2013).

Strategic products and services are of great value and critical to the operation and success of the company. Usually, there are only a few alternative suppliers for them. At most, there is only one supplier. Products and services are often - though not always - unique or customized. They may involve testing or fitting stages or special technology that is protected by patents. If switching to a new supplier is even possible, it is a laborious and time-consuming process. The procurement of this group poses the most significant challenges to the procurement organization. Traditional bidding-oriented purchasing tools do not work because there are no alternative suppliers on the market. Building close cooperation with suppliers is the only way to manage such a strategic relationship somehow. (Iloranta & Pajunen-Muhonen, 2015, p. 122)

Out of the above presented frameworks, VIPER and Kraljic matrix are developed further and combined in this case study. VIPER provides the study with substantial differences that can be used as criteria to categorize and segment the suppliers. The use of the Kraljic matrix in sourcing and purchasing is widely used nowadays and is appropriate for this case study. The quantitative nature of the criteria chosen for the suppliers benefits the results and objective of the model and the Kraljic matrix (Montgomery et al., 2018). The 5 C's framework could be further developed in future research to be applied on to

volume and strategic suppliers to develop further the supplier relationships from different viewpoints than the VIPER framework.

3.3 Supplier types

The supplier base can include vendors for materials and services that are procured for both the projects and services units. Indirect purchases also contain suppliers who provide workforce and supporting operational services for the case company.

Different supplier relationship types can be placed on the Kraljic matrix to create a formula for supplier relationship management. The supplier relationship type should be inspected and placed on the matrix according to its attributes. When reviewing suppliers individually according to Kraljic matrix segmentation, they would be given the status of supplier relationship management accordingly.

Table 1 below represents some substantive differences between supplier types in visual form. More detailed descriptions of supplier types are in the following subchapters. Chosen criteria for table 1 are the occurrence of purchase orders, typical spend value assumed, and the level of cooperation between the buying and selling organizations.

Supplier type	Purchase order occurrence	Spend value	Co-operation between organizations
Transactional	Occasional	Small	Non-existent
Preferred/Approved	Recurrent	Moderate, high	Commercial
Critical	Recurrent	Moderate, high	Commercial
Strategic	Continuous	High	Innovative
Group companies, internal suppliers	Continuous	Moderate, high	Innovative, commercial
Outsourced provider	Continuous	Moderate	Commercial
Subcontractor	Occasional	Moderate, high	Commercial

Table 1 Differences between supplier types

Differences between supplier types are estimated in the above table 1. Three criteria regarding the purchasing organization were chosen to demonstrate differences between supplier types and how they affect the procurement function. If the purchase order occurrence is recurrent or continuous, the procurement function is repeatedly purchasing and doing business with the supplier. The spend value indicates this also, but with a higher spend value, the risk of affecting revenue is larger. The co-operation between organizations indicates the communication and collaboration nature of the parties. Commercial co-operation is based on agreements and procurement induced. Innovative co-operation is more in depth with the product or service, and collaboration is done to bring new efficient and sustainable solutions to customers.

3.3.1 Transactional supplier

The transactional supplier can also be known as an arm's length supplier. Arm's length supplier communication is mostly orders and requirements of processing those, no further communication or interaction is initiated outside contractual fulfillment. Products

and services provided by the transactional supplier are commonly found and simple in a way that no alterations are needed to be done to fit the buyer's scope. (O'Brien, 2014)

Transactional suppliers include wholesale traders and importers of components that are universally known and identified with 3rd parties. For example, in Finland, electrical numbers are commonly found product codes issued by the Finnish Electrotechnical Trade Association (STK). (STK-Tietopalvelut Oy, 2022) Electrical numbers ensure the product is the same regardless of the supplier company.

3.3.2 Preferred/approved supplier

The preferred supplier is known to be high capability and to deliver accordingly. This information about preferring or selecting such a supplier can be formal or informal in the company or procurement function. There is a possibility of an existing framework agreement or long-term service agreement, which define terms for engagement and commercial terms for purchases or select product group.

There is a status for a preferred supplier, which can be defined locally or in specific business area hubs. A group of preferred suppliers can be presented in lists or strategic instructions for those in purchasing function of procurement. This requires control and upkeep of purchasing data and unifying efforts for procurement units.

The case company has also identified an approved supplier type. An approved supplier is also known to be competitive in supplying materials and services successfully to the company. According to the case company's sourcing process, supply chain management is not obligated to perform as many supplier performance evaluations to an approved supplier versus a preferred supplier.

3.3.3 Critical supplier

The critical supplier has a product or a service that is difficult to procure elsewhere due to requirements that buyer cannot fulfill themselves. Relationships with critical suppliers should be identified to reduce the risk of supply shortages and problems. Supplier relationships must be maintained and developed to mitigate the risk. A large amount of critical suppliers places the supply base at considerable risk, and amount of them should be reduced when possible.

In such delicate and critical environments, such as power grids, end customers and grid owners have high requirements, and the components must fulfill industry specific standards. This narrows possible suppliers for the projects, and sourcing must be done with an understanding and knowledge of the requirements. For example, Finland's transmission system operator Fingrid has set out their own system requirements, YLE2021 and KVS, for grid connections alongside EU Commission regulation 2016/1447. (Fingrid, 2022)

3.3.4 Strategic/core suppliers

Strategic supplier relationship is close and well communicated to enable business and collaboration on innovative solutions. Sharing innovations, know-how, capacity, and coverage will help businesses recognize their targets and objectives for the future. (O'Brien, 2014) In a strategic-core relationship, both parties benefit from and see the advantage of working collectively, and both managements are aligned on the objectives of the supplier-buyer relationship.

With the energy sector having to create more sustainable solutions for the growing and more complex electricity grid, core suppliers offering and co-operating with new innovations is essential for competitive strength in the market. Large-scale cooperation with a supplier requires new, versatile skills from individuals and unconventional operating models from the entire organization. Strategic acquisitions represent the organization's

most difficult and often most complex acquisitions, requiring both technical and commercial expertise. In these purchases of electronic commerce tools, anything that can facilitate collaboration across organizational boundaries is usually welcome. (Iloranta & Pajunen-Muhonen, 2015, p. 122).

3.3.5 Group companies, internal suppliers

Group company supplier is owned within the company group, which could benefit contractual terms and conditions for purchases internally. However, in a large global company, it is to be noted that differences in physical distance, culture, and organizational structure make distinguishing group companies as allies in business more complicated and can make distant partners more similar to the preferred supplier type. (O'Brien, 2014)

Internal suppliers for the case companies consist of other Hitachi Energy business units in Finland and abroad. In Finland, Grid Automation and Transformers are under the same legal entity and account for the turnover of the same company. It benefits contracting in the sense that all parties in the end benefit for the same company, with internal sales being transactions with neutral contracts and payment terms. All Hitachi Energy Finland business unit's product ranges can be included in the end customer scope. Therefore, it is inevitable for the agreed terms to be clear and consistent to benefit business processes.

Internal suppliers also include other Hitachi energy units and factories globally. Despite being under the same brand and corporate company, it is notable that different entities can have a more competitive approach to business with pricing and internal customer service. The general terms and conditions for internal purchases have been negotiated with all Hitachi Energy units and countries to use the same contract to do business within.

3.3.6 Outsourced provider

An outsourced provider is a supplier who has assumed control over completing a core task, need, or responsibility for a business, possibly one that was formerly completed internally. Examples of such tasks include cleaning, data management, IT assistance, and outsourced engineering services. The outsourced provider is working on close, day-to-day interaction at an operational level. Relationship and likely contract are built around performance and operational management, which are often written out in a service contract or a description.

