



## ABSTRACT

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Author	Virpi Tikkala
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The purpose of this case study is to understand how visual management could be utilized in strategic supplier relationship management in global procurement organization. Research aims to identify knowledge, which organization needs in their daily work. Target is to improve process efficiency in the case organization in future, reduce waste (muda) and mistakes, by improving knowledge management processes. Theory framework includes knowledge management, strategic supplier relationship management and visual management. This research increases understanding of the visual management usage in global procurement organization and support the research results of prior studies about the benefits of efficient knowledge and information sharing in procurement operations and with strategic suppliers.

Data for this qualitative case study was collected with semi-structured theme interviews from key informants of the case organization and strategic supplier. In addition, different kind of case company instructions, process descriptions, training materials and documents were reviewed before interviews. Collected data was analysed using content analysis. Organizational learning, data analytics and decision-making, are excluded from this research. Implementation of the visual management methods is not included to this research due to the research schedule. Case study was done for global procurement organization of international technology company, which has the corporate head office in Finland.

## TIIVISTELMÄ

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Tekijä	Virpi Tikkala
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Tutkimuksen tavoitteena on ymmärtää, miten visuaalista johtamista voidaan hyödyntää strategisten toimittajien suhteiden johtamisessa globaalissa hankintaorganisaatiossa. Tutkimuksessa pyritään selvittämään mitä tietoa organisaatio tarvitsee päivittäisessä työssään. Tavoitteena on parantaa organisaation tehokkuutta tulevaisuudessa, vähentää hukkaa (muda) ja virheitä, tietojohtamisen prosesseja kehittämällä. Tutkimuksen teoria koostuu tietojohtamista, visuaalisen johtamista ja strategisten toimittajien suhteiden johtamisesta. Tutkimus lisää tietoa visuaalisen johtamisen hyödyntämisestä globaalissa hankintaorganisaatiossa ja tukee aiempien tutkimusten tuloksia tehokkaan tiedon jakamisen hyödyntämisessä hankintatoimessa ja strategisten toimittajien kanssa.

Tämän laadullisen tutkimuksen tiedonkeruumenetelmänä käytettiin puolistrukturoituja teemahaastatteluita. Lisäksi tutkimuksen valmistelussa hyödynnettiin tapausorganisaation ohjeistusta, prosessikuvauksia, koulutusmateriaaleja ja muuta dokumentaatiota. Kerätty tieto analysoitiin sisällönanalyysin metodeja hyödyntäen. Tutkimuksessa ei käsitellä organisaation oppimista, data-analytiikkaa tai päätöksentekoa. Visuaalisen johtamisen käyttöönotto ei ole osa tätä tutkimusta aikataulujen takia. Tapaustudkimus toteutettiin kansainvälisessä teknologiateollisuuden alan yrityksessä, jonka pääkonttori sijaitsee Suomessa.

## ALKUSANAT

Opiskeluni Lappeenrannan teknillisessä yliopistossa on ollut mielenkiintoista ja opettavaista aikaa. Olen saanut monta kertaa ahaa elämyksiä, että työssä oppimani asiat ovat myös tieteellisesti tutkittuja ja monessa kohtaa tutkittu tieto olisi puoltanut mielipiteitäni ja auttanut perustelemaan kannanottojani töissä. Väitän, että olen saanut nyt aikuisena opiskelusta paljon enemmän irti kuin aiemmin opiskellessani ennen varsinaista työuraani. Opinnot ovat tukeneet työtäni ja mahdollistaneet ammatillisen kehittymisen, vaikka opintojen ja työn yhdistäminen onkin aika ajoin ollut haastavaa.

Tutkimuksen tekeminen työn ohella jatkuvien organisaatiomuutosten keskellä... HUH! Tutkimuksen tekemisen yhteydessä olen saanut paljon uutta tutkimustietoa tuekseni kehitystöihin ja ajatuksia siitä, että mikä toimii ja miksi. Tiedonjanoni ei ole ehtynyt, vaikka lukeminen iltamyöhään onkin ollut joskus kuin pakkopullan syömistä, kiitollisena hampaat irvessä.

Kiitokset ohjaajalle ja tarkastajille. Kiitos Kirsimarja sekavan visioni ymmärtämisestä ja jatkuvista muistutuksista tiivistämisen tärkeydestä! Aina ei tarvitse mennä sieltä, missä aita on korkeimmillaan. Kiitokset opiskelukavereille. Erityisesti haluan kiittää opiskeluryhmäämme yhteistyöstä ja kaikesta kannustuksesta. Eli kiitokset teille Laura, Paula, Päivi ja Anne. Ilman teidän tukeanne ja yhteistyötä olisi jäänyt monet naurut nauramatta ja ryhmätyöt palauttamatta ajoissa. Olette mahtavia, upeita naisia! Lauran muistoa kunnioittaen.

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Kiitokset myös perheelle ja ystäville. Opiskeluni on vienyt aikaa teiltä kaikilta, joten kiitokset ymmärtämisestä ja tuesta. Nyt minulla on taas aikaa teille enemmän.

Valkeakoskella, 30.5.2021

Virpi Tikkala

## Table of content

<b>1. Introduction .....</b>	<b>9</b>
1.1. Research targets and questions .....	12
1.2. Research methodology .....	14
1.3. Limitations.....	15
1.4. Structure of the thesis .....	16
1.5. Key concepts and theory framework.....	17
1.5.1. Knowledge management.....	17
1.5.2. Supplier relationship management (SRM).....	19
1.5.3. Lean terminology and elements of visual management.....	21
<b>2. Knowledge management, strategic supplier relationship management and visual management in global procurement organization.....</b>	<b>26</b>
2.1. Knowledge management .....	26
2.1.1. Knowledge processes.....	27
2.1.2. Leadership and knowledge management.....	31
2.1.3. Knowledge, information, and data management systems .....	33
2.2. Strategic supplier relationship management in global organization .....	35
2.2.1. Strategic suppliers .....	36
2.2.2. Global sourcing organization .....	38
2.2.3. Knowledge in supplier relationship management.....	40
2.2.4. Supplier relationship management processes and systems .....	41
2.3. Visual management in lean procurement operations .....	43
2.3.1. Lean procurement.....	44
2.3.2. Visual management.....	45
2.3.3. Visualization of metrics and data .....	48
2.3.4. Challenges of implementing Lean.....	50
<b>3. Research methodology.....</b>	<b>53</b>
3.1. Data collection .....	53
3.2. Analysis.....	58
3.3. Trustworthiness.....	60
<b>4. Findings .....</b>	<b>64</b>

4.1. Case organization .....	64
4.2. Usage of visual management in case organization .....	66
4.3. Research findings .....	68
4.3.1. Lean procurement and visual management – Are there any benefits? ....	70
4.3.2. Leadership – What is the role of leadership when implementing Lean? ..	74
4.3.3. Data, information, and knowledge – What is needed for efficient SRM? .	75
4.3.4. Tools and processes – How to share and distribute data, information, and knowledge? .....	82
4.3.5. Visual management – What should be visualized?.....	85
4.4. Development ideas collected during the interviews .....	87
<b>5. Discussion and Conclusions .....</b>	<b>89</b>
5.1. Visual management in strategic supplier relationship management .....	90
5.2. Knowledge management and leadership in supplier relationship management	96
5.3. Key elements of visual management for global procurement organization ..	107
5.4. Contribution and implications .....	111
5.5. Further research proposals .....	115
<b>References .....</b>	<b>117</b>

## **APPENDIXES**

Appendix 1: Research questions and interview question relation

Appendix 2: List of the questions of all interview rounds

Appendix 3: Analysis related question grouping and themes for content analysis

Appendix 4: Training requirements collected from Procurement organization

## LIST OF FIGURES

Figure 1: Research questions are formed based on the theory framework	p. 13
Figure 2: Theory framework in this research	p. 17
Figure 3: Purchasing activities	p. 19
Figure 4: Research focus and key concepts	p. 25
Figure 5: Four types of 'BA' and knowledge creation spiral	p. 29
Figure 6: Possible dimensions and categories in the Kraljic matrix	p. 37
Figure 7: Architecture and deployment of SRM Systems	p. 42
Figure 8: Visual management theory synthesis	p. 46
Figure 9: Visual management board for purchasing	p. 47
Figure 10: Some example from current company visual management	p. 67
Figure 11: Knowledge management plan	p. 114
Figure 12: Operational excellence overview	p. 114
Figure 13: Performance management concept	p. 114
Figure 14: Strategic supplier relationship management elements	p. 115

## LIST OF TABLES

Table 1: Knowledge creation processes	p. 28
Table 2: Supplier segmentation factors from Coca-Cola company	p. 37
Table 3: First version of the interview questions	p. 56
Table 4: Interviews and key informants	p. 57
Table 5: Research questions, theory framework and analysis structure	p. 68
Table 6: key findings and dimensions based on research questions	p. 69-70
Table 7: Knowledge needed in SRM	p. 75

## LIST OF ABBREVIATIONS

BA	Business area
'BA'	Mental, cultural or physic place in time or space
BI	Business intelligence
COPQ	Cost of poor quality
CPFR	collaborative planning, forecasting, and replenishment
ERP	Enterprise resource planning
etc.	Et cetera
e.g.	exempli gratia, which means "for example"
FTY	First time yield
F2F	Face-to-face
IVM	Integrated visual management
JIT	Just-in-Time
JITP	JIT purchasing
KMS	Knowledge management system
KPI	Key performance indicators
LCM	Life cycle managements
MNC	Multinational company
MOQ	Minimum order quantity
OEE	Overall equipment effectiveness
OOE / OPE	Overall Office Effectiveness / Overall Professional Effectiveness
OTD	On time delivery
RBV	Resource based view
SECI	Systemizing, externalization, combining, internalizing
SRM	Supplier relationship management
S2S	System-to-system
TPM	Total productive maintenance
TPS	Toyota production system
VMI	Vendor managed inventory
VPMS	Visual performance management system
VSM	Value stream mapping
WIP	Work in progress



## 1. INTRODUCTION

Lean procurement. Operational excellence. Needed knowledge, information, and data to create competitive advantage. Efficient strategic supplier relationship management. These themes are the cornerstones of this research and can be identified also from the strategies of the best-in-class companies. Operational excellence is not built without efforts. Professional purchasing, materials management, sourcing, and procurement activities affect to company profitability and those processes are in the focus of this research. This research is a case study about strategic supplier relationship management and the usage of visual management in the related processes. This research is concentrating on identifying knowledge management processes in global strategic supplier relationship management (SRM) and Lean-office context. Companies need to identify their key processes to ensure operational excellence and creating methodology for knowledge management processes to the organization to be able to grow and build sustainability. The purpose of this case study is to understand how visual management could be utilized in strategic supplier relationship management in global procurement organization. Research aims to identify knowledge, which organization needs in their daily work. Target is to improve process efficiency in the case organization in future, reduce waste (muda) and mistakes, by improving knowledge management processes.

Theory framework is built around the knowledge management and supplier relationship management (SRM) in the context of Lean procurement. Visual management is one method of the Lean tools and supporting the visibility of the key performance indicators (KPIs) in the company and the continuous development. Data and information visualization can be used to improve process efficiency and management also in office processes including procurement operations (source-to-pay, procure-to-pay and design-to-delivery). Specified knowledge is needed for efficient supplier management. Organization should identify the needed knowledge and performance metrics to manage processes with fact-based data and identify waste in processes. Dynamic knowledge creation theory is supporting to create a visual management model for strategic supplier management development.

Novelty of this research is aligning knowledge management framework into the context of strategic supplier management in global organization where visual management methods from Lean tools will be implemented. There are several researches available about the issues separately, but combining these themes together brings additional value for the case organization and practical insights to the management. With this approach, the case study research aims to bring more information for management and especially people working within procurement operations. Lean office management methodology with visual management and continuous improvement, are challenging to implement. One target in this study is to identify those pitfalls and offer recommendation to the development and implementation of visual management into the case organization.

Competitive business intelligence, organizational learning, decision-making and (big) data analytics are relevant aspect to this research, but those are left out from this research scope. Those are something to consider in additional research proposals after concluding the findings from this case study.

Selected approach for the research data gathering, is not that common for this type of the research. Researches done before of the supplier relationship management or Lean implementation, are either quantitative and / or it is not common to have interviews done in case company and include also external supplier interviews for the research data. In this qualitative case study research, semi structured theme interviews are used to collect research data. Key informants were selected from case company with cascading method and one supplier interview was arranged to ensure the wide enough material and data for the research. Case company instructions, training materials, process descriptions and other documents were reviewed, when preparing the interviews. This allowed more in-depth insights from the case company and supplier co-operation.

Interviews were arranged during organizational restructuring and governance e model changes in case company between 2018 and 2020 to identify the development requirement for the procurement organization. Since the timeline of the interviews was rather long, some differences can be noticed between the findings from the earlier

interviews and latest interviews. There was also an internal study done in the case company on 2018, which aimed to identify the training requirements of the procurement organization to prepare a proposal for the knowledge and skills management system. Summary of the identified training requirements is presented in appendix 4.

Another case company internal research was completed before starting this research and the findings of that were reviewed to identify development requirements of the case organization. The findings of that internal organizational status survey indicated that development is still required for the tools, talent and training, metrics, and strategy. This case study uses these research results and other case company internal material to identify challenges in current knowledge management. After the internal research results were reviewed by the management, improvement plans were initiated. This research is part of those plans. Relevant for this research, were the identified needs to improve inconsistent supplier relationship management (SRM) processes, strategic approach of procurement development globally, low formalization of cross-functional co-operation in the organization (i.e., processes, roles & resp., KPIs, governance mechanisms and transparency issues due to partially insufficient tool landscape and often low discipline in usage of tools). Also, the missing training curriculum and difficulties with talent retention relate for this study.

Identifying key knowledge and information for procurement managers and directors in the case organization help to avoid unnecessary waste (i.e. delays) in procurement operations. Having needed information available timely, ensuring needed knowledge for the organization and efficient communication within organization lead to operational excellence and create the aimed competitive advance. This is the target for this research. Implementing visual management practices and effectiveness of the new methods are unfortunately left out from the study scope, but there will be a plan made for the case company during the research. Target is not only to visualize data with smart fancy business intelligence (BI) systems, but to also to bring additional value for the organization's usage by visualizing tacit kind of the knowledge to enable dynamic knowledge creation and information sharing in case organization. Organization will benefit from more harmonized knowledge processes and tools. Target is to identify key

areas for improvement for new procurement organization with continuous development process. With a right kind of leadership and management there is a huge potential for operational development in supplier relationship management.

Case organization is part of international company in technology field. Case company has gone through significant restructuring of procurement organization and integration actions after major acquisitions. There are more than 10 000 employees in this international technology company, and it is operating in more than 40 countries.

### **1.1. Research targets and questions**

This research aims to identify key inputs for knowledge management and dynamic knowledge creation processes to ensure needed data, information and knowledge for organizations use in strategic supplier relationship management. Target is to use this information to form visual management system using ideas from Lean tools to visualize the needed information for organization's daily use. At the end, target is to ensure the continuous improvement and operational efficiency for procurement organization in case company. By identifying the needed knowledge, which is necessary for daily work, organization should be able to improve supplier relationship management. With right leadership, organization can develop and harmonize knowledge, information and data used in visual management. Based on the findings of the research a visual management system proposal will be done for global procurement organization. Implementing visual management practices and evaluation of effectiveness of the new methods are scoped out from the study scope due to the schedule.

Target of this case study is not only to visualize big data with BI systems, but to also bring additional value for the organization's usage by visualizing needed information using Lean and visual management principles. Target in this approach is to create more fluent process flow in procurement. With a right kind of leadership and management there is a huge potential for operational development in strategic supplier relationship management.

Research questions follow the setup of theory framework and are formed to support the identified development needs of the case company and procurement organization. There is one main research question with two supporting questions. Theory framework link with research questions is presented in figure 1.

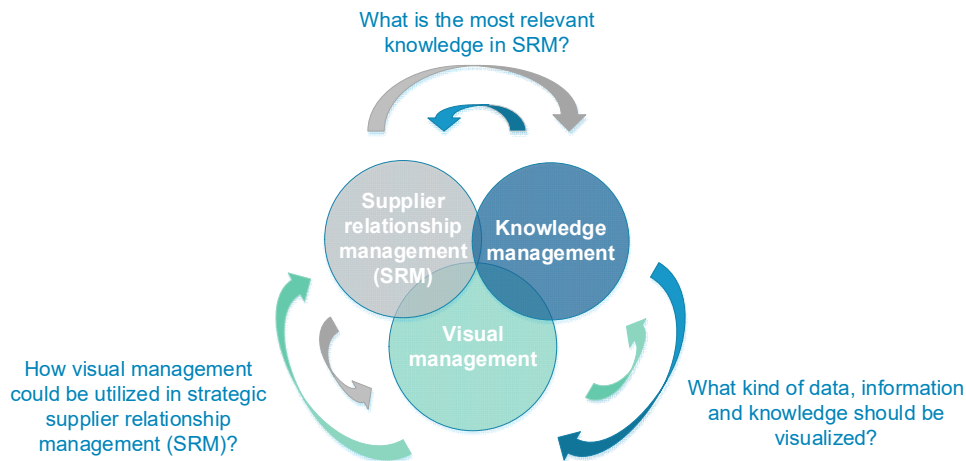


Figure 1: Research questions are formed based on the theory framework

### **How visual management could be utilized in strategic supplier relationship management? (*Visual management and SRM connection*)**

Additional research questions combine knowledge management dynamic knowledge creation processes into the context of Lean procurement in global organization and supplier relationship management theories. Supportive research questions are:

- **What is the most relevant knowledge in SRM? (*SRM and knowledge management connection*)**
- **What kind of data, information and knowledge should be visualized? (*Visual management and knowledge management connection*)**

With these research questions target is to clarify the most relevant information for procurement organization in case company to further develop the strategic supplier collaboration. Collected information during the research and based on the findings from

the interviews visual management system will be designed for case company. Research methodology has been designed to support the research approach.

There are different research strategies and different factors affecting which should be considered when the type of the research and analysing methodologies are selected. For this research, case study is selected strategy with content analysis.

## **1.2. Research methodology**

There are many quantitative researches of Lean, supplier relationship management and knowledge management. The idea in this research is to make a case study using qualitative research methods. Qualitative approach for the study is taken, like proposed in the further research proposals by Sluyts et al. (2011, 884). By using the semi structured interviews instead of surveys, there is a possibility to collect deeper insights from the case organization. The input from suppliers is also in the scope to form dyadic information collection.

There is a variety of data sources, which can be utilized in the case study type of a research (Eisenhardt & Graebner 2007, 28). Data sources in this research are interviews, observations, operational data and documentation like instructions and guidelines from the case company. I as a researcher, have been working in the case company for more than 10 years. I am also familiar with the procurement processes, tools, and the case organization. This enabled also easy access for the different data sources and key informants.

Information about the different visual management, supplier collaboration and knowledge management methods are collected by interviewing key informants from case company procurement organization and external supplier. Target is to find out the best practices and development ideas for supplier relationship management. Interview questions are formed based on the literature review and the results of the previous researches done in case organization. Secondary data sources are the supplier performance related KPIs, procurement development projects, procurement

processes, other related supplier relationship management information and documentation.

Case study was selected for this research because it is one step towards the development plan implementation in co-operation with the case organization. Valuable feedback and ideas are collected from the key informants. The research approach also allows the generalization of the research findings with limitations (Stake 1995, 9-12), even this case study is done only within one company.

This research follows similar phases as adapted from ethnographic research according to Metsämuuronen (2006, 210-216):

1. Preparation of literature and access for the key informants
2. Literature collection and building theory framework
3. Collecting the data including the interview, descriptions of the current processes, data from supplier performance, instructions and training materials, tools, and their usage information
4. Summarizing the findings and collecting additional information
5. Data handling and analysing
6. Conclusions and reporting

Answers of the research questions are summarized and organized based on the case study research analysis. The novelty value in the research is a case study approach, access for the key informants from both customer (= case company) and supplier sides and looking for new insights and information from in depth theme interviews. Also combining wider theory framework, gives interesting new aspects while analysing the research findings.

### **1.3. Limitations**

This research is a single-case study. Eisenhardt (1989, 533-534) instructs to concentrate on the theoretically useful cases. Case study research may include one or several cases. Since this research aims for the deep understanding of the

organizational challenges and aims to create a plan for visual management system for the case organizations, single-case study approach was selected.

Case company is multinational company. Data collection, including interviews and preliminary information collected from case company about the strategic suppliers, systems, processes and documentation, was aiming at global approach in data collection, but due to the limited research resources and limited schedule, all the case company subsidiaries and countries, were not included for the interviews. Target was to identify key informants to collect information widely enough to support this research.

This research is limited only for the supplier relationship management with the strategic suppliers. There are different ways to manage supplier base, suppliers in different segments and categories, and in this research focuses on strategic suppliers globally. The implementation of visual management system and comparison of the effectiveness of the implemented actions are left out due to schedule. Knowledge creation process is in the focus of this research instead of the knowledge assets management is left out. The deeper analysis from the supplier side – customer relationship point of view is left out from this research. Focus is only in the case company organization point of view and results from the supplier interview is used to compare the findings from the case company.

#### **1.4. Structure of the thesis**

In the chapter 1 research and scope of this case study is introduced with research questions and key concepts. Theory framework and literature review of knowledge management, strategic supplier relationship management in global procurement organization and visual management elements of Lean are introduced in chapter 2. Chapter 3 explains the research and analysis methodology. Findings and status of the case organization are summarized in chapter 4. Finally, in chapter 5 there are conclusions, discussion, and implications.



## 1.5. Key concepts and theory framework

In this chapter key concepts are introduced from knowledge management, supplier relationship management (SRM) and Lean procurement with visual management.

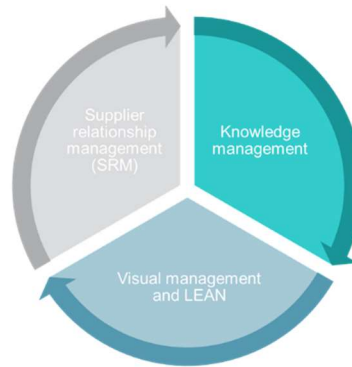


Figure 2: Theory framework in this research

Target of the research is to understand how visual management could be utilized in the global procurement organization in strategic supplier relationship management. By identifying the needed knowledge of the strategic supplier relationship management and related processes and tools, it will be possible to create enhanced visual management model and methodologies for the case organization. By understanding key concepts and terminology data collection for the research can relate to theory framework.

### 1.5.1. Knowledge management

Data, information, and knowledge. Those are the basic concepts in knowledge management. Knowledge is formed from information and information requires data. Alavi & Leidner (2001, 109) has defined data as raw numbers and facts, information to be processed data and knowledge to be information possessed in the minds of individuals, personalized information. Information is related to facts, procedures, concepts, interpretations, ideas, observations, and judgments. They state that: *“information is converted to knowledge once it is processed in the mind of individuals and knowledge becomes information once it is articulated and presented in the form of text, graphics, words, or other symbolic forms”*.

Nonaka (1994, 15) defines knowledge related to knowledge creation process as a dynamic human process of justifying personal beliefs as part of an aspiration for the "truth." Knowledge is created based on prior knowledge and information. Information in knowledge creation process is connected to the beliefs of its holder. Knowledge is always related to human action. Process of knowledge creation is a continuous process and has many interfaces with environment of individual and related organization. Environment works as a source for the inspiration for knowledge creation. Knowledge redundancy and trust facilitates knowledge transfer and sharing due to interaction between organizational members. (Nonaka 1994, 27-28) 'BA' is a context which can be physical, mental, or virtual place. 'BA' functions as a platform of knowledge creation process where trust is needed among the organizational members. (von Krogh et al. 2012, 242)

According to Alavi & Leidner (2001, 115) there are four knowledge management processes: creation, storage / retrieval, transfer, and application. Von Krogh et al. (2012) have described knowledge transfer, sharing, creations exploiting processes related to organizational knowledge activities. There are more knowledge management processes identified in different knowledge management frameworks globally, like introduced in the study of Heisig (2009), but in this research most relevant knowledge management processes are sharing, transfer and conversions.

Knowledge is not stable. Organizations need specific knowledge to maintain competitive advantage and growth. There are three main elements in knowledge creation: SECI process, energizing BA, and knowledge assets. There are four knowledge creation processes: socialization, externalization, combination, and internalization (Nonaka et al. 2000, 9-11). In organizations, new knowledge is created in continuously through dynamic knowledge creation process, where it is maintained and exploited after creation again and again. Knowledge creation can be described as a spiral that grows. There are different kind of knowledge in organizations: tacit and explicit knowledge. Explicit knowledge is formal and systematic and tacit knowledge is personal and hard to formalize. (Nonaka et al. 2000, 5-7). Details of these key concepts and knowledge related processes will be explained in coming chapters.