3.3.7 Subcontractor

A subcontractor is a supplier hired to carry out a specific task or provide a work package, maybe as a part of a larger project or to deliver the entire project. Construction works on a project site and software contractors are two examples of this type of supply. It is common practice to communicate detailed requirements and technical specifications before the order is placed or a subcontract is signed.

Project sites may have multiple subcontractors working alongside on different aspects of the project scope and in different stages of project execution. Subcontractor can gain know-how of purchasing organizations' needs and ways of working to get an advantage in future project work scopes.

Subcontractors might not recognize how seriously to take the tender process or whether the particular main contractor is a strong contender when they submit their quotations. Even if they succeed in the tendering process and their prime contractor is awarded the project, they might still need to requote to secure the contract. Between the project's requests for offers and the beginning of construction, months may pass, and market conditions could change. Due to the seasonal nature of the construction industry, demand may have increased or decreased, which could impact labor or material pricing. In

contrast, main contractors can engage with subcontractors earlier in the building process, with better knowledge and less wasted effort, when the client agrees to work with a main contractor in advance. (Barber, F., & Goold, M., 2014)

3.4 Contracting

Businesses often use contracts in the conventional protecting and codifying manner as tools to enable them to lock in predictable futures. The contract serves as a document of what the parties are expected to do, when, and how to accomplish the future. Until a dispute emerges, the contract loses meaning once it is signed and closed and becomes more of a to-do list. (Vesalainen, 2017)

It is essential to know the general contract terms of the buyer's own industry. To simplify both the request for quotation and the offer, it is customary to refer to the general terms and conditions attached to the document or on the cover page. The general terms and conditions are usually drawn up at the initiative of various industry associations, and they are intended to reduce risks and problems in trade in the industry. It is usual for large companies to have them attach their own terms and conditions to reduce risks. (Iloranta & Pajunen-Muhonen, 2015)

The contract or agreement has two different functions: firstly, it expresses how it is intended to be delivered, and secondly, what follows if something does not go as planned (Iloranta & Pajunen-Muhonen, 2015). It is often wise to draw up a contract so that small changes in weekly deliveries and operations can be made smoothly without renewing the actual contract, according to Iloranta and Pajunen-Muhonen (2015). They also conclude that it is, therefore, reasonable to describe the details in the annexes to the Agreement, which can be amended together without formal negotiations at a high level.

An important point when making contracts, according to Iloranta et al. (2015, p. 276), is that often they say a deal is only needed when something goes wrong. It is wise to go

through the issues that might cause problems in advance and evaluate their consequences and cost effects. In a contract with a foreign supplier, it is also good to ensure that any possible disagreements are resolved in Finland and on the basis of Finnish law, which will, when needed, ease the control of the situation.

The above point of contract usage at the times of things going wrong gives benefit to the purchasing organization on safety measures to minimize the risk of cost and quality in project execution. Contracting selected suppliers benefits also shared innovations increasing the value of the supply chain.

Centralizing purchases reduce the costs of customer and supplier switching. The continuous preparation of offers, which is part of the market-based exchange model, is time-consuming. Although continuous tendering is rare, every bid calculation that does not lead to a sale is wasted work. In this sense, it is clear that if the supply chains can be organized in such a way that deals can be created without unnecessary calculation of offers, this will result in cost savings. From the supplier's point of view, avoiding the offer calculation reduces its switching costs. (Vesalainen, 2004)

Vesalainen (2004, p.63) also notes that the effect of the customer for preparation of requests for quotations, which is compatible with the market exchange, also requires an investment of resources from the procurement function. When purchases are centralized to a selected partner, this is avoided. This cost saving is mainly realized in the indirect (or fixed) costs of the purchasing organization.

Purchasing agreement and contract with supplier streamline the purchasing process depending on the terms agreed upon between the purchasing organization and the supplier. If no agreement of terms and conditions of purchases are agreed upon beforehand, they must be agreed upon in each purchase order. When there are multiple purchase orders in a year, it saves time and procurement resources to have agreed terms with the most used suppliers.

There are no direct disadvantages to purchasing contracts if the terms have been to benefit and improve procurement of materials and services to the defined organization's needs. Organizations, however, may misuse executive and widely strategic negotiating versus lower-level management, and local operational levels to bind all purchasing organizations to a global frame agreement and create organizational boundaries (Sarkis, 2012). The disadvantages of supplier relationship management and contract negotiations are the resources it takes to implement and maintain the systematic approach to initiate and follow up the contract and relationship.

4 Study methodology

The following chapter goes through the methodologies used for this case study. First, we go through the data collection and address the business confidentiality to keep suppliers anonymous. The second and third subchapters cover supplier identification and supplier segmentation which are specific methods used in the case study. The last subchapter goes through the reliability of the methodologies and the data used.

The study is conducted through mixed methods in action research. Description of action study according to Stringer (2014), is "a systematic approach to investigation that enables people to find effective solutions to problems they confront in their everyday lives." Action research's primary goal is to generate valuable knowledge that will improve an organization's economic and social success (Ivankova, 2015). It also aims to encourage a more fair and long-lasting engagement within the social context of the supplier base. Action research is defined in other ways also in Ivankova's (2015) text. Still, the importance of action research's practical focus, community-based orientation, participatory and collaborative character, emphasis on empowerment, and value of reflection are all highlighted by those concepts. Reason and Bradbury (2008) add to the above definitions that action research is a dynamic, emerging process that cannot be predetermined. Instead, it evolves as participants gain a deeper grasp of the problems at hand and strengthen their capacity as co-inquirers, both individually and collectively.

The use of action research as a methodology for this study is justified to get a better understanding of the executing organization and personnel managing the supply chain according to the given information by the ERP system. The two entities can only function with other to produce efficient supply chain management and supplier relationship management. A mutual feature of critical theory and action research is the aspiration for change with the help of theory, in critical action research theories are first framed, then applied to the case (Huttunen & Heikkinen, 1999). The third phase is choosing a suitable practical strategy to implement. Action research is conducted in organizations and improves local stakeholders' capabilities, which requires a participatory observation

procedure. According to Baskerville (1999), the degree to which this is a target and how it is balanced amongst the stakeholders will depend on the circumstances. Enhanced capabilities are relevant to the prior skills of the researchers and subjects, which is an inevitable effect of collaboration.

The mixed method is a research method connecting and integrating both quantitative and qualitative data (Creswell, 2010). For this study, quantitative data is purchasing data of the case company in the form of reports and spreadsheets. The qualitative data is obtained from the discussions conducted and strategic supply chain management decisions. Ivankova (2015) states the following advances of using mixed methods that are applicable to the case study. Through the thoughtful integration of different quantitative and qualitative data sources, mixed methods research contributes to the validity and reliability of the study results. Mixed method research contributes to the development of innovative and improved means of learning about a legitimate topic or problem. Better transferability of research findings to other contexts and settings is achieved by mixed methods research.

The research gap for this case study is the non-existing system of identifying and segmenting suppliers for organized supplier relationship management. The case company has contract templates and general terms and conditions to be used with different types of suppliers and purchases. It is not defined for which suppliers the contract is to be made with, excluding already existing contracts. This has to be solved due to limited resources in negotiating the supplier contracts. At the same time, there is an excessive amount of suppliers in use for materials and services for the procurement function.

4.1 Data collection

ERP (Enterprise Resource Planning) system offers a wide range of features and capabilities to the organization. ERP systems assist the business in transmitting and integrating data and information throughout all functional departments, both inside and outside

the business. Sharing data and information across corporate departments support the business in various ways and strives to accomplish a variety of targets. (Abd Elmonem et al., 2016)

Supplier data will be presented in a form that individual suppliers cannot be identified due to business confidentiality. This is to protect and preserve the case company's position in negotiations and as a trusted customer and partner.

The company has a functioning ERP system in place to track projects, purchasing, and financials of the business unit. The ERP produces spending reports according to given variables. For this study, spend reports focusing on purchasing and supplier spend were gathered.