### 1.5.2. Supplier relationship management (SRM)

Terminology is varying in the literature related to the usage of terms vendor and supplier management, procurement, sourcing, buying, and purchasing. Úbeda et al. (2015, 181) has visualized the different purchasing activities according to processes defined in 'Revolution in purchasing' by van Weele & Rozemeijer (1996). Figure 3 presents the process steps in upstream and downstream process of purchasing activities.



Figure 3: Purchasing activities

(modified from Úbeda, Alsua & Carrasco 2015; Weele & Rozemeijer 1996)

Úbeda, Alsua & Carrasco (2015, 181) have defined upstream activities to be more strategic and downstream more operative. They state that in literature purchasing to describe upstream activities and procurement for downstream activities. Somewhat different definitions are used in this research in analysis phase due to the definitions in the case company. According to case company definitions 'procurement' is covering all activities from strategic activities called strategic sourcing activities and purchasing, where more operative activities are handled. Both up and downstream processes require specific skills, knowledge, and resources. Critical resources of firm may appear outside of its boundaries and be embedded in interfirm processes and routines.

Lambert & Schwieterman (2012, 337-338) see supplier relationship management (SRM) as strategic, process-oriented, cross-functional, and value-creating process for buyer and seller, and means of achieving superior financial performance. SRM is a set of processes that are needed for strategic and operational supplier relationship management. As example, these processes include setting up segmentation, doing supplier profitability analysis, setting up business objects by supplier segments and relationship implication guidelines by segment (Lambert & Schwieterman 2012, 340-348).

Different supplier segment management require specific resources, knowledge, and activities. Lambert & Schwieterman (2012, 344) has listed dedicated resources, extensive business planning, business strategy and two-way customized supplier metrics to be potential implications of strategic supplier segment. Supplier segments are not stable. Portfolio analysis should be revaluation and strategic direction of suppliers analysed. For example, with strategic suppliers following decisions can be taken to terminate partnership and find new supplier, accept the locked-in 'partnership' or to maintain strategic partnership. (Gelderman & Van Wheele 2003, 212).

SRM is one form of alliance management. From the alliance management literature and researches there are several findings supporting the knowledge management and SRM development. For example, in the research of Dyer & Singh (1998, 661-666) they have stated that firms which are collaborating are benefitting of interfirm knowledge sharing routines. Those alliance partners that are effective on transferring know-how are likely to outperform those competitors who are not. Collaboration with alliance partners should align incentives to support transparency and knowledge transfer and sharing. Choosing correct alliances and managing them efficiently might be the needed competitive advance in the market, which can help the firm to lose or to survive in the competitive market environment.

Managing alliances requires capable resources who can co-operate successfully with strategically selected partners. Gulati (1998) has described strategic alliances to be voluntary arrangements between firms. Alliances can be formed to exchange, share, or co-develop products, technologies, or services. Firms have different kinds of motives to form a voluntary relationship which may be formed either horizontally or vertically across boundaries. With the correct selection of strategic alliances and by managing them efficiently firms may change their competitive positioning or market power.

### 1.5.3. Lean terminology and elements of visual management

Target for Lean is not only to reduce waste, waste in processes and transaction when considering improving profitability, but to create flow for the processes. The biggest benefit of creating the flow, is to identify when it is stopped. This applies also for office processes. (Duggan 2007, 20-22) Key concepts of Lean for this research are operational excellence, Lean office, Lean metrics, visual control and management, kaizen and continuous improvement and standard work and instructions. These are introduced below.

#### **Operational excellence:**

Random act of goodness in process development is not enough to lead company to operational excellence. According to Duggan (2007, 22) operational excellence is *“when each and every employee can see the flow of value to the customer and fix that flow before it breaks down.”* Flow is related to information, material and process flow, timing, lead times and limitations. Different methods can be used to define the flow: value stream mapping, standard work and making the flow visual.

Implementing business excellence models include different methodologies like Lean Six Sigma, Lean manufacturing, or any management system. Those aim to decrease the costs and to improve performance in the organizations. There are some similarities and differences in concepts of Six Sigma and Lean. Six Sigma methodology is used more for problem solving and Lean aims to improve process flow by eliminating waste. (Chiarini 2013, 7-13)

#### **Lean office:**

Reducing waste is one of the main targets of Lean also considering office processes. In office reduction concentrates to transactions and to the number of handovers instead of production steps. Value stream mapping might be used as a tool to identify the waste. Waste can be for example order backlog, waiting time for approvals, waiting signatures. (Chiarini 2011, 98).

Basic principles of Lean can be also used in office environment to improve and maintain standard work and process flow. Lean tools for office and services are for example 5S, mistake proofing, setup reduction and quick changeover. (Locher 2011, 75)

### **Lean metrics:**

Lean uses different kinds of metrics to identify the efficiency and effects of waste reduction. According to Chiarini (2011, 103-104) most important key performance indicators (KPI) in her research were: lead-time, overall equipment effectiveness (OEE), first time yield (FTY), cost of poor quality (COPQ), inventory turns and safety incidents/accidents. There are also other important KPIs identified like on time delivery (OTD), process cycle time and work in process (WIP). Strategic objectives of organization should be linked with KPIs. KPIs should be measured and managed on daily or even hourly bases. (Chiarini 2011, 98).

Setting or changing the performance metrics is under responsibility of management. Metrics should follow the goals of the organization and if there is Lean manufacturing system in us, the metrics should be following the process blueprint according to value stream mapping. Metrics development should consider end to end process including transportation, inventory, quality, and cost metrics. (Harris 2013, 14)

### **Visual control and management:**

Originally visual control has been linked to production line problems, where waste is visualized immediately in production line. Displays, signals, horns, and other systems alert real time if problem has been identified. This kind of problems have been product defects, problems with inventories or with takt time. (Chiarini 2011, 99). Visual control in Lean office targets to bring transparency for process flow, queues and bringing problems visible. Visual signals help organizations to maintain flow, recover from problems without management interference and guidance. Also, department boards improve visibility (Locher, 2011, 36-58)

Visualizing in Lean methodology aims for transparency to enable sustain standard work. Visual management can be implemented to reduce waste with different kind of

processes and to indicate problems in processes. Target is to solve problems as soon as they appear and help to recover as soon as possible. With visual management the language used for communication should be universal and international. Visual management brings performance visual. Design for visual management should consider proximity and complexity. Less complex and closer community is, signals and simple boards could be used, but when there is more complexity, more information in processes, then the needed information could be communicated by using electronic solutions. In that case installing also monitors close to operations should be considered. (Locher 2011, 61-64)

It is also recommended to post the working instructions close to the workstation. It is also considered as a visual management. Visual management also provides possibility to make performance measures visible. Visual management helps organization to communicate and clarify the targets for improvement. Visual management can also help to identify problems. It can highlight the gap between the target and the status. Visual management might reinforce performance and show the progress towards targets (Imai 2012,110-112)

There are several visual management tools available, for example andon. Imai (2021, 122) describes Andon as a lamp or other kind of visual signals, which can be used by team members or leaders to call help. Andon calls can be used whenever abnormalities like part shortages or quality errors are identified.

### **Kaizen and continuous improvement:**

Kaizen term is coming from Japanese words of Kai (改) which means change, and Zen (善), which means good or better. Kaizen is not purely same thing as continuous improvement. Kaizen is involving everyone and all on-going improvements. Continuous improvement is included to kaizen, but it is more like defined by Hua (2018, 410): “total continuous improvement”. One example of the kaizen process is the chain of improvements:

*“People perform tasks. When tasks become complicated, people will develop systems to manage the tasks. When systems become complicated, people will*

*develop and utilize technologies (including computer and information technologies and systems, decision support systems, etc.) to manage tasks and systems.” (Hua 2018, 419-420)*

Kaizen event is something where organization aims for quick and full solution for problems. Kaizen aims to reduce waste in processes. Chiarini (2011, 99). Continuous improvement toolbox includes basic tools like flowcharts, pareto charts, cause-and-effect diagrams. (Locher 2011, 143)

### **Standard work and instructions**

While describing standard work, it should also include the description of abnormalities and what to do in case abnormalities occur. Work instructions help team to work independently and not to check from the management how to perform their work. When standardizing the work, instructions should describe what is the best way to do the job. (Imai 2012, 110-111, 243, 403)

Key concepts represented in chapters above, are linking the research questions with what is already known, meaning results from prior research (Stake 1995, 15-16). In this research key concepts are combined from knowledge management, supplier relationship management and visual management in Lean procurement. These are combined for the case company research and supporting forming of the research questions and analysing the findings. As a summary of the key concepts, those are presented in figure 4.



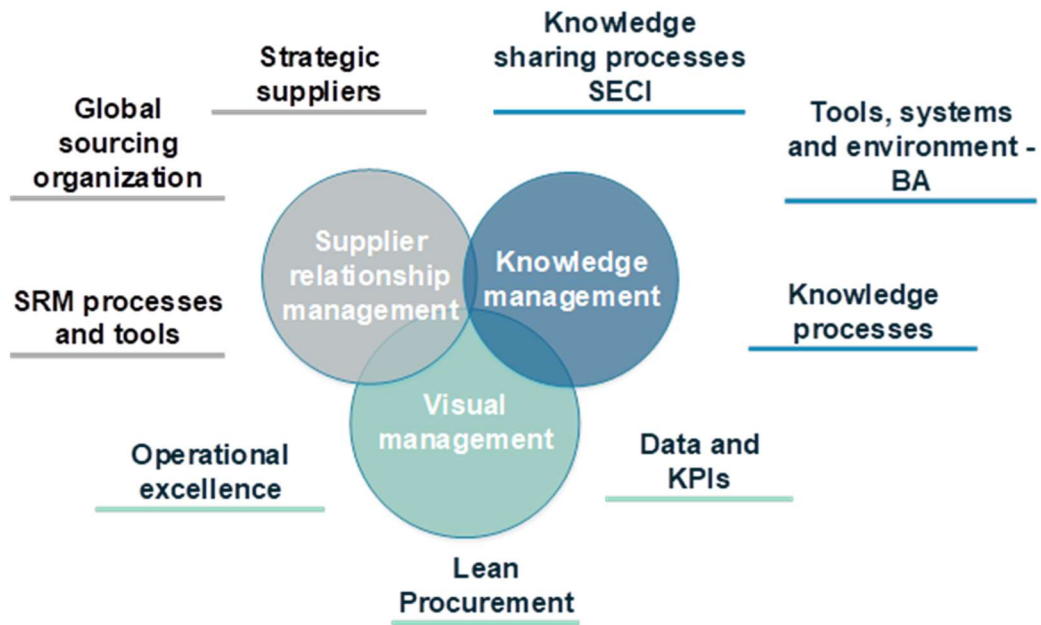


Figure 4: Research focus and key concepts

Next chapter builds the theory framework for this research by introducing knowledge management, strategic supplier relationship management in global organization and visual management methodologies and possibilities.

## **2. KNOWLEDGE MANAGEMENT, STRATEGIC SUPPLIER RELATIONSHIP MANAGEMENT AND VISUAL MANAGEMENT IN GLOBAL PROCUREMENT ORGANIZATION**

Year 1996 van Weele and Rozemeijer wrote the article of “Revolution in purchasing”. In their article they introduced three revolutions: ‘*globalization of trade*’, ‘*information society*’ and ‘*more demanding consumers and continuously changing consumer preferences*’. According to them, to survive from the revolution, organizations need to either concentrate into drastic cost reduction or constant innovation. Year 1998 Dyer & Singh introduced idea of four potential of interorganizational competitive advantages. Those include interfirm resources and routines include relation-specific assets, knowledge sharing routines, complementary resources / capabilities, and effective governance. This research theory framework is covering the theory and concepts from knowledge management, supplier relationship management and visual management in Lean office.

In case study type of the research, one should be aware of the full range of theories relevant to the case (Yin 2003, 30-31). In this research wide approach for theory framework has been selected to support the research theory building. Target for this research is to combine theory framework from knowledge management, supplier relationship management and Lean. The relevant knowledge management processes are introduced next.