Due to purchasing being done to suppliers outside of Europe and Finland, different currencies were used in purchase orders, and were included in the purchase order reports without exchange rates. Currencies included were euros, US dollars, Swedish crowns, and Swiss francs.

In addition to ERP provided reports, there is a tool gathering purchasing data from all Hitachi Energy business units in Europe. It is an efficient tool to gather purchasing data from international suppliers for different countries using the same material suppliers. However, the countries do not have connected ERPs, which makes the report complicated regarding the spend in categories, when different material codes are used for the same suppliers. Additionally, to different material codes used for the same products, it was noted that some suppliers appeared in multiple product categories for countries due to their extensive product portfolio.

4.2 Supplier identification

All suppliers must be registered through the case organization's ERP system to receive purchase orders and payments for invoices. This is to prevent false orders and keep track of supply chain accounting and spending.

Cleaning data is a crucial step to identifying suppliers in the correct form and disregarding duplicate or irrelevant suppliers. Duplicate suppliers may appear to company changes, system errors, and multiple locations. Group companies appeared to have duplicates for each business unit in each country due to business units having separate supplier identification numbers for invoicing. The ERP system also has data of suppliers that have been blocked due to inactive use of their accounts. This is indicated clearly in the header of the supplier and is not included in the supplier segmentation.

Report from the ERP system is issued in a chart form, which simplifies processing of the large amount of purchasing and spend data. Spend reports were filtered to count relevant purchases for the business unit.

4.3 Supplier segmentation

Segmenting suppliers is a core activity for the study. Segmentation categorizes the supply base into groups to be intervened similarly regarding relationship management. The company's specific segmentation criteria should be defined in accordance with the goals of the organization and applied to present and possible new suppliers in accordance with market intelligence. The phases of segmentation are shown in figure 4 below. In this subchapter, the first three phases are presented and applied to the procurement organization's needs and attributes. The last phase, the segmented supplier base, is not applicable to this case study that aims to discover supplier relationship management types for the different segments.

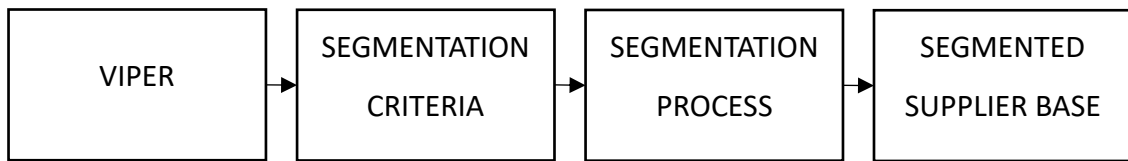


Figure 4 Segmentation phases

It is rare that a single segmentation criterion, like spend, for instance, would fulfill all of the organization's goals; instead, effective segmentation requires a fair assessment taking a variety of aspects into account and, thus, requires a variety of criteria (O'Brien, 2014). Nevertheless, complexity should be avoided whenever possible because a basic model is easier to use and more accessible for groups to follow.

Various criteria for selecting a supply and supplier base segmentation should be aimed toward goal driven segmentation process. This requires the criteria to be modified in general form and for individual suppliers to get the value the organization wants from the supply base.

Differences in the use of material codes and groups disable the possibility of using the same supplier type for all suppliers with purchase orders with specified material code. General material codes in current use grant the opportunity to use a different supplier for the same material and allow specifications to be modified according to each project's needs.

Recognition of the suppliers was not efficient due to the ERP system identifying Grid Integration and Grid Automation business units under the same purchasing organization. This created vendor lines not belonging to the case business unit, which were cleaned from the data to get a better understanding of the supplier base and accurate listing of suppliers in use. After data cleaning, it was still noticeable that the spend of the case

business unit, Grid Integration, was spread widely across hundreds of vendors with varying monetary values.

Segmentation of suppliers could be partly done according to a listing of the suppliers. Group companies could be identified due to names clearly indicating belonging under the Hitachi Energy brand. There is also the status of an internal supplier to simplify the internal netting of payments. Subcontractors are often opened for a project to accommodate geographical challenges by subcontracting local companies. Subcontractors could also be identified due to the small number of available suppliers and diligent use of correct material codes in the ERP system. The case company also has a European wide listing of suppliers with preferred status, those have been used and proved to be great partners for the business. The listing is only partially applicable to the Finland business unit because most of the suppliers are located around Europe and do not include some of the case units locally commonly used suppliers for the same materials and services. After segmenting above mentioned supplier, there were still hundreds of suppliers left to be segmented.

Due to inefficient supplier segmentation in the case company's ERP system, a simple framework was needed where suppliers could be evaluated. The VIPER model was used for the framework below in table 2 to simplify supplier segmentation when there is a large number of suppliers to go through. The use of the VIPER model was deemed to be objective to get through suppliers in different material and service categories without modifications to each category. No definitive units of measure were used due to accommodate different material and service categories, but also due to the case company widely spread spend of different scales. The high, medium, and low indicators indicate attention, value, or need of the VIPER descriptions listed on the bottom row. The judgment of the measurements is left to procurement and purchasing specialists of the case company when implementing the framework to suppliers.

Supplier segmentation framework					
High					
Med					
Low					
	Value to gain from co-working	Innovation from supplier	Performance growth	Effective operation and processes	Risk reduction of supply

Table 2 Supplier segmentation framework

As seen in the framework in table 2, the vast majority of the table is for routine supplier relationship management as the impact of described variables is low or medium for the business or procurement function.

The figure 5 below represents the generic criteria for supplier segmentation. Generic criteria should be modified according to the organization's needs more precisely to avoid unnecessary criteria from complicating the segmenting process and to provide a more fitting supplier base in the segments. This criterion should be lined strategically with the company's purchasing strategy. When segmentation is done in categories, the category's strategy should be implemented, and criteria lined up accordingly.

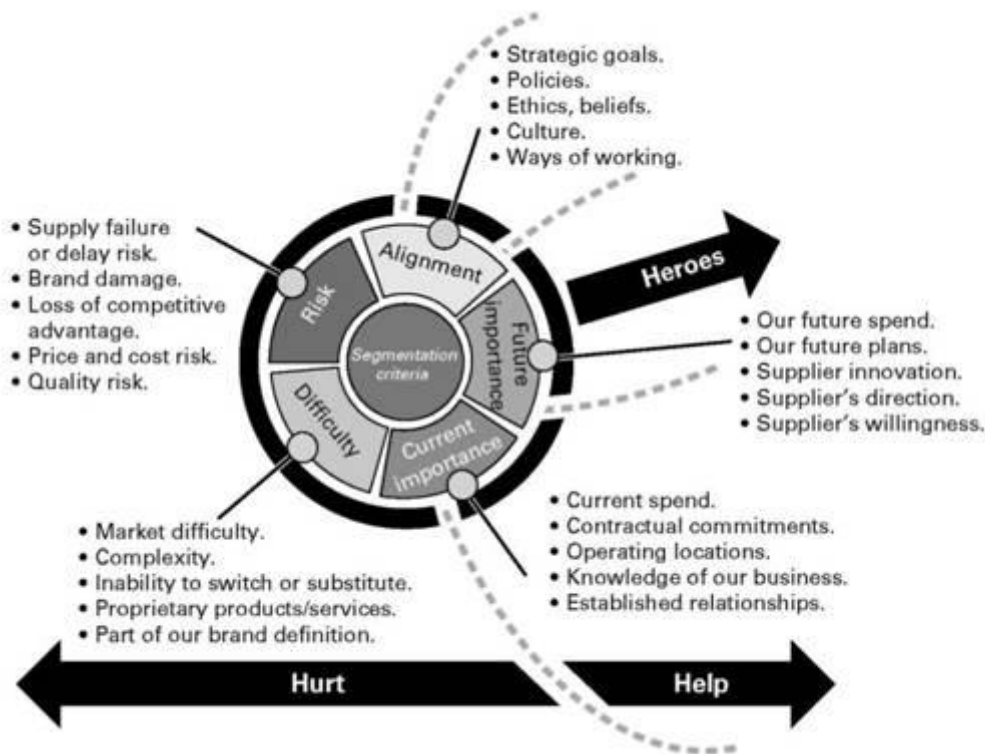


Figure 5 Generic segmentation criteria (O'Brien, 2014)

Risk is a factor that can be perceived from many perspectives regarding the project execution. Delay risks in substation and critical maintenance service are known and followed up to avoid harm to the systems and to execute projects successfully. Delays can be checked per supplier from the purchasing data of the case company, and when needed, suppliers are intercepted and regarded for their negative on-time delivery status. With a new supplier, there is a risk of quality, especially in the installation works during project site works, where materials must be fit to adjust and meet expectations of the case company's high-quality standards.