### **2.1. Knowledge management**

Knowledge is context specific and depends on a particular time and space. Information becomes knowledge when individuals or organizations interpret it. There are two different types of knowledge. Tacit knowledge is difficult to formalize and store, where explicit knowledge is easily processed transmitted and stored. Knowledge creation is a dynamic process where knowledge is created in social interaction among individuals and organizations according to the definition by Nonaka et al. (2000, 7). New knowledge is created through conversions while utilizing tacit and explicit knowledge like a form of a spiral. Knowledge spiral takes place in socialization, externalization,

combination, and internalization processes. Knowledge creation processes are also possible for groups of companies, not only within a single company. (Nonaka et al. 2000, 30)

### **2.1.1. Knowledge processes**

According to Nonaka et al. (2000, 13-15) putting information into context creates knowledge. Knowledge creation process needs place, which in this context is described as a 'BA', which means roughly place in Japanese. 'BA' is the context in which knowledge is shared, created, and utilized. 'Ba' is a time and space where information is interpreted. For example. for socialization and externalization processes, it is important to share time and space. 'BA' can be compared with the concept of 'communities of practice', but 'BA' is more. 'BA' needs energy to be activated, 'BA' is the place where knowledge is created, and boundaries of 'BA' are fluid. (von Krogh et al. 2012, 242)

According to Nonaka et al. (2000, 9-12) knowledge is created in four different interaction processes of explicit and tacit knowledge: socialization, externalization, combination, and internalization. You can see knowledge scope of each in table 1.

Table 1: Knowledge creation processes

Process	SECI mode	Knowledge scope
Tacit to tacit knowledge – Empathizing	<b>Socialization</b>	<ul style="list-style-type: none"> <li>- Shared experiences</li> <li>- Hands-on experience</li> <li>- Informal social meetings</li> <li>- Mutual trust (also beyond organizations)</li> <li>- Interaction of / with experts</li> </ul>
Tacit to explicit knowledge – Articulating	<b>Externalization</b>	<ul style="list-style-type: none"> <li>- Crystallized tacit knowledge</li> <li>- Example new product development and quality control cycle</li> <li>- Creative and essential dialogue</li> </ul>
Explicit to explicit knowledge – Connecting	<b>Combination</b>	<ul style="list-style-type: none"> <li>- Explicit knowledge which is collected, combined, edited, and processed</li> <li>- Computerized communication networks</li> <li>- Assembling internal and external data and databases</li> <li>- Combining information from several sources</li> <li>- Breakdown of vision into actions</li> </ul>
Explicit to tacit knowledge – Embodying	<b>Internalization</b>	<ul style="list-style-type: none"> <li>- Learning by doing</li> <li>- Reading documents and manuals</li> <li>- Shared values and thoughts</li> <li>- Understanding vision</li> </ul>

Knowledge creation spiral takes place in intra- and inter-organizationally in dynamic process through interaction starting from individual level continuing to interaction between companies. Interaction between organizations can trigger new knowledge creation with suppliers and customers. Mutual trust facilitates the knowledge sharing and creation. (Nonaka et al. 2000, 11-13; Nonaka & Toyama 2003, 2) In similar way than enabling 'ba' inside company, by creating trusting environment, knowledge creation processes can exceed lowering the borders of the company and organization. Nonaka et al. (2000, 12-14) use knowledge creation processes and 'ba' to also explain the competitive advantage of companies. Nonaka & Toyama (2003, 4) states that organization should choose the environment in which and how to build and sustain competitive advantages.

Originating, dialoguing, systemizing, and exercising are the four different types of 'BA' (Nonaka et al. 2000, 16-17). Interaction can take place individually or collectively. It also can happen face-to-face or virtually. 'Originating BA' is a context for socialization,

where individuals share experiences face-to-face. 'Dialoguing BA' creates place in collective face-to-face interaction for externalization. 'Systemizing BA', which is defined as collective and virtual interaction, offers virtual collaborative environment for knowledge combination. Individual and virtual interaction creates context for internalization, which is defined by 'exercising BA'. These four types of 'BA' and knowledge creation spiral concepts are presented below in the figure 5.

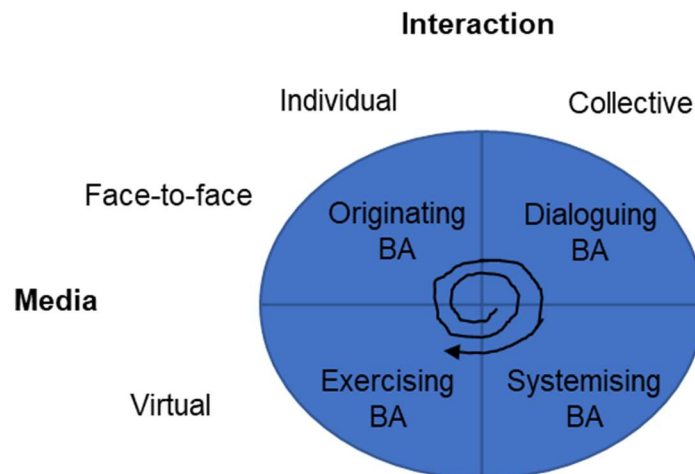


Figure 5: Four types of 'BA' and knowledge creation spiral  
(According to Nonaka et al. 2000, 16)

Dialoguing 'BA' with tacit knowledge sharing and systemizing 'ba' with on-line data banks where individuals may exchange information enable new knowledge creation in externalization and combination processes. Reflection through action in exercising 'ba' and experience sharing in originating 'BA' creates time and place for knowledge internalization and socialization. 'BA' can be understood as a mental, virtual, and physical location and putting knowledge creation into social, historical, and cultural context. (Nonaka et al. 2000, 15-16) Management facilitates the steps of knowledge creation spiral in SECI model (Nonaka et al. 2000, 9-11):

- **Socialization:** Enables informal discussions and meetings when building the trust.
- **Externalization and combination:** Make knowledge visual and transferable with formal structure, tools processes and practices.

- **Internalization:** Organization is learning and able to share know-how, know-what and know-when within organization and their network. Organization is learning by doing.

Middle and top managers are responsible of building and providing and motivating 'BA'. Different kinds of 'BA' include mental space like corporate goals, physical space like meeting rooms and virtual space like computer networks. (Nonaka et al. 2006, 1191-1192) In knowledge creation processes, when ensuring knowledge spiral facilitation, also non-verbal visual language is encouraged to be used. With SECI processes different communication methods should be considered. (Nonaka et al. 2000, 29)

According to Alavi & Leidner (2001, 119-121) organizational knowledge transfer is driven by communication processes and information flows. Knowledge transfer in and between the organizations is important process in knowledge management. It is important to identify where knowledge is needed and where it could be used. With different kinds of information systems knowledge transfer can be extended beyond the formal communication lines. Organization needs to pay attention for selecting correct transfer mechanisms. There are different methods available to help individuals to access knowledge like computer networks, electronic bulletin boards and discussion groups facilitate knowledge transfer process.

Monteiro, Arvidsson & Birkinshaw (2008, 102-104) have studied knowledge flows in multinational companies (MNC). Their findings revealed that sometimes centrally managed organizations have challenges sharing and collecting information equally. Those units which are more active on sharing the information and using that as a knowledge source also tend to receive more knowledge from other units or from central organization. Activity of the unit has an impact to how knowledge flows. Knowledge is shared and exchanges within similar subgroups within the MNC. Some units, which are less active might be alienated from an information networks. Communication activity with peers might be also affected due to the language skills.

### **2.1.2. Leadership and knowledge management**

Leadership is different than management. Managers are assigned to their roles, but not necessarily act as leaders. Leaders can be recognized from organization when they act as innovator, mentor, or facilitator. Leaders are important for acting as role models and sharing their knowledge. (von Krogh et al. 2012, 243-244) Leadership in knowledge management requires creation of knowledge vision and understanding the knowledge assets in the organization. Facilitating, energizing, and utilizing 'ba' enables dynamic knowledge creation processes. This requires dynamic interaction inside and outside of the organization. (Nonaka et al. 2000, 30)

Von Krogh et al. (2012, 247) reviewed leadership and knowledge researches and according to their study results different leadership styles should be varied according to issues and problems on hand. Situational leadership style fit for broad set of situations. Even preferences of different leadership styles vary in different cultures, country specific mainstream leaderships styles are not always expected in one organization or within one team. The experience of the individuals and company culture affects for the expected leadership style. (Tikkala 2014, 54-58)

There are three different activity layers in the organizations considering knowledge creation processes and leadership required in the organization. They appear in formal and informal organizations and structures. First, in the core layer knowledge is created in collaboration. It is considered as informal local knowledge creation and sharing knowledge in small groups. Knowledge is shared because of common interests, individual needs, and unique areas of expertise. Second, the conditional layer provides resources and context for knowledge creation. One example of knowledge creation in the second layer is a cross-hierarchical small team where tasks are solved in peer like groups. Centralized leadership synchronizes the flow of knowledge assets and sometimes needs to put more efforts on trainings and to provide resources for facilitation. The third, structural layer, which is more formal, gives frames, coordination, control, and direction for knowledge creation. This layer provides structures for connecting knowledge creation and knowledge assets in organization. In structural layer centralized leadership is creating knowledge strategies and vision, implements

organizational procedures and balances knowledge creation with application of knowledge. There are specific tools and leadership activities for each layer. In core activity layer distribute leadership, in conditional layer both distributed and centralized leadership and in structural layer centralized leadership activities are necessary. (von Krogh et al. 2012, 257-268)

Leaders should set knowledge vision with strategy, plan knowledge processes, set up knowledge sharing channels and motivate people to participate in knowledge management initiatives. Leadership style of top management can be facilitating knowledge creation processes and in that way support organization to increase its competitive advantage. Management can affect for organization by creating knowledge vision, facilitating 'BA', and managing knowledge spiral (Nonaka et al. 2000, 30). Leadership provides important strategy and direction for the knowledge management processes, which include knowledge transfer, creation, sharing and accumulation (von Krogh et al. 2012, 242). Part of the required leadership is to plan knowledge processes and sharing channels, support of the organizational culture and providing needed tools for the organization. These tools include knowledge repositories, technology infrastructure, but also "infostructure", "infrastructure" and "infoculture". 'BA' is enabled by leadership in informal networks, virtual environments and learning communities. (von Krogh et al. 2012, 248-250) Most critical task for leadership is to provide accurate, timely and complete information for decision-making (Nonaka et al. 2006, 1190).

It is important to consider the organizational setup in knowledge processes. Leadership can be either distributed or centralized. Autonomy and empowerment are normally supported by centralized leadership model, where shared leadership styles are not specified clearly. When leadership is distributed in organization, effectiveness increases, and team members becomes important resource for the organization. Distributed leadership is seen more participative and centralized leadership as more directed and planned. (von Krogh et al. 2012, 252-254)



### 2.1.3. Knowledge, information, and data management systems

To support efficient knowledge creation processes, companies arrange information systems for organizations to use. These information systems may include different kinds of electronic repositories, electronic communication tools like chat and e-mail, collaboration, and simulation capabilities. (Nonaka et al. 2006, 1186) According to different research results it is found out that with implementing IT tools for knowledge management can lead to greater breadth and depth of knowledge creation, storage, transfer, and application in organizations (Alavi & Leidner 2001, 130).

Chua (2004, 88-89) has introduced the three-tiered knowledge management system architecture, where infrastructure, knowledge management and presentation services are combined with knowledge processes. These processes include:

- Presentation services: personalisation and visualisation
- Knowledge services: knowledge creation, sharing and reuse
- Infrastructure services: storage and communication.

Intezari & Gressel (2017, 72-73) continues with knowledge management systems, where Alavi and Leidner (2001) left their listing, adding more recently developed knowledge management systems like different kinds of portals. These tools might be also integrated into problem-finding and problem-solving processes. They also bring big data velocity, volume, and variety into the knowledge management system focus. Analysing capabilities of data allow organization to take needed actions, develop business processes and improve customer service. There are different structured and unstructured data sources available in and to organizations. There are tools available to help with analysis and for example visualization.

Increasing big data and dropping costs of databases enable organizations to make better, strategic, and operational decisions. Having access for big data is not enough. Also arranging advanced analytics capabilities is necessary to provide transparency through performance monitoring. Organizations need to solve the challenges of having too much or inaccurate data. Many organizations try to incorporate data with their

decision-making processes when timely access for data and secured data quality is essential. (Intezari & Gressel 2017, 74-78)

Different kinds of data bases may for example present status of the inventories or provide feedback from customers. Data can be converted also for scorecards to support business performance management and to be visualizing performance metrics. Electronic document management systems support organization in daily work. They allow search functions to find essential information, reports, policies, and documents. (Intezari & Gressel 2017, 79-80) These different tools help organizations to absorb and share knowledge across networks and even outside of the organization. Advanced knowledge management system can integrate knowledge and big data. These advanced systems should be social, cross lingual, interactive, dynamic, agile, simple, and understandable. Knowledge management systems should be aligned with organization strategies. (Intezari & Gressel 2017, 83-85)

There are information systems build to support prioritization and communicating critical data, information, and knowledge, but also monitoring processes and operations. Connecting big data and knowledge allows using key performance indicators, dashboards, and real-time observations. (Rothberg & Erickson 2017, 93) Predictive knowledge is combination of big data and interpretation of experienced professionals. Machine learning with the big data algorithms become more and more robust and can be further utilized in the SECI process in the future. (Sumbal et al. 2017, 191-192) Argyris & Schön (1996, 8) encourages organizations for organizational learning since knowledge is useful only if learning is put out into action. The knowledge management framework with predictive knowledge presented by Sumbal et al. (2017, 193) proposes improved decision-making and business performance for future.

Sumbal et al. (2017, 180-181) has taken also big data approach for knowledge management in their research. Knowledge creation and decision-making processes can utilize the big data where more focus should be put into data flows and data analytics. With big data the challenge is volume, velocity, and variety of the data. The definition of big data in their research was: *“big data technologies describe a new generation of technologies and architectures, designed to economically extract value*

*from very large volumes of a wide variety of data, by enabling the high-velocity capture, discovery, and/or analysis”* from International Data Corporation.

Personal knowledge management is typically handled without electronic tools. It concentrates transforming information into knowledge. In the future intelligent tools might be learning which data, information or knowledge is relevant for individual and supporting efficient knowledge usage. Personal knowledge management tools help to collect data, building self-knowledge maps and convert and extract knowledge into skills. (Liu et al. 2017, 216) Different kinds of mobile business apps and efficient usage of smartphones for example for searching, presenting, or storing data, will help organization to operate efficiently and to create new knowledge. (Liu et al. 2017, 217-227)

## **2.2. Strategic supplier relationship management in global organization**

Target for this research is to combine theory framework from knowledge management, supplier relationship management and Lean. The relevant strategic supplier relationship framework is introduced next.

Leading companies in purchasing concentrate on creating value to customer in their business model. Culture, business processes, management systems and computer platforms of company are all aligned to support that target. Those companies also use value chain management, process orientation and competence-based strategies to change business. With value chain, companies can link organization's knowledge, competences, and relationship with customers. (van Weele & Rozemeijer 1996, 155)

With new solutions companies can combine demand information globally, provide transparency, provide single-point-of-contact, benefit from purchasing power and still support flexibility in purchasing processes. With production related purchasing global coordination companies need to uniform the purchasing processes and standardize supply to implement worldwide information systems and databases. Harmonized processes and systems enable the co-operation of so-called cross-functional commodity teams, who could be defining preferred parts and suppliers for the

company. Systems would provide information like approved suppliers, supply history, performance, and details of contracts. Harmonized purchasing and sourcing processes should be arranged to be simple, transparent, and focused to customer. Organization should motivate, lead and control performance in organization to develop purchasing and supply functions. (van Weele & Rozemeijer 1996, 155-160).

### **2.2.1. Strategic suppliers**

In the strategic supplier portfolio management, strategic partnership requires experience and organizational setup from firm. Selecting strategic suppliers for deeper collaboration can be chosen according to Kraljic matrix where supply risk and profit importance of the purchased products and suppliers are evaluated. Suppliers and their products are categorized under four groups: non-critical, leverage, bottleneck, and strategic categories. Kraljic's matrix is one of the best know portfolio model for supply strategy planning. (Gelderman & Semeijn, 2006 211, 214) There is some critique against Kraljic's matrix in more recent research. Model is lacking the aspects of different types of demand and product complexity. For example, in more recently introduced model agility and leanness of the product and supply chain are also considered. Lean dimension includes quality and cost and agile flexibility and time. (Drake et al. 2013, 4)

There are several different ways, frameworks, and methods to classify supplier base and to identify if purchased parts are strategic for business. Trautman et al. (2009) and Gelderman & Semeijn (2006) introduced an adapted model of Kraljic matrix in their research. In figure 6 there is a classification model to identify strategic items from organization's purchasing portfolio, which has been modified from models presented by Gelderman & Semeijn (2006) and Gelderman & Van Wheele (2003, 208).

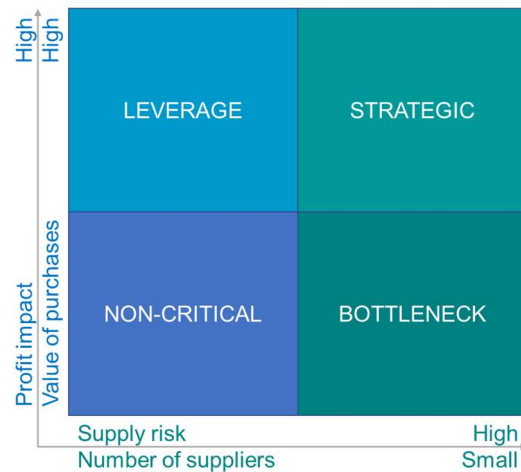


Figure 6: Possible dimensions and categories in the Kraljic matrix

Labert & Schwieterman (2012) have continued with the idea from Kraljic's matrix and introduced different processes for supplier relationship management with supplier segmentation examples from global companies. There is one example of the different factors of Coca Cola company used for supplier segmentation for routine, leverage, bottleneck, and strategic suppliers presented in table 2. Suppliers with high in supply risk and highly potential in value adding are considered as strategic suppliers.

Table 2: Supplier segmentation factors from Coca-Cola company (Lambert & Schwieterman 2012, 343)

Supply risk	Potential to add value
Product, Service, quality, continuity, capacity, complexity of specifications, social responsibility, supplier's responsibility with competitors, financial stability, industry dynamics, environmental issues, availability of suitable suppliers, supplier also a customer	Innovation and technology, intellectual property, supply chain process integration, minority / women owned business, global presence, competitive pricing, cost management, volume / spend, compatibility / strategic alignment, access to asset and capabilities, impact to cost / quality / delivery / profitability, attractiveness as a customer

Different supplier segments require different activities to manage supplier relationships utilizing different methods and skills. Also, the management of the segments might be divided to the global or local organization. (Lambert & Schwieterman 2012, 343)

Recent development direction for segmentation is going more for the direction of behavioural segmentation. Business strategies and performance should be aligned with business processes and technology infrastructure. Buying (customers) and selling (supplier) behavioural segmentation characteristics in supply side according to Gattorna (2009) are:

- Trusted and reliable partners: close working relationship
- Process driven: low cost and predictable demand
- Planned creativity: rapid response to irregular demand
- Opportunistic: fast and innovative solutions.

Demand patterns follow the buying behaviour of customers. These patterns should be evaluated when designing the supply chain. (Hjort et al. 2013, 862)

As firm's purchasing capabilities grow, they maturity level is enhanced. When the maturity level increases more strategic actions are needed to gain more benefits of the co-operation with the suppliers. In purchasing one measurement of efficiency and maturity are the cost savings and the type of the actions taken to gain benefits. (Úbeda et al. 2015, 179-180)

### **2.2.2. Global sourcing organization**

Multinational companies (MNC) need purchasing strategy to manage their purchasing and suppliers efficiently. The most traditional approach to classify purchase and supplier segments is Kraljic matrix. There are different ways to gain benefits in the different segments. Trautman et al. (2009) and Rozemeijer (2000) have defined the three main categories for possible purchasing synergies:

1. economies of scale
2. economies of information and learning, and
3. economies of process.

Considering the possible synergies in purchasing strategic importance needs to be evaluated to decide if global corporate level management is needed or should suppliers be managed locally. Effecting factors there according to Trautmann et al. (2009, 197-199) could be synergy potential and strategic importance for the corporate. Competence and economic factors are part of strategic importance evaluation and synergy potentials can be evaluated with economies of scale, information & learning, and process. In economies of scale relevant supply market and degree of volume and aggregation, in economies of information & learning purchasing difficulty and supply risk and in economies of process transaction volume and process complexity are subfactors to be evaluated when planning purchasing portfolio and correct strategy for managing suppliers. In information and learning synergy companies need to identify the needed knowledge of category and market with strategic corporate level suppliers. Level of the automatization and standardization of purchasing process and integration with process development are sub-elements when evaluating economies of process. (Trautmann et al. 2009, 197-199)

Organizational design should reflect to planned sourcing and purchasing strategy. Globalization is pushing MNC to form global sourcing and purchasing strategies. According to Hartmann et al. (2008, 28-30) one option does not fit for all situations, but management should design organizational form which supports the strategy the best. Two different approaches centralization and decentralization can be taken and of course there are different kind of hybrid organizations as well. Effecting factors are for example pressures of globalization, standardization, efficiency, responsiveness, and customization needs. Based on these dimensions Hartmann et al. (2008) introduces three different organizational strategies: multidomestic, global and transnational strategies. Multidomestic companies and global companies differ on integration requirements. Global strategy aims for standardization and are brining global systems and processes from headquarters to subsidiaries. Transnational strategy also supports location-specific advantages with multinational flexibility and usage of worldwide know-how. Identifying information processing capabilities and control mechanisms are also part of strategy planning. Global organizational form may affect to the success or failure of MNC.

### **2.2.3. Knowledge in supplier relationship management**

Knight et al. (2014) have clearly defined the connection between global purchasing strategy and requirements for the resources and knowledge. Previous research has indicated that skilful and knowledgeable purchaser are a prerequisite for a strategic-oriented purchasing function. Part of global purchasing strategy is to consider the need of the resources. With resources tacit and explicit knowledge, financial means, physical characteristics, and scale of resources needs to be defined to support global purchasing strategy.

Integrating new suppliers in the global supply chain can be challenging and requires coordination. Complexity of information and knowledge, capabilities to codify knowledge and information and supplier capabilities needs to be evaluated when planning supply chain control methods. For example, in modular value chains, where information and knowledge could be codified at least partly and in relational value chains, where knowledge and information cannot be codified in business transactions, differ from control methods. Power symmetry brings additional dimension into governance method selection. In-house production should be considered as an option for value chain governance models due to tacit knowledge exchange challenges. This governance type is called hierarchy. Variables which will impact on selection of value chain governance are complexity of inter-firm transactions, codification capabilities as mitigation to complexity and supplier capabilities of meeting buyer's requirements. (Gereffi et al. 2006, 85-87)

Supply chains are complex and multi layered. Suppliers collaborate in networks constantly. Sharing knowledge in these networks and learning from each other helps to solve problems more effectively. In this kind of networks combination of competences might be source for competitive advantage. (Steinle & Schiele 2008, 5)

Managing the supplier network and strategic alliances requires competences and skilled resources. In the resource-based view (RBV) resources of the firm create competitive advantage and through the alliances, firms might access for wider range of the knowledge and gain more information. (Sluyts et al. 2011, 876). Managing the



networks requires specific knowledge and skills. Ritter et al. (2002, 120) have defined the network competence as *“a degree of network management task execution and the degree of network management qualification possessed by the people handling a company's relationships”*.

With the economies of information and learning as well as with the economies of process the relationship management can be done efficiently with strategic supplier's category. (Trautman et al. 2009, 195-197) Interfirm knowledge sharing routines bring competitive advantage with complementary capabilities. (Kale & Singh 2007, 994-995). Codification tools like alliance checklists, guidelines, and manuals, allow firms to facilitate the dispersion of existing knowledge and help to replicate best-practices within the firm. By harmonizing tools and processes firms can create competence stocks. (Sluyts et al. 2011, 880-883)

Kauppila (2015, 152-162) investigated the alliance management capabilities and found out in his research that there are different outcomes of exploiting or exploring alliances when considering firm performance and growth. There is a difference in the point of view when speaking about firm capability and choosing to take strategic actions. Firm can choose to either explore new resources or exploit the current ones. Co-exploitation increases firm growth in short term, but in a long run co-exploration with increased alliance management capability brings better results. Co-exploitation on the other hand improves financial performance of a firm in short term (one-year timeline).

#### **2.2.4. Supplier relationship management processes and systems**

Hughes & Wadd (2012, 22-24) have raised the importance of systematic supplier relationship management across the relationship lifecycle. It is not only a system solution or a tool, but much more. Part of SRM is performance measurement. Target is to increase efficiency and improve performance. Moeller et al. (2006, 85-86) proposes also that the resource allocation should be considered according to the status of the supplier relationship. They divide supplier lifecycles for in-suppliers, out-suppliers, and supplier dissolution. There are different actions, like for example

development and disturbance management activities, in in-supplier management phase. These actions are relevant in SRM and performance management.

Park et al. (2010, 498) listed JIT purchasing (JITP), vendor managed inventory (VMI), collaborative planning, forecasting, and replenishment (CPFR) as best-known collaboration techniques between supplier and customer. Different kind of platforms and systems can assist with collaboration processes. There is one example of architecture of SRM system in figure 7.