Alignment with policies, terms, and conditions is both beneficial and convenient to purchasing and selling parties to ease negotiation and speed the purchasing process. The case company has a qualification process for suppliers in place, in which during it is reviewed that partners and suppliers comply with the case company's HSE and quality policies. Alignment of strategic goals within a strategic supplier relationship grows value for

involved businesses when goals and innovations are set and reached in mutual understanding.

With the growing demand for new technologies and environmentally friendly solutions, the purchasing organization must consider that their supplier base fulfills all requirements, but also consider innovative new suppliers to be added. The need for new innovations and change toward carbon-neutral technologies should come from internal motion, but nowadays, the end customers can demand such things during the tender negotiations. If the supplier cannot provide products or services according to new regulations and market demand, it will decrease their future importance until requirements are available. The case company has made plans and targets to build more sustainable solutions for the energy market and collaborate for new innovations in their 2030 plan. (Shaping an Evolving Power System to Accelerate the Energy Transition, 2022)

Subcontractors are variable in the future importance criterion. Subcontracting relies on the geographical location of the projects. For distant projects or services, the company may use contractors locally, making them as a supplier, possibly single-use or not planned to be used in the future.

Current importance is especially shown in the ongoing projects in the case company and the market sights in the tender phase. Project purchasing is focused on the procurement for need and demand, not on keeping up stock and warehousing, so large quantities do not affect current importance or are relevant for the case company at the time of this study. As a leading substation and power quality solutions offering business in Finland, the case company has grown and integrated products with important, valued suppliers to be able to offer a solid product portfolio and improve sustainability in their supply chain to end customers.

The difficulty is a significant criterion regarding electronic components and specific regulations followed with materials and services when working and procuring for the

electric grid and critical appliances. The complexity of customer requirements and grid regulations are strict about keeping the quality and stability of the electric grid up. Inabilities to switch or substitute materials or suppliers occur due to specifications and demands of end customers or the existing system's compatibility. Switching and substituting suppliers may also occur due to supply offering being small or geographically non-existent.

In table 4 below chosen, three criteria are placed to be scored and calculated to define the classification of the supplier for transactional, preferred, critical, and strategic suppliers. Group companies, outsourced providers, and subcontractors can be distinguished as suppliers in their own categories by procurement professionals. The scores are multiplied to define supplier relationship type, which will categorize the supplier to the supplier relationship management model. Table 3 below presents score limits for each supplier relationship after multiplying the criteria scorings.

Segmentation score	Segment
≥ 18	Strategic
12-18	Preferred
9-12	Qualified/Approved
≤ 8	Transactional

Table 3 Segmentation scoreboard

Below is an example table 4 of scoring each criterion for four dummy suppliers and the results of the scores. For the implementation of supplier relationship management, this scoring activity must be done for all suppliers that are not distinguished as group companies, outsourced providers, or subcontractors.

Supplier	Spend factor	The complexity of switch or product replacement	Innovation and sustainability	Segmentation score	Segment
Vendor A	2	3	3	18	Strategic
Vendor B	2	2	3	12	Preferred
Vendor C	3	1	3	9	Qualified/Approved
Vendor D	2	1	2	4	Transactional

Table 4 Score table for supplier segmentation with examples

Due to strategic goals behind supplier relationship management and supplier segmentation, building close relationships with all suppliers is not feasible and would be an ineffective use of procurements resources. According to the case company's agenda, only suppliers capable of contributing to the business strategy are due to be built a close supplier relationship with. Limitation of the followed-up suppliers is also related to the resources available and the recommended number of accounts to be monitored per supplier relationship manager. The case company has its own recommendation of five to ten accounts managed by per supplier relationship manager (Skill Dynamics, 2022-a). However, procurement professionals in the purchasing organization are experiencing a high workload, so more significant amounts would not be recommended to them to preserve the quality of the supplier relationship management.

From the data, it was identified that the pareto principle was applicable to the purchasing and supplier base. Pareto principle indicates that roughly 80% of consequences come from 20% of causes, the data showed that circa 15% of the suppliers open in the ERP system were accountable for 80% of the monetary value in purchase orders.

The four segments included in the model to develop supplier relationship management have a different number of suppliers per segment. Including the same number of suppliers in each segment would create unnecessary compromises in supplier selection and create obstacles in contracting suppliers with available resources.

4.4 Reliability

The data age used for the study was a maximum of two years old. This was to ensure getting data of suppliers used more infrequently. The case company has a practice of inactivating suppliers in their ERP if the supplier has not been used for five years.

The data used in the study was produced in the unit's own ERP system and is based on verified transactions in supply chain management. Tools and reports are built and intended to follow up and guide supply chain management in sourcing and knowledge of the markets. Accuracy of the data is in place regarding past occurred purchases, and in line with the code of conduct for the company.

The spend value was chosen to be criteria and factor due to its wide use in key performance indicators of the company's reporting tools and meters. Key performance indicators regarding purchasing were calculated for spend value, not PO items or number of purchase orders.

Data required manual cleaning due to the system identifying two business units under the same purchase organization. This identification caused spending reports to include unnecessary suppliers and purchase orders. Identifying those two business units under the same purchasing unit was due to the company's ERP system being the same since before the ABB unit mergers and the business units remaining under the same codes in the ERP system.

The results of supplier segmentation were not affected by unnecessary supplier spend due to a large number of suppliers. The use of the pareto principle enabled the distribution of spend value and the number of suppliers the same.

It was noted during the study and data processing that the reports and data available could be improved to serve supply chain management more effectively. This would include data output to be prepared and ready to be integrated into other systems and tools that the procurement function uses, to reduce the manual work of transferring data for reporting and development purposes.

5 Supplier relationship management

As a result of segmenting and choosing applicable criteria for different supplier relationships, the following chapter introduces a matrix based on Kraljic's model combined with the case company's requisition to analyze different supplier relationships. The second subchapter identifies the needs for supplier contracts, as well as the benefits and cons of contracts for applicable relationship types. The matrix can be applied to the whole supplier base with suitable criteria to divide all existing suppliers. It is also possible to use the matrix in material categories. However, the criteria should then be revised to suit a smaller number of suppliers to fit, for example, smaller or larger spend amounts between categories.

The procurement function is experiencing an excessive number of suppliers in its supply base and new vendors opening in its ERP system. The changing market, material availability, and pricing increases have led to the sourcing of new suppliers with fast timetables. Processing of new suppliers has been done to serve the business unit quickly, and the qualifications of the suppliers need to catch up in the procurement function. This also includes the de-sourcing of suppliers from the supply base, which has led to overlapping use of suppliers in the categories resulting in a large number of different suppliers used yearly. De-sourcing is essential to keep supplier relationship management efficient. According to the business unit's directive, de-sourcing is to be done when the supplier is substantially underperforming, no longer fits the company's sourcing strategy, or is no longer needed. It is unavoidable to have a substantial number of suppliers conducting infrequent and small-scale business with the highly diverse product portfolio of the case company, but where possible, the spend should be moved to preferred and approved suppliers to ensure high quality, price-competitive products are received sustainably on time.

As all the supplier relationship types require different elements to control and follow up with the supplier, the contracts may differ between strategic and routine suppliers but

also with material and service providers. Implementation of these contracts, therefore, is not all similar and will require procurement units' attention to each supplier contract.

5.1 The model

The model shown in table 5 consists of four segments to act on supplier relationships upon. It has two factors of which the segments are observed, spend and supply risk, to provide a simple evaluation to distinguish differences between the segments. Spend is measured on the y-axis, and supply risk is on the matrix's x-axis. The segments are identified as routine, bottleneck, volume, and strategic to be consistent with the supplier relationship types and actions needed for the segments. Colors indicate a requirement to have an agreement and the closeness of the relationship with the supplier. Green meaning requiring a contract and close relationship, yellow indicating no contract, and the red indicating specified actions. Explanations for these indications are elaborated further in the following subchapters.

Each segment represents certain types of suppliers that are recognized for a similar supplier relationship management. As the segments are based on goal driven criteria, the suppliers can include both service and material providers in the same segment. To recognize and benefit from segmenting based on goal driven criteria, there should be an aim which the organization wants to follow and gain from the supplier relationship with the supplier.

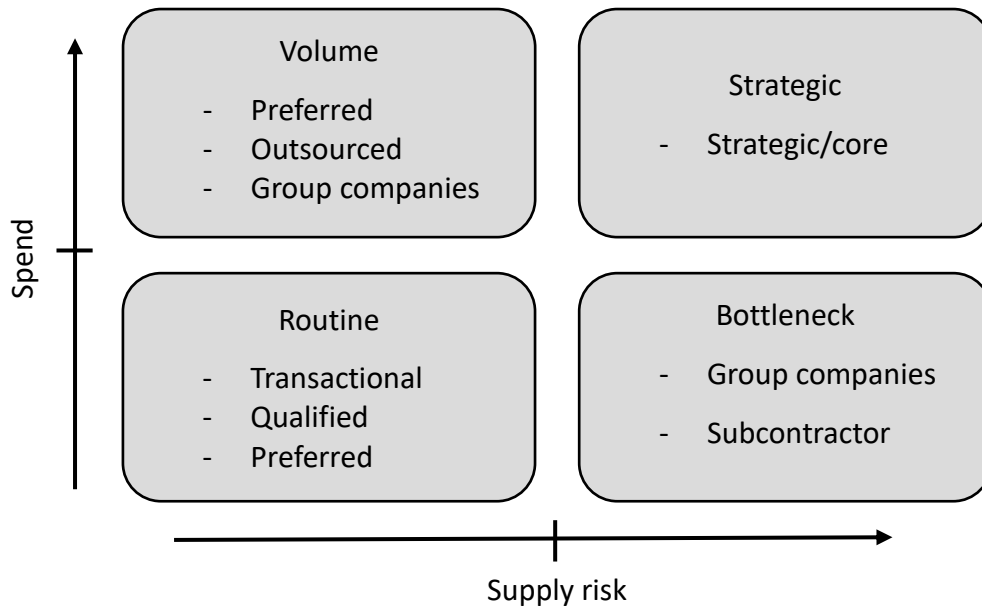


Table 5 Supplier relationship management model

The y-axis of the model accounts for the spend factor, enabling the use of the Pareto principle for a clear indication of the limit on the factor. The Pareto principle of 20% causing 80% of consequences translates to 20% of suppliers acquiring 80% of the purchasing organizations' spend. One fifth of suppliers is expected to be negotiated an agreement of sorts to provide materials and services under agreed terms, which will preferably be the case company's own general terms and conditions due to high volume spend and purchases to the eligible suppliers.

On the x-axis is a factor of supply risk indicating the complexity and criticality of the product or service supplied and procured. The difficulty of switching the supplier or product to an alternative is also to be considered in this factor. Supply risk has an unknown time horizon, which can be highly variable due to suppliers' availability and flexibility to deliver the procured items due to specified materials.

5.2 Contracts

Contracts offer clarification and understanding of agreed terms and conditions of purchasing between the parties. A purchase order is considered as an agreement of kind. However, in a purchase order there can be a reference to other agreements or frameworks. For a supplier contract, the case company is also looking to agree upon the follow-up of the contract and deliveries, for example, in reporting and meetings.

Having contracts and agreements on purchasing conditions will benefit the purchasing organization with the suppliers most commonly used and a large amount of spend. Beforehand agreed on terms and conditions, warranties, and payment terms make the purchasing process leaner, and negotiations regarding commercial terms are not needed during the tender phase and in quotations. Contracts are designed to be beneficial when deliveries are not done according to the agreed terms, to minimize the cost effect and risk of delivery to the purchasing organization.

Negotiating comprehensive agreements take time and resources from the purchasing organization; hence it is not practical to have contracts with the whole supply base of hundreds of suppliers. For evaluation of the suppliers and the necessity of having a contract, a model pictured in table 6 was created to illustrate the supplier base into segments. With two factors, spend and supply risk, it can be determined if a supplier should be within a contract with the purchasing organization. Contracts minimize the risk in the procurement, so the suppliers with large spends are to be in the contract due to their risk of affecting business financially. Products and services with complexity and considerable supply risk should be contracted due to securing the supply chain and project execution.

Therefore, contracts and agreements should be in place with suppliers in the supply base's strategic and volume segments. The bottleneck segment has its own challenges described in the designated subchapter but should be considered to be a contracted

segment due to the high supply risk. The routine segment is not considered to have a contracted supply base due to the low spend and low supply risk.

The limit on the spend factor follows the Pareto principle, which was also used in the supplier segmentation. Here it is applied to all suppliers in the model. The Pareto principle is used according to the variable spend of the purchasing organization to distinguish the 20% suppliers accounting for 80% of the spend. As the spend of the purchasing organization fluctuates in different fiscal years, this gives flexibility for the supplier relationship management.

The factor of supply risk is more complex to estimate on a scale which makes it a factor to be considered together with purchasing organization and engineering function. Especially for strategic suppliers, it must be regarded as which materials and services are complex and be able to gain value in the supply chain from a strategic supplier relationship. Purchasing organization must also be able to recognize their bottleneck suppliers in internal group companies due to materials having to be sourced internally.