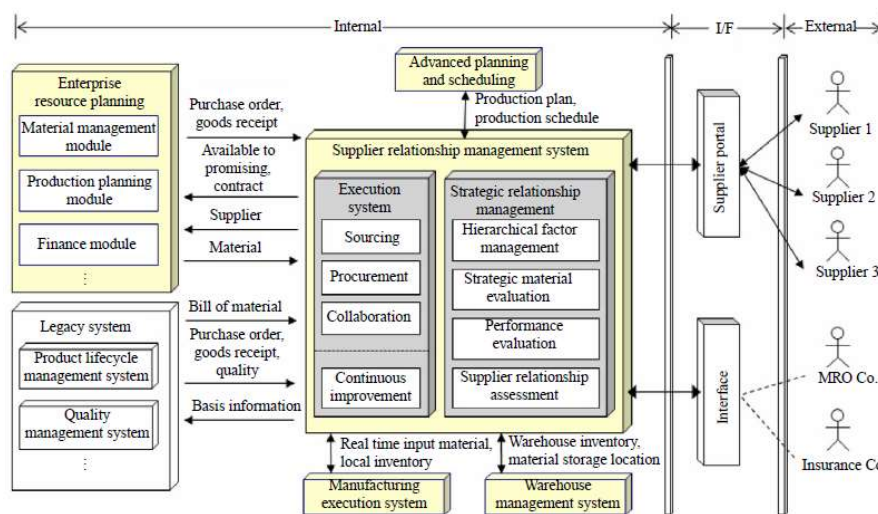


Figure 7: Architecture and deployment of SRM Systems (Park et al. 2010, 503)

According to Cox (2004, 348-349, 353) trust helps to build Lean supply chain and transparency between supplier and buyer companies. It is important to understand the power circumstances in supplier relationship management. Trust is essential to create and maintain relationship. It is argued that 'Lean' or so-called Japanese style of supplier relation management might also require buyer to have higher level of dominance and that is not necessarily approach always characterized with high level of trust. Supplier relations should be considered to fit for purpose. Appropriate management styles and sourcing option should be selected to support different kinds of business relations. With collaborative way of working supplier and buyer can build long term relationship. (Cox 2004, 353-354)

There are advanced electronic systems supporting supplier relationship management. Hsin Chang et al. (2013, 38, 46-47) studied the idea of e-procurement and possible effects for the supply chain performance. This kind of electronic solutions will help to maintain information sharing and supply chain integration. With these electronic solutions organizations can contribute to the growth of supply chain performance, enable cost reduction and time savings. Electronic solutions may also include functionalities to document know-how and provide “electronic visibility”. Like implementing any new tool in the organizations, managers should identify possible barriers like end-user resistance, partner relationships, information infrastructure system integration and standardization.

### **2.3. Visual management in lean procurement operations**

Target for this research is to combine theory framework from knowledge management, supplier relationship management and Lean. The relevant Lean framework for procurement organization and visual management in Lean are introduced next.

When planning implementation of Lean into organization, it is important to align the targets with business strategy and objectives. Basic steps towards Lean in the organizations are *stabilize, standardize, visualize, and continually improve*. Visualizing in Lean is important principle. It helps to understand standard work, process flows and possible problems faster, which brings transparency and efficiency, helps with communication and timing of activities in office. (Locher 2011)

Chiarini (2013, 141-145, 150-152) introduces Lean office in his book of “*Lean organization: From the tools of the Toyota Production System to lean office*” as a service process where customer service and application of the Lean ideology is implemented throughout the organization, not only in manufacturing, where Lean implementations typically are started. Base for the Lean improvements are process transactions and waste. Process flow mapping helps to identify the possible types of waste. There are different kinds of metrics to identify if processes are working well, for example: Overall Professional Effectiveness (OPE) or Overall Office Effectiveness (OOE). These indicators might also include availability, efficiency, and quality like in manufacturing. In office environment problems and disruptions can be used in in same

way as downtime in factory operations. Indicators should be followed on daily bases and be available for managers and staff. Visual management principles can be also utilized to control processes. Process transactions are hard to visualize sine many of them happens in computers and are not identified as product. Claim handling process lead time is another example of applying visual control board.

A little bit different kind of approach for Lean has been introduced by Corbett (2011, 120). He has listed five key principles of Lean:

1. the identification of waste (or muda)
2. the specification of the value stream
3. the achievement of flow through the process
4. pacing by a pull (or kanban) signal; and
5. the continuous pursuit of perfection.

Corporate culture can be described a heart of a company (Marksberry 2011, 132). Values, customs, traditions make companies unique. One of the most famous Lean culture examples is Toyota. Toyota has been building their company with long-term focus for improvement and efficiency. (Marksberry 2011, 147).

### **2.3.1. Lean procurement**

Implementing 'lean' and eliminating non-value adding activities streamline the processes and spend less in procurement activities. (Partida 2014, 78-79). According to Locher (2011, 105) by implementing Lean only for own organization has certain limitations. There are also actions which can be implemented to manage supplier base and supplier performance with Lean principles to ensure organization's own performance. For example, visual management can be used to obtain internal and external capabilities.

Purchasing organization plans order frequencies and quantities, agrees payment terms and monitors performance of suppliers. Purchasing organization is collaborating with internal and external organizations, so end-to-end visibility of the processes is

important. Long term partnership with suppliers are needed to implement Lean. Idea is to not overlook poor supplier performance and to agree how exceptions are handled when supplier performance is not stable. There might be different purchasing processes for different categories, but all should be predefined and monitored. Focus should be to handle manually less transactions and more in development actions. Different systems help with communication. (Locher 2011, 105-109)

### **2.3.2. Visual management**

Jaca et al. (2014, 1755-1770) did a review for the different kind of research of the visual management implementation. They collected information of the implementation and the usage of the visual management tools in the companies. Companies seem to underestimate the effectiveness of the visual information, concluding the opinion of visual management the most common implementation, like a simple marking on the floor or some posters in the shop floor. The most common usage of visual management in the 80% of the companies are exactly those. More advanced visual management tools like maintenance schedules and statistical process control tools are implemented in less than 50% of the companies on average. As a conclusion of the study of Jaca et al. (2014, 1767) the importance of using the visual controls and display indicators as it is difficult to control and improve something that cannot be measured or seen. It is easier to identify the gaps of the future and the current state of processes with visual controls. By making process visible and showing relevant information of the performance, company promotes innovation, commitment, and awareness of employees. This also encourages organization to participate to continuous improvement. Jaca et al. (2014, 1758) presented the visual management theory synthesis from visual tools and techniques to continues improvement as in figure 8.

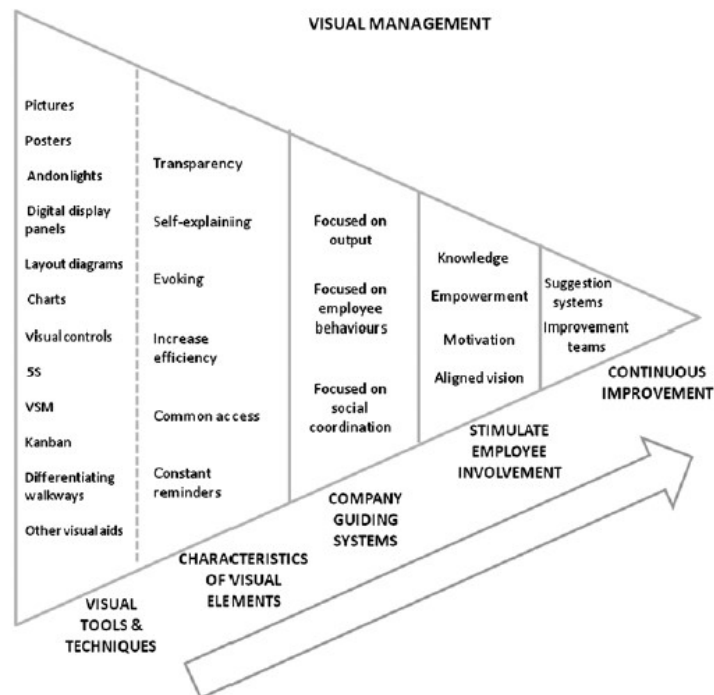


Figure 8: Visual management theory synthesis according to Jaca et al. (2014, 1758)

Visual management system related tools and processes aim to assist communication and bring real time visibility when driving operations. Even visual management system has brought benefits to shop floor processes like process transparency, visibility to process bottlenecks and work in progress, but also brings focus on continuous improvement actions. There are general principles which drive the development of the visual management boards. Boards bring focus to customer related processes and display relevant KPIs. One additional benefit of the visual management boards is the cross-function visibility. There are benefits by using tangible, colourful boards and keeping the boards simple. Changing boards to the electronic versions requires additional facilitation and system experience and those systems are more costly than physical boards. Customers and suppliers can be involved to the usage of visual management to bring additional value and enhance the communication. Regular meeting patterns should be implemented to ensure constant drumbeat towards efficiency. (Parry & Turner 2006, 77-88)

Bititci, Cocca & Ates (2016, 1590-1591) clarified in their research that visual strategy and performance management are effective. Visual performance management system (VPMS) assists when implementing and developing strategy, facilitating performance

measurement and review, and improving internal and external communication. It also enables people engagement and enhances collaboration and integrations. VPMS is also supporting cultural changes and fostering innovation.

Visual management can enhance an information flow in the organizations. Organisations should link visual management with a performance management system, which provides an input to the VSM. It should be also connected with continuous improvement, where visual management brings inputs to the process, to bring benefits to the organization. This boosts transparency, discipline, morale and empowers the teams. With this approach visual management system is integrated with performance management and continuous improvement as an interconnected system. This is called integrated visual management (IVM). Performance management elements can be prescribed as performance planning and implementation, performance measurement and performance evaluation, corrective actions, and continuous improvement. (Eaidgah et al. 2015, 187-192, 204-205)

There are many kinds of applications of visual management boards supporting different office processes. In figure 9 is one example of board for purchasing department. There are different types of visual boards: standard work, pitch board, performance measurement and completion boards. Kaizen can be also included to the boards for opportunities to improve or agreed improvement activities. (Locher 2011, 70-72)

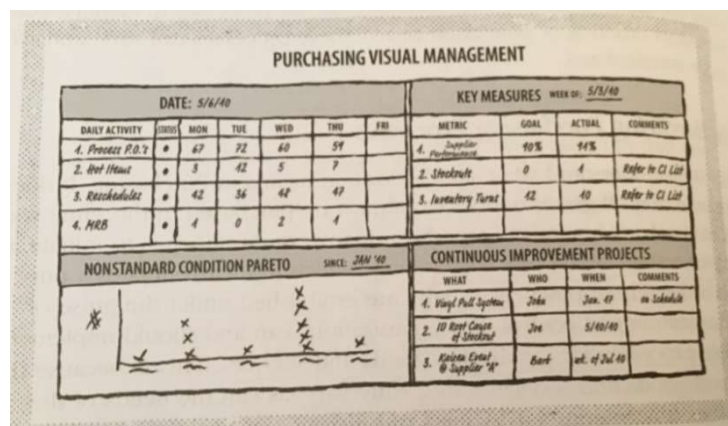


Figure 9: Visual management board for purchasing (Locher 2011, 108)

Jidoka is also significant part of visual management. It is important to know when process flow has problems, there are some abnormal conditions, low performance and when to stop the work. Escalation process should be defined to list the problems and to follow up corrective and preventive actions. (Locker 2011, 71-72)

There might be some resistance when implementing visual management. There might be fear of job security and the role of manager is changed from manager to leader. Middle management should concentrate more on development, not on organizing the daily work. Defining standard work and reminding organization them by using visual signal, maintains the process flow and helps to monitor the demand and available resources. The plan for visual management and boards vary, but those bring stability, awareness of the problems and improve communication in organizations (Locker 2011, 62-73; 129)

### **2.3.3. Visualization of metrics and data**

In the book of Multidimensional Data Visualization (Dzemyda et al. 2013) visual data mining is defined as a process where the human is integrated in the data analysis process. Visualization and different kinds of graphical presentations are used to analyse and share information. With the data visualization it is possible to gain insight into the data, draw conclusions, and directly influence a further process of decision making.