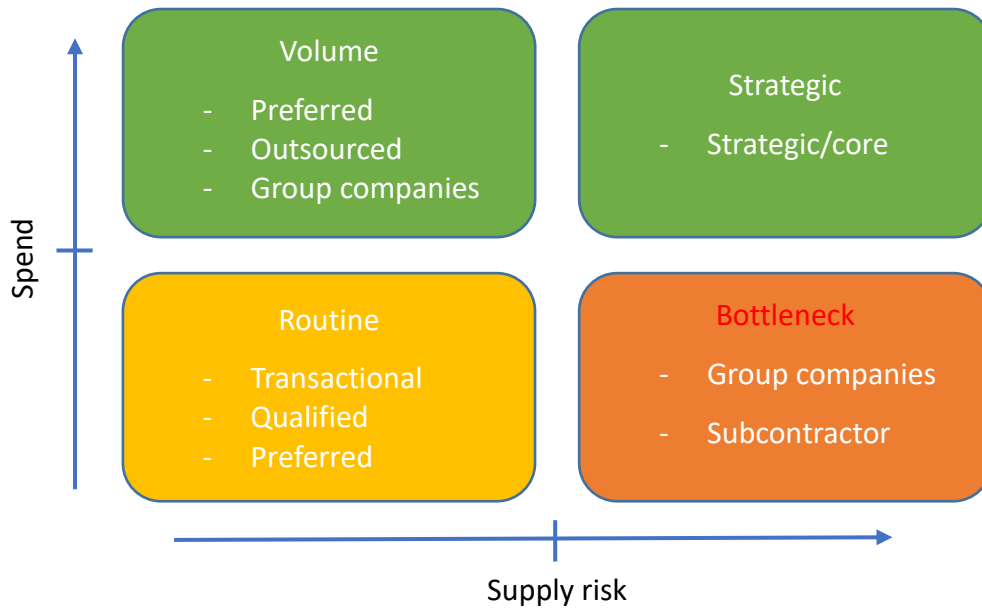


Table 6 The model for supplier relationship management

The four segments contain different supplier relationship types that have characteristics to be identified with the factors of the model. The strategic segment only includes strategic suppliers due to the strategic segment intended to be a small number of suppliers with a significant impact on the purchasing organization. The volume segment is another segment that is recommended to have a supplier be within an agreement due to high spending volume. The volume segment is expected to include the preferred suppliers from the segmentation, group companies, and outsourced providers of services. The routine segment includes transactional and qualified suppliers from the segmentation, as well as low spend volume, and preferred suppliers that are not included in the Pareto principle of the supplier spend. The bottleneck segment has suppliers that have been identified as high supply risk, but the spend is low or occasional such as certain group companies or subcontractors used in the projects.

5.3 Strategic



Supplier relationship management regarding the strategic segment is unique and according to the suppliers selected and the nature of the provided materials and services. The strategic segment of suppliers must be a limited number to ensure the relationship can be followed up by the purchasing organization's procurement personnel accordingly to a sufficient level. Strategic suppliers have the immense potential to contribute to the business strategy of the case company, as the segment is described to have significant spend as well as a considerable supply risk. With the complexity of the goods, the supplier must have research and development resources available to work with the case company's personnel to develop and test new solutions together.

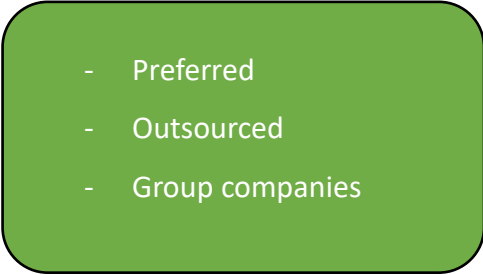
It is expected to only be 1-3 suppliers in this segment, due to the criteria of selected suppliers. If the model is used in a category with a smaller supply base, the expected number of suppliers in the segment would be one. The supplier must have the potential to add value to the supply chain from the result of the strategic supplier relationship. With the small number of suppliers in the segment, it enables the procurement function to practice supplier development on the strategic suppliers intensely.

The actions in a strategic supplier relationship depend on the nature of procured goods. For a supplier in complex systems, it should be a close relationship with the purchasing function as well as the engineering function to innovate new solutions to the market.

The purchasing functions activities include extensive performance management in line with the supplier development, as well as strategic alliance management.

Strategic suppliers should be managed with designated procurement professionals to develop and manage the supplier activities. The supplier relationship manager would be involved in target setting, development plans, issues, and relationship management. Development activities should be aiming to decrease the supply risk.

5.4 Volume

- 
- Preferred
 - Outsourced
 - Group companies

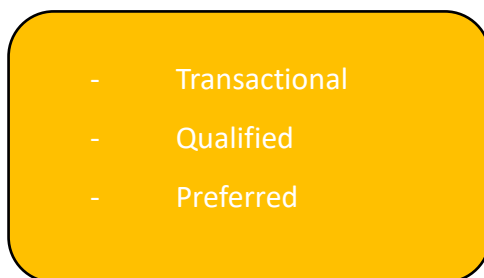
The volume segment has suppliers with high spend volume and low supply risk. Agreements are needed due to the spend volume which, due to the Pareto principle, is 80% of the case company's purchasing spend. With low supply risk the agreements are cost driven and aim to lead to cost reductions in materials and services. The low supply risk in the volume supplier segment means there are multiple suppliers available to purchase from and sourcing should be successful.

Large spend volume group companies and internal suppliers are placed in this category, however there are already internal terms and conditions in place for business units procuring from other business units. The case company has noticed a need for a more specific framework to tender and execute projects more efficiently for the market in Finland.

Preferred suppliers are supplying categories with a high impact on profit. In the supplier segmentation process, preferred suppliers are placed on the upper limit of spend with the scores being multiplied in the score table to reach the preferred classification. Outsourced providers consist mainly of indirect service providers to execute core activities for the case company, including the workforce.

Actions for the volume segment are supplier performance management, such as following up with the deliveries and monitoring of purchase orders to ensure the contract is followed accordingly. Supplier development is encouraged to be implemented to get the value of the supply base and to develop sourcing agreements accordingly. With the high volume of purchases inspecting the supplier's processes and cost structure, it can have a considerable impact on the purchasing organization. Developing a volume supplier requires the buyer to be an attractive customer and effort from both parties to develop the relationship, this requires comprehensive data to be shared of the procurement and demand.

5.5 Routine

- 
- Transactional
 - Qualified
 - Preferred

The routine segment includes transactional, qualified, and preferred suppliers. The routine segment consists of suppliers with lower spend volume and low risk of supply. The spend volume is deemed low as the suppliers in the segment are determined to be in

Pareto principles 80% of suppliers are accountable for 20% of the purchasing organization spend. The number of open suppliers is very considerable that it is not practical to have purchasing agreements with all the suppliers in the segment.

As suppliers within the routine segment of the supplier relationship matrix may not have contracts, the procurement function will need to monitor prices if necessary to avoid yearly cost increases without further notice or market reasoning. This can be done through ERP system comparison of old purchase orders and purchasing tools comparing pricelists and development of yearly spend.

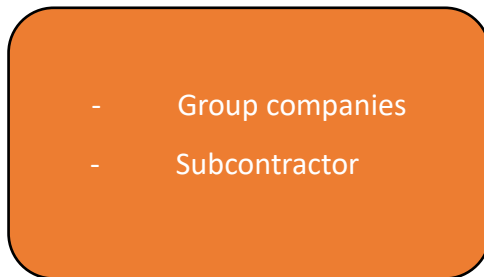
The suppliers with limited resources are found to reject Hitachi Energy's general terms and conditions. Such suppliers are typical to use generally available 3rd party terms and conditions, for example, Orgalime, to minimize the suppliers' risk. The case company should consider approving generally available terms and conditions for this segment's suppliers if requested by individual suppliers due to the slight risk of affecting business. This, however, raises the risk for the buyer, in this case Hitachi Energy. Especially for small service jobs, common ground about general terms and conditions of service description and warranties should always be found and agreed upon.

A purchase order on its own is an agreement of the trade. There is no requirement to negotiate a separate sourcing framework agreement for transactional suppliers where communication is mainly done by purchase orders and order acknowledgments, and pricing is quoted by emails beforehand. This is also applicable for qualified and preferred suppliers with low spend volume and goods with low supply risk.

Within the routine supplier segment are three different supplier types. Maintenance of the relationship with preferred suppliers with low spend value includes supplier performance management. Qualified suppliers are to be followed up with essential performance management. Transactional suppliers are managed by exception. The

development of routine suppliers can be done by increasing volume to raise mutual dependence and to seek cost reduction without decreasing the profit margin.

5.6 Bottleneck



The bottleneck segment consists of group companies and subcontractors. Group companies were partly included in the volume segment for high spend goods, but they were also included in the bottleneck segment for having high supply risk and low spend goods. Subcontractors are included due to the nature of scattered spend and high supply risk.