Basic performance metrics should be enough and 'less is more' the first principle. Quality, service, safety, and cost are applicable KPIs for most of the processes. Information of measurements should be timely available, or people might ignore those. In Lean management timeframe is very short, so performance should be reviewed frequently to address performance problems quickly. (Locker 2011, 139-140)

Datasets to understand and to evaluate business processes and performance are large. Visualization development has been fast with ever-growing amount of data. Intelligent data reduction is needed to visualize data due to amount of the data or due to dimensionality. One shortcoming of data visualization might be the uncertainty of



the data, but there are statistical analysis techniques which can be used to minimize uncertainty. (Ebert et al. 2002, 207-208)

Data visualization can be tricky especially with data analytics and if data is multidimensional. Multidimensional data visualization can be divided into direct visualization methods and projection methods where dimensions are reduced to enable visualization. In direct methods each feature is presented separately and in projection multidimensional data in low-dimensional space. By using different visualization techniques hidden knowledge from data can be revealed. Direct data visualization enables qualitative understanding of information. (Dzemyda et al. 2013, 1-5)

Utilizing big data in organizations has developed and the question is no longer the capabilities of storing the amount of the data but identifying the most important data and data availability. Organizations define different kinds of performance indicators and dashboards where data is used. Organizations need data scientists, statisticians, and functional analysts to be able to interpret the data. Operational experts and analysts need to co-operate to get most out of the data analytics and interpretation. (Rothberg & Erickson 2017, 102) Increasing analytical capabilities will affect for company competitive position. Analytics is nothing new, it started already 1950's, but evolves rapidly. Responding to digital smoke signals and being more data driven is something management should focus in the future. Data can help to give insights from operations and shortcuts to decisions. Benchmark companies of data analytics are for example Bosch Group with their intelligent service offering, Schneider Electric with advanced distribution management, UPS with advanced delivery routing initiative called ORION (On Road Integrated Optimization and Navigation) and General Electric with asset and operations optimization services. In some companies, analytics is already automated, embedded, algorithm based, prescriptive and data is available in decision cockpits. (Davenport 2013, 66-70).

According to Davenport's (2013) classification of analytics development proceeds from Analytics 1.0 where organization uses lot of time for preparing the data for analytics and Analytics 2.0 where organizations utilize already innovative technology, powerful

analytics tools, agile development and big data, to Analytics 3.0, where every firm in every business utilized analytics, which are embedded and optimizing business processes. Already in Analytics 2.0 complex visual reports and machine learning is utilized. Organizational changes also might happen when analysts do not work anymore in back offices, but in development of processes and products. (Davenport 2013, 66-67)

#### **2.3.4. Challenges of implementing Lean**

Implementing Lean and taking different tools in use might be challenging. There are many different reasons for failed implementation, which should be reviewed before implementing new tools in use. For example, Andreadis et al. (2017, 7076) identified differences when implementing Lean tools. Some of the tools require specific training and resources for implementation. As an example, they mention jidoka, kaizen, kanban, visual control and andon. Reasons not to implement value stream mapping (VSM) has been lack of awareness, skilled personnel, assistance in implantation or there has not been enough benefits perceived. According to their research there is a significant difference between the training and effort needed to implement VSM, TPM, JIT and jidoka. Implementation of the tool can be ensured with proper management support, arranging enough training, putting efforts of implementing Lean culture, monitoring, ensuring skills and expertise, but also with effective information systems. (Andreadis et al. 2017, 7083-7087)

Bhasin (2013, 125) has identified challenges of implementing Lean culture and principles. Organization needs to tackle the obstacles to adoption of Lean principles in organization. One should pay attention for following points:

1. Perception of Lean targets and implementation in management and operative levels of organization
2. Importance of training
3. Involving key stakeholders
4. Performance management of Lean initiative coupled with the
5. Communication plan of Lean initiative in organization

Related to the implementation of Lean tools and research questions of Andreadis et al. (2017, 7078), practical and managerial issues should be evaluated. Those questions are relevant also for this research. When planning Lean implementation questions below should be considered. Those are modified according to Andreadis et al. (2017) research questions to match for this research scope.

1. Can visual management and jidoka be implemented separately from other Lean tools and philosophy?
2. Which tools should be implemented first and is visual management tool implementation somehow related to other tools?
3. How much training visual management requires?
4. Which are the most critical factors considering visual management implementation?
5. What kind of results can be identified when implementing visual management and what improvements it can offer when coupled with other Lean tools?

Bhasin (2013, 137-138) reminds everyone trying to implement Lean principles, that commitment for Lean implementation and means commitment of management, resources, time, and money. And this commitment should be maintained even after the implementation. Lean is continuous process, not one-time tool implementation- Training is required as well as support from management. It is important to explain the benefits to organization clearly when implementing Lean; these targets should be encouraged with suitable awarding system.

Top management support is vital for any project, implementing new tools or processes and especially leading companies towards operational excellence. Instead of guiding individual actions top management could concentrate creating supportive environment for organization to perform needed activities. Top management involvement enhances the project performance. Those projects are not isolated from daily work and it is important to realize that these development projects can help to achieve the targets of the company. (Hermano & Martín-Cruz 2016, 3455-3456)

Even the best of the companies in Lean world might have problems of following their implemented principles. For example, Toyota itself has struggled to maintain its core principles when implementing cost cutting plans in the organization. 'TPS house', its pillars being jidoka and JIT and roof build from quality, cost, delivery, safety, and morale, failed and negatively affected to organization. Unfortunate decisions in the company lead to product recalls and lost image as company where quality stands high on values. Toyota production system (TPS) is not only process or methodology, it is more like a cultural mindset. (Chung & Kleiner 2012)

### **3. RESEARCH METHODOLOGY**

I, as a researcher, have been working in the case company over 10 years, which helped to access the information and key informants when collecting the data for this case study. According to Welch et al. (2002, 614, 617-620) getting contacts from the companies are challenging and time consuming. This research is a case study, where only one case company was selected due to the pre-agreed access to interview key informants. Selecting known case enabled deeper interviews, analyses and enabled practical development proposals for the case company. Grönfors (1985, 124-125) has pointed out that it is common practice to use additional supportive documentation with other research methods to support research data collection. This has been done also in this research.

Case study is a common research type in business and economic research field and the number of the cases are low typically. In some cases, case research might comment case company's organizational practises directly, like for example organizational culture or strategy. Common data collection methods are interviews and case related documents. Using multiple data sources increases validity of the research. (Koskinen et al. 2005, 154-159) This kind of data collection methodology have been followed also in this research. Getting familiar with internal processes, tools and documents have helped to be more prepared for the interviews.

#### **3.1. Data collection**

Relevant information for this research was collected from case company before the interviews were started to ensure the correct interview questions and to find the key informants from the organization and from the strategic supplier contacts. The role of the key respondents is not only to answer to the interview questions, but to support research with own propositions, insights for open-ended questions or contrary evidence for the research (Yin 2003, 90).

Interview arrangements were designed to identify key informants and to find persons with different kind of experience and backgrounds from different locations in global

procurement organization. The selection of the key informant from supplier side followed similar criteria. Selection criteria for interviews were defined by following reasoning:

- Strategic supplier or sourcing manager / category manager, procurement directors, with experience of performing / non-performing suppliers
- Strategic supplier, key contact person, who knows the current relationship and co-operation

Eisenhardt (1989, 537) has proposed to select extreme situations or polar types of cases to be studied in case of limited number of sampling to ensure more transparent observations. Because of this also the selection of the interviewees was done to endues different background and experience level of supplier relationship management and knowledge of Lean, tools and procurement processes in the case organization.

Test interview was conducted prior to the other interviews were arranged, which is recommended by Koskinen et al. (2005, 128) Test interview round included feedback discussion about the number and the content of the questions. After the test interview, the list of the questions was reviewed and adjusted. Also, the first test interview was included to the analyses phase. Feedback was collected after each interview and included a discussion about the key concepts of the research, proposal of the new model and the content of the questions. It is common in case studies to rely on the expertise are of the interviewees (Stake 1995, 65). Interview questions were modified to clarify the vocabulary, key concepts and terminology used in the case company. Some overlapping questions were removed from the interview question list, compared to the first test interview. Interview questions were also modified when changing the interview focus from case company to supplier.

Persons who were interviewed, are working in key positions in case company procurement organization and are managing strategic suppliers. Target was to also include supplier point of view and include minimum one supplier interview to data collection. Persons for interviews were selected from key stakeholders using

cascading or “snowballing” method where during the preliminary discussions, persons identified potential key informants. This was also done base on the researcher prior knowledge of the case organization. As Welch et al. (2002) have pointed out that reaching key informants or company elite for interview, might be challenging due to several reasons. Challenges before and during the interviews might be caused by age, gender, culture, power, seniority, language, or geographical gaps. Access for the key informants was guaranteed with the support from case company high level sponsor. Openness and power gaps did not affect lot for the research, but sometimes some minor attempts during the interview were noticed. Interviews were sometimes some trials to dominate the interviews by more senior person and in some cases some answers were avoided by some of the interviewees.

Semi structured theme interviews were arranged via Skype and Teams calls, where also the recordings were stored (Skype Recording Manager / Teams recording). Semi-structured theme interviews are more flexible and allows certain freedom during the interview session (Koskinen et al. 2005, 105). Interview themes, key concepts and research were always introduced before the interviews (Metsämuuronen 2006, 235). “No names published” - policy was agreed with all interviewees participating for the interviews. Interviews lasted from 1 to 1,5 hours each. All interviews were arranged in English even none of the persons interviewed was native English speaker. Questions were constructed according to literature review summary and findings from previous studies.

The original interview question list included following questions, which are introduced in table 3, but as mentioned above those were modified, when the theory framework was modified, after collecting feedback from interviewees and to fit the purpose for case company interviews:

Table 3: First version of the interview questions for test interview

Research question and theory	Interview questions
<p><b>How visual management could be utilized in strategic supplier relationship management (SRM)?</b></p> <p>Visual management and SRM connection</p>	<ol style="list-style-type: none"> <li>1. Does data visualization effect on decision-making in strategic supplier collaboration management?</li> <li>2. How visualized data, information and knowledge affected for decision-making in supplier management?</li> <li>3. How and what kind of visualization would benefit efficient strategic supplier collaboration management? (Visualization benefit to procurement?)</li> <li>4. Do you see any similarities between supplier collaboration management methods and supplier performance?</li> <li>5. What are the basics of visual management in Lean ideology in your opinion?</li> </ol>
<p><b>What is the most relevant knowledge in SRM?</b></p> <p>SRM and knowledge management connection</p>	<ol style="list-style-type: none"> <li>1. What kind of best practices there are in supplier collaboration management?</li> <li>2. What kind of key knowledge, skills, know-how is identified in (procurement) organization?</li> <li>3. What kind of knowledge sharing practises are used in organization?</li> <li>4. What kind of data and information organization needs in their work?</li> <li>5. How information would be shared in most efficient way in organization?</li> <li>6. Which knowledge sharing, and documenting practices would help the most to develop supplier collaboration?</li> <li>7. What kind of leadership and management methods are used or needed in organization?</li> <li>8. Which knowledge sharing processes are most efficient among in organization?</li> <li>9. Are there any best practises there are in supplier collaboration management which you would like to share (which are not currently utilized)?</li> </ol>
<p><b>What kind of data, information and knowledge should be visualized?</b></p> <p>Knowledge management and visual management connection</p>	<ol style="list-style-type: none"> <li>1. What kind of data, information and knowledge from your opinion could and should be visualized (to enable efficient supplier collaboration management)?</li> <li>2. What kind of visualized data/ information/ knowledge would enable efficient supplies collaboration management?</li> <li>3. What kind of visualized data / information / knowledge is missing from current tools and processes?</li> <li>4. How organization would be able to utilize tacit knowledge by using visualization?</li> <li>5. How visualised data / information and knowledge could be best utilized in organization?</li> </ol>

Questions were modified after the feedback was collected from the interviewees. Some of the wording was clarified, the number of the questions changed after each interview round and the terminology was brought closer to key informants. Some of the terms used were not well understood as the vocabulary in the case company was still a mixed after the integration and combining different organizational cultures. After terminology



was clarified during the interview period, terminology for the questions was adjusted accordingly. First draft of the interview questions based on the research theory framework can be found from appendix 1 and list of the questions of all interviews can be found from appendix 2.

Key informants of the case company were located to three different regions, all males with mixed experience level of procurement, Lean and visual management. All work currently in procurement middle or top management position. One interview was done to strategic suppliers based on the recommendations of the key informants. More detailed overview of the interviews and key informants are listed to table 4.