The bottleneck quadrant should not be considered as a segment for bad or troubling suppliers. It identifies suppliers with goods that are unavailable through other suppliers or have such complexity that results to problems in deliveries. The motion toward suppliers in the bottleneck segment should be solving and developing the supplier or goods towards better availability and lessening the complexity, which would lead to a decrease of supply risk. The aim is to reduce the number of bottleneck suppliers to reduce the supply risk for the purchasing organization.

Suppliers in the bottleneck segment have higher supply risk due to an inability or difficulty of substituting material or the supplier to an alternative. This can be notified from previous attempts or ongoing challenges. Regarding subcontractors, there have appeared to be shortages of available suppliers due to the industry having fast growth

and sites booked entirely far into the future. The geographical location of project sites has an effect on available subcontracting companies and the pricing of their quotations.

In tendering and quotation phases, due to possibly missing agreement, the terms and conditions of the possible upcoming purchase order must be clearly communicated and agreed upon beforehand to expedite the purchasing process. With subcontractors, the laws and regulations of the industry must be considered, and the responsibilities of the contract parties to be indicated regarding the site on the contract.

Purchase orders for the suppliers in the bottleneck segment are to be monitored due to the material or service procured being designed for individual projects, is technically complex, is first time procured, challenging to install, or needing product support.

Development of the segment includes building a network of subcontractors in Finland to cover it more broadly and aim for cost reductions with a more competitive position within the category through the more comprehensive network. Other complex and sensitive categories and suppliers in this segment should be developed, aiming towards other quadrants of the model. With first time procurements, it is natural and learning from failures to fix specifications in the next purchase. Challenging goods installations should be developed with the supplier towards more lean and efficient ways.

6 Results analysis based on case study

Four different segments were appointed with suitable supplier types in each quadrant. Supplier types were placed into the quadrants based on the spend value and supply risk of the materials and services provided. The allocation of the supplier type will determine the actions taken for the supplier relationship management. Differences between the segments are presented below in table 7 and further analyzed in this chapter.

Segment	Contract	SDE/SPE	Number of suppliers	Actions
Strategic	Yes	SDE and SPE performed and monitored quarterly	~1%	Collaboration on innovations, development of sustainability
Volume	Yes	SDE performed to minimize risk on revenue, SPE monitored quarterly	~20%	Operative process development, maintaining supplier performance, quarterly monitored
Bottleneck	Yes	SDE to minimize supply risk, scouting alternative suppliers	~1%	Reducing supply risk, developing supplier performance
Routine	No	De-sourcing of suppliers underperforming	~80%	Purchasers to move spend to Preferred and Approved suppliers, to ensure that case company gets high-quality, price-competitive products sustainably and on time.

Table 7 Differences between supplier relationship segments

Actions on contracting suppliers are recommended for suppliers in strategic, volume, and bottleneck segments, as shown in table 7. This is to lower the risk on procurement on high spend value affecting revenue and minimize supply risk to ensure on-time delivery of correct high-quality products and services. With framework agreements, it is possible to reach savings by targeting spend to preferred suppliers and increasing business with suppliers.

Supplier development and performance evaluations are to be performed regularly in strategic, volume, and bottleneck according to the designated column in table 7. Guidance on supplier performance evaluation done quarterly is according to the case company's sourcing instructions. If significant underperforming in a routine segment is noticed, de-sourcing should be evaluated.

Actions within each segment benefit the procurement function and the business unit by adding value to the supply chain. Each segment has actions to serve a purpose to the amount of spend value and supply risk in the assigned segment. The negotiated contracts with suppliers with high spend factor and financial impact add value to the supply chain directly with cost reductions in items and indirectly in the procurement process validating the use of contract when recommended. The impacts of these actions are further explained in the next chapter regarding managerial implications.

The number of suppliers is calculated with the Pareto principle corresponding to the spend value of the case business unit. Due to the large number of suppliers open in the case company's ERP system, the strategic and bottleneck segments do not have a considerable effect on the number of suppliers in the volume and the routine segments.

Below in table 8 is presented a case calculation for 344 suppliers used yearly. Most of the suppliers are expected to be placed into volume and routine segments. The number of strategic suppliers is expected to be minor, as suggested by supplier relationship theory and available resources. Per the previous chapter regarding bottleneck segment, it

is not desirable segment to keep suppliers but to develop them towards routine and volume segments.

Supplier segment	Percentage of suppliers	Number of suppliers	Portion of spend
Volume	20 %	65-69	80 %
Routine	80 %	271-275	20 %
Strategic	≤1%	<4	
Bottleneck	≤1%	<4	

Table 8 Case calculation of supplier distribution in the segments

The bottleneck segment's spend impact is also challenging to calculate due to its nature, including subcontractors with varying spend values depending on ongoing projects and the scope of civil works in them. Due to these deviations, the volume and routine segment number of suppliers is variable. It does not have a significant impact on the spend value portion due to the small number of suppliers compared to the whole supply base.

Identifying and picking out the strategic suppliers is done by the category manager or the local supply chain manager to aim for business growth with the case company and to collaborate on effective strategic solutions in the defined product category. The small number of strategic suppliers in table 8 is due to a calculation targeted to the case business unit in Finland, not indicating the number of global strategic suppliers.

Concentrating spend value and using preferred or approved suppliers ensure that the procurement function gets high-quality, price-competitive products and services sustainably and on time. Decreasing the use of small-spend suppliers reduces the internal administration in the procure-to-pay process and focuses resources to maintain supplier relationships with chances of affecting the revenue.

Recognizing smaller spend value suppliers that require a contract, or a framework agreement may prove to be challenging. This is due to the purchasing organization procuring for two units with different volumes of procurement. Firstly, the project unit executing substation and power quality solutions with a larger spend volume. Secondly is the service unit with a smaller spend volume and revenue but using critical suppliers to have services available at sites when needed, but needing more spend value to reach the volume segment. This issue is something that the supply chain management and service unit personnel need to discuss to bring up suppliers that should be contracted in the routine segment.

In this study it was suspected in the procurement function that not all suppliers are to be in contract with the purchasing organization, but the benefits of contract were known to save resources and simplify the procuring process. It is a matter of choosing the suppliers that are prioritized to negotiate the contract with. If no contracts are done with the supply base, the procurement function will continue to work in ineffective way of negotiating the terms and prices of purchasing for every purchase order placed.

7 Managerial implications

Following this case study, there are managerial implications that affect the procurement function. For this section, two viewpoints were chosen to observe differences in executing everyday business in purchasing of the case company. Supply chain management will be affected on the strategic and operative purchasing sides. In table 9, there are listed effects of this study and supplier relationship management in the case company.

Strategic purchasing	Operational purchasing
Wider knowledge of spend	Purchase order processing time shorter
Improvement of purchasing strategy and preferred suppliers	Minimizes risk on purchases
Supplier performance evaluation targeting	Development of follow up
De-sourcing and reducing number of suppliers	Reduce international administration in the procure-to-pay process

Table 9 Benefits of supplier relationship management on strategic and operational purchasing

Implementation of effective supplier relationship management takes resources on the procurement function. Still, the results and effects mentioned in table 9 will overcome the resources used in the future sourcing and supplier management. The next subchapters cover table 9 impacts on the strategic and operative areas of procurement.

7.1 Impact on strategic purchasing

Strategic purchasing and sourcing in the case company is a methodology and related techniques and tools to source goods and services to meet business requirements optimally (Mitchell, 2012). For the case company, these requirements are high quality, price-competitive products and services delivered sustainably and on time.

More comprehensive knowledge of spend aids strategic sourcing to recognize suppliers delivering products and services on the high capacity to use the spending data in contract reviews and negotiations. Knowledge of spend in different countries can improve preferred supplier lists to serve each business unit more specifically in different locations. De-sourcing of suppliers with low spend and transfer of purchases to higher spend suppliers can be done with improved knowledge of spend and supplier product offering.

Improvement of purchasing strategy and preferred suppliers is the result of maintaining supplier relationships systematically and performing evaluations on suppliers at regular intervals, for example, SPE and SDE quarterly on volume and strategic suppliers. Focusing spend on a smaller number of suppliers saves resources in the procurement function by using more contracted suppliers and expediting purchasing process.

Targeting suppliers for supplier performance evaluation is managed based on their supplier relationship classification. For high spend value suppliers, volume, and strategic suppliers, it is mandatory. For routine suppliers, it can be done when necessary and when considering changing the supplier relationship type, initiating the contracting process, or when considering de-sourcing. De-sourcing and reducing the number of suppliers with the above means is necessary for the case company to handle its supply base more efficiently.

7.2 Impact on operative purchasing

Operative purchasing is also referred to purchase-to-pay, P2P, process. This involves ordering, delivery, goods receipt, and payment of the procured materials or services. Within operational procurement, a PO is a key document. It is a commercially and legally binding document issued by a buyer to a supplier indicating the purchased items, the quantities, the agreed prices, and delivery conditions. It can also refer to a contract or framework agreement, if any is in place (Skill Dynamics, 2022-b).

With mutually beforehand agreed terms and possible pricelists, purchase order processing time will be shorter. This would be due to established processes with the supplier ensuring that purchase orders placed would be received and appropriately acknowledged. Invoices would be sent and handled within agreed payment terms and quantity.

Focusing spend and using preferred, or approved suppliers minimizes risk on purchases. The supplier relationships or classification should be available to operational buyers to refer to correct agreements and process purchases with agreed terms.

Established and close supplier relationships aid operational follow-up on purchase orders and invoices with agreed terms, defined order processing, and expected delivery capacities of well-known suppliers. Development of follow-up in operating purchasing improves the data quality in supplier performance evaluations and is thus aiding strategic purchasing. The established purchase process reduces internal administration in the procure-to-pay process when documentation is delivered in the correct form and with all necessary references without deviations.

To support the operative purchase process, the contracts and frameworks need to be quickly available to view in the procurement function. Referencing the terms and conditions must not rely on common knowledge, but to automatically appear to purchase orders from the ERP system.

8 Conclusions

Supplier relationship management requires continuous improvement to maximize the value from the supply base. To guide the procurement function in decision making regarding supplier contracts, a model was needed to distinguish suppliers from each other due to the large amount. The model distinguished four segments with typical supplier relationship characteristics and included different suppliers accordingly.

The segments identified were strategic, volume, routine, and bottleneck suppliers. Each segment was appointed with identified supplier classes that would be treated for supplier relationship management with the same principles. For each segment, characteristics and actions for a supplier relationship were created to be followed.

The results of the study analyze the need for a contract, the number of suppliers, and actions to be taken in each of the identified segments. The impacts of establishing supplier relationships for strategic and operative purchasing are implicated to support the justification of the study.

Due to the nature of project purchasing and combined with the lower volume service unit, there might be suppliers needed to negotiate an agreement outside of the recommended segments. For project execution, there are differences and exceptions expected in commercial terms, for example, warranty terms to end customers are sold extended, which requires components to be also procured according to the extended warranty.

The scope of this study answered the research questions and met its objectives. The first research question regarding contract developing supplier relationships was deemed to as contracts develop and benefit the supplier relationships to reduce risks in purchasing and grow the collaboration between businesses. Contracts targeted to bigger spend suppliers, it also aids strategic and operative purchasing to add value to the supply chain and process purchases faster. The second question about identifying suppliers used in the case company was figured out with existing supplier theories and studying the case

company's supplier base, resulting in seven types of suppliers being identified in the case company. The suppliers were segmented into four quadrants depending on supply value and supply risk. The four quadrants were identified as strategic, volume, routine, and bottleneck segments creating a model that resulted in an answer for the third research question about recommendations of contract negotiating with certain supplier types. The model considers the spend and risk factors resulting in that three of those segments should the company have a contract, or a framework agreement made with due to high spend value, high supply risk, or a combination of both. Suppliers in strategic, volume, and bottleneck segments should be negotiated a contract with.

The first study objective regarding the identification of the benefits and disadvantages of contracting suppliers was made in the theoretical framework. Disadvantages were found to be the limited resources available, and the excessive number of suppliers used in the case company. The second objective gathering identification of supplier types and segments, was met based on supplier theories and studying of a supply base of the case company, resulting in seven supplier types and four segments, strategic, volume, routine, and bottleneck. A model was created to solve the third objective where identified supplier type is assigned a segment, and the segment defining if the supplier is to be a contracted supplier. The model is based on the factors that support the available resources of the case company to prioritize purchasing activities.

Study limitations were concerning the data gathered and the complexity and wide range of materials and services purchased. Data gathered from the ERP system was not optimal due to the irregular use of the material codes. Secondly the ERP operated two business units under the same purchasing organization creating unnecessary spend value to the case business unit. Regarding the case study topic, the challenge was the strict business confidentiality regarding the business and the suppliers.

8.1 Summary of the research

The beginning of the study introduces and showcases the subject case and the case company. Background and procurement function are introduced to justify the need for the study with the scope and objectives. The third chapter includes the theoretical framework on which the study is built on. Fundamental theories for supplier relationship management are introduced, including the basics of supplier relationship management, the Kraljic matrix, supplier relationship types, and contracting.

Study methodologies are presented in the fourth chapter and proceeded with for the study. Methods of data collection and case relevant processes, supplier identification and segmentation, are done with the analysis of reliability regarding the methods and the data. The continuation of data processing in the previous chapter is implemented in Kraljic's theory in the fifth chapter to create a model to manage the supplier relationships.

The sixth chapter analyses and defines the results of the study and the model created. Managerial implications and the benefits of the results for the procurement function are discussed in chapter seven. The final chapter concludes the study with future research suggestions.

8.2 Future research

This case study did not include the implementation phase of the model and supplier relationship managers. The future research for this study and case company could analyze the implementation and occurring tasks of following the initiated and established supplier relationships. The tasks following different types of supplier relationships could be mapped out and analyzed for the increase of resources needed for successful implementation and continuous improvement of the relationships. Evaluation and impact of the new model for supplier relationship management should be included. The impact and change for the supplier's end could be investigated, and a communication plan could be built to support designated relationships.

The development of relationships and the aim to reach toward volume relationship could be investigated. For the future development of the supplier relationship management, its tools and goals should be revised regularly to serve the purchasing organization more effectively. A separate supplier database or integrated into the ERP system, where suppliers can participate, and input data of deliveries and procurement data, would benefit and release resources from the purchasing organization by decreasing the amount of resources used in follow-up, manual data updating, and analyzing. The existing supplier database does not include purchasing data nor serves a purpose for the segmentation of suppliers.

ERP data integration to a database guiding supplier relationship management could be combined with category management due to the two entities sharing basic principles and utilizing the same tools to analyze data. Supplier relationship management and category managers would be able to benefit from the same database and tools. This would serve a larger group of supply chain management personnel of the case company and furthermore develop supplier development internally. With the supplier information, terms, or scope of agreement available to other departments, such as sales, the procurement aspect of the tender phase could be more controlled, and the handover to execution could be better prepared regarding procurement requirements.

However, before there can be the development of external databases and tools for supplier management, the quality and diversity of the data from the ERP system must be developed and reasoned to serve its purpose. The use of overlapping purchase organizations and reporting tools not serving a deliberate purpose to the procurement function must be upgraded to serve project purchasing needs nowadays. The use of material codes must be more precise to get a better understanding of purchased materials and services, for the supply chain management personnel to develop suppliers and follow up and update the requirements of the sourcing agreements made.

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