Table 4: Interviews and key informants

<b>Position</b>	<b>Country</b>	<b>Experience and responsibilities</b>	<b>Time and method of interview</b>
Regional sourcing manager Europe, Indirect	Germany	<10 years, sourcing	Interview round 2 - 30.4.2020, Teams
Senior Manager, Procurement	Germany	<10 years, 4 years, indirect / direct, process development 9 years for procurement	Interview round 2 - 30.4.2020, Teams
Director, Procurement	China	<10 years	Interview round 2 - 7.5.2020, Teams
Procurement Director, Direct categories	Finland	<10 years	Interview round 1 - 7.5.2018, Skype
Director, Procurement	China	<10 years	Interview round 1 - 22.11.2018 f2f + Skype recording
Procurement Director, Indirect categories, and logistics	Finland	<5 years	Interview round 1 - 25.4.2018 via Skype
Member of board at supplier company	Estonia	17 years in operations management	Supplier interview 26.5.2021 via Teams

Supplier collaboration and alliance management terms were changed to term supplier relationship management. There was also some discussion about the number of the questions and some of the original questions were repeating same topics but asked by using a bit different wording. This led to the clarification of some questions and to

change sequence of the questions. At the final analysis phase questions were grouped again to be able to conclude the main findings into correct themes. Some themes were decided to leave out from the scope of this research, so related questions were also left out or modified to support more of the theory framework and focus of the research.

### **3.2. Analysis**

Content analysis phases according to Mäkimuuronen (2006, 244-245) were followed when conducting the analysis for the data in this research:

- 1) Getting familiar with the data, key concepts, and theory framework
- 2) Internalize the gathered information
- 3) Dividing themes and high-level classification of the findings
- 4) Clarification of the concepts and clarification of research targets
- 5) Representing the frequency and exceptions of the themes
- 6) Cross validation, supporting and undermining findings
- 7) Final conclusions and interpretation of the findings

According to Eisenhardt (1989, 540) case research and analysis includes often detailed case descriptions. Difficulty is to choose which data and information to include to the research. One tactic in analysis phase is to choose which dimensions and categories to look and analyse within-group similarities and intergroup differences. Selected dimensions can also be reflected from existing literature or by research problem.

It is important to identify the most important themes from the research material (Koskinen et al. 2005, 230-233). According to Grönfors (1985, 144-161) and Eskola & Suoranta (1998, 159-160,174-175) analysis needs to be developed to support research and collected data. Analysis can be started already by the time data and information is collected in the research. During the analysis process the collected research material is conceptualized and those concepts are used to form the conclusions. There are several different methods to prepare the research material for analysis and in many cases, method is developed to be research specific. In the

content analysis information can be organized for example according to how frequently key concepts and key words appear. It is recommended to not to do conclusions only based on content analysis. With context analysis, content analysis will get more depth for the analysis. Content analysis is kind of a raw material for theoretical reasoning.

During the analysis anonymity was ensured to avoid too much of discretion and diplomacy of the informants. Also, the terminology of the informants was used to adopt the interview questions to be more familiar to case organization and the focus of the questions was adjusted according to support the further discussion and development in the case organization. First order categories of the summarized interview were listed from the cleaned interview transcripts. Categories are further reduced to themes by using the terminology from informants and dimensions aggregated. These themes and dimensions are then compared to the theory framework according to literature and prior research results.

All the information and interviews were recorded, and transcriptions done. In addition, notes were taken during the interview to support recording (Grönfors 1985, 130). Key words and points were collected to support observations. With recording, it is possible to refer to direct comments from interviews (Grönfors 1985, 137-138). Collected data was analysed using cross point of view approach and content analysis to identify key themes. Similarities and differences in the answers of case company and suppliers, performing and non-performing supplier and based on the experience and seniority of the participants. Analysis aimed to answer the research questions, finding the patterns and repeated phrases or themes.

Analysis was started by internalizing the gathered information and by grouping the questions and findings again according to key concepts and theory framework. Questions and interview findings were grouped according to theory framework and high-level classification of the findings. Themes were then connected with research targets. In the analysis summary main findings (according to repetency and relevance) were then listed for top findings to be presented in managerial implications and conclusions. Also, some new ideas for additional research were indicated in the summary of findings. As the organization is not yet fully aligned in the usage of

harmonized knowledge sharing tools and processes or processes, roles, tools are not 100% harmonized, there are some differences in the maturity and experience. Interview were arranged in rather long timeline due to several reason and have had some impact on the research findings as the development activities and maturity level of visual management knowledge can be noticed clearly from the findings. After the first analysis of the research material, cross checks between the findings and theory framework was conducted. Findings are summarized in chapter 4. Discussion between the research findings and theory framework and conclusions can be found from chapter 5.

### **3.3. Trustworthiness**

Case studies are challenging and subjective, also always limited to the case organization(s). There are also several different decisions made when designing the research and data collection which may impact to the research trustworthiness like the language and cultural background of the researcher or the key informants selected for the interviews.

Using multiple data collection methods, triangulation, is recommended by Eisenhardt (1989, 534-537) to strengthen the research validity. In case study research approach selecting the population for the research needs to be evaluated as appropriate, it effects to the generalization of the findings. In this research participants for the interview were selected widely from the different parts of the case organization. Stake (1995, 108-112) points out that also in the case studies, triangulation helps to increase the validity of the research. For example, with data source triangulation misinterpretation of the data sources can be less accidental and avoid leading to wrong conclusions. Triangulation in this research have been ensured with gathering information of the case organization based on the instructions, training materials and other documentation as a secondary data source. Also, the supplier interview ensures that the data collection scope have been wide enough. This type of the research is commonly used type for researches, which include more explanatory type of the research and can rely on multiple data sources to ensure triangulation. Single-case

studies are challenging considering the generalization of research findings. (Yin 2003, 1-14, 31-32)

Eisenhardt & Graebner (2007, 27) suggest using multiple cases instead of single case approach. It is easier to determine accurate definition and built more robust theory formation and findings generalization. In this case research It was not possible to include several case companies for the research, but when planning the research, organization was widely known by the researcher and ensured access to key informants. A deep discussion with case company management before and during the research, also ensured the support to this research.

In interview research validity can be increased by comparing the information collected from interviews with other data sources. Reliability can be shown in research with the congruence between interview and secondary data source findings. (Grönfors 1985, 174-175) Secondary data sources were the process descriptions and training materials in the case company, which were used to understand the current roles and responsibilities in the case organization. Those also presented the current ways of working and the requirements for the organizations. It is common for business and economic research to use different kinds of documentary as research material. That kind of material is used for example to prepare the interviews for the research and to understand different processes in the organization. (Koskinen et al. 2005, 130-133) In this research internal documentation like guidelines, process descriptions, descriptions of the tools, training materials and KPIs were used to compare the interview findings and interview structure planning. By planning the research questions, by selecting correct amount and correct persons for interviews support research validity of the research is increased (Koskinen et al. 2005, 254-257).

It is also challenging that researcher have been working in the case company for several years, participated to the development work and well known by the key informants. Though, this enabled deep discussions on the research topics and open idea sharing.

One of the challenges in the research was that the interview period was longer than originally planned. There are many reasons for this and clearly it had an impact to the analysis and findings. Earlier interviews indicate different knowledge level of Lean and usage of visual management in case organization, supplier relationship management maturity and knowledge management in the case company. Between the last and the first interview there have been also different kinds of development projects in the company to improve data availability, improvements done to the tools and processes harmonized.

Yin (2003, 34) has listed research design, data collection, composition and data analyses as research phases when validity and reliability of the case study research can be increased by using multiple sources, using key informants, using logic models, using relevant theories in single case studies and developing a case study database.

To minimize the bias of researcher considering the employer-employee relationship and outsider view was requested from a colleague, who is not working in the same company and has relevant experience on the field of supplier relationship management. Yin (2003, 61-62) has recommended this especially in single-case study research bias mitigation.

The beauty of the single case study are the deep insights from a case company. Those insights combined with the theory framework helps to create new theory. Eisenhardt (1989, 546-457) is also supporting this idea:

*“One strength of theory building from cases is its likelihood of generating novel theory. The likelihood of valid theory is high because the theory-building process is so intimately tied with evidence that it is very likely that the resultant theory will be consistent with empirical observation.”*

As this is a single case study, target is to ensure enough of the data. Representing rich qualitative data in this research includes direct quotes from key informant, which is proposed by Eisenhardt & Graebner (2007, 29). This is connecting the theory framework with the empirical evidence. It is important to clarify what was said, clear

connections of each statement to the theory and the point of view of interviewee (Metsämuuronen 2006, 244-247).

## **4. FINDINGS**

First part of the findings chapter includes the description of the status of the case organization. Target is to introduce the strategic supplier management activities and describe how the visual management and Lean have been taken in use in different parts of the case organization.

### **4.1. Case organization**

Based on Eisenhardt (1989, 540) in case study analysis typically include case company descriptions. Target is to create insights for the research and analysis. As a next step there is a description of the case company status and organization related to research scope.

Case company have re-organized procurement operational and governance model during the last two years. Procurement organization was divided under different business areas. In a new governance model, there is a centrally lead procurement team, which is supported by business areas. There have been different operational and organizational models in procurement organization during last 8 years; some implemented more successfully than others. After major integration activities, there are still different tools and processes in use in the different parts of the organization. Nevertheless, the target for future way of operating is under development and implementation. Many training requirements have been already identified to step up in the maturity level and implementation of operational excellence.

There are many global development projects on-going to improve procurement efficiency. Project planning is done in matrix organization by using the procurement development roadmaps. Case company has identified and started implementing several initiatives related to the ways of working, tools and processes. Organization have used several techniques to identify development requirements and prioritized those. During the last three years, case company has gone through significant organizational changes and the governance model of global procurement organization



has changed. Responsibilities have been clarified and re-organized to global team, but also regional and business area (BA) specific responsibility areas have been agreed.

Global procurement organization includes global category managers, procurement controlling, supplier quality and development, logistics and procurement back office teams. Global process owners (GPOs) of procurement processes are responsible for the procurement process and tool development. Procurement controlling with assistance of Procurement back office is responsible for KPI and reporting development and alignment. There are several global tools and processes already implemented. Global ERP, PLM, supplier relationship management tool and other system implementation projects are currently on-going to bring better visibility and efficiency to the company, but also brings possibility to harmonize the processes and ways of working. There are global documentation management (Enterprise Content Management) and communication systems available (Teams, SharePoint, Yammer, etc.). Business areas are responsible of their own main spend categories and supplier manager responsibilities for those suppliers which are not managed by central team.

Currently in the organization there is no harmonized way of managing daily operations or systematic methodology for the supplier relationship management. Even though some processes and tools are implemented, global supplier management model is still under development. This thesis is one part of the development work. Requirement is to implement visual daily management system into the operative performance management and supplier relationship management concepts to the case company.

Like already described in chapter one, case company procurement organization is currently lacking common training program for SRM, harmonized methods for knowledge sharing with clarified processes and tools. There are also some major gaps in data and information availability, harmonized reporting and KPIs. SRM methodology, targets and controls were identified to be inconsistent. And there were no knowledge strategies, nor identified knowledge assets in systematic management control. There was no systematic cross functional collaboration and no transparency for the challenges across organization. Roles, responsibilities, and skill mapping were more defined on regional and business area level, than centrally managed. In addition to the

organizational and operational model re-structuring and integration project, there is a wide IT harmonization project on-going, which is causing challenges for reporting and data availability. Due to scattered IT systems, some data gathering has been done manually, locally from several source systems.

Partially insufficient tool landscape and often low discipline in usage of tools with localized processes, is leading to inefficiency, lack of visibility and impossible to ensure timely communication with key stakeholders. Strategic supplier relationship management and sufficient information sharing with easy and accessible data and performance metrics requires tool, process, and responsibility development. Current co-operation with suppliers has been planned by supplier and category managers or local materials management organization. Systematic communication guidelines and operative performance management requires still harmonization and common guidelines.

#### **4.2. Usage of visual management in case organization**

There are several business units inside of the case company which has been already implementing daily / visual management system. There are also some management team members, who have participated to Lean training. This has not been done in all units nor in all BAs. Two examples of visual management methods are introduced in this report. First example is a daily management system board in one manufacturing location, where there is no own sourcing team available, but there is a material's management team, where operative purchasing is working.

Visual management system has been implemented in this manufacturing plant approximately a year ago. According to plant's Material Manager, team has really taken pulse and improvement meetings as a part of their daily work. A lot of development ideas are created, and team takes responsibility of ensuring improvement actions. In addition to pulse meetings there are also weekly development meetings where improvement actions are reviewed. There is also co-operation with other teams if cross organization support is needed. Every week there is also a KPI meeting where all teams review operative KPIs and agree of improvement actions, which are recorded

also the to the board. These weekly management KPI meetings are gathering the most important KPIs and action points from each team. In this way management has common understanding of the organization's capabilities.

In another business unit there is a visual management board available, but no systematic operational actions, reviews not meeting practises around the dashboards. Data is collected, visualized, and distributed automatically. There are monthly meetings in the business unit, but boards are not included for this meeting. Neither continuous improvement actions, others than quality improvements, are systematically followed or planned around the KPIs. Below you might see the examples of these two different methods in the case company.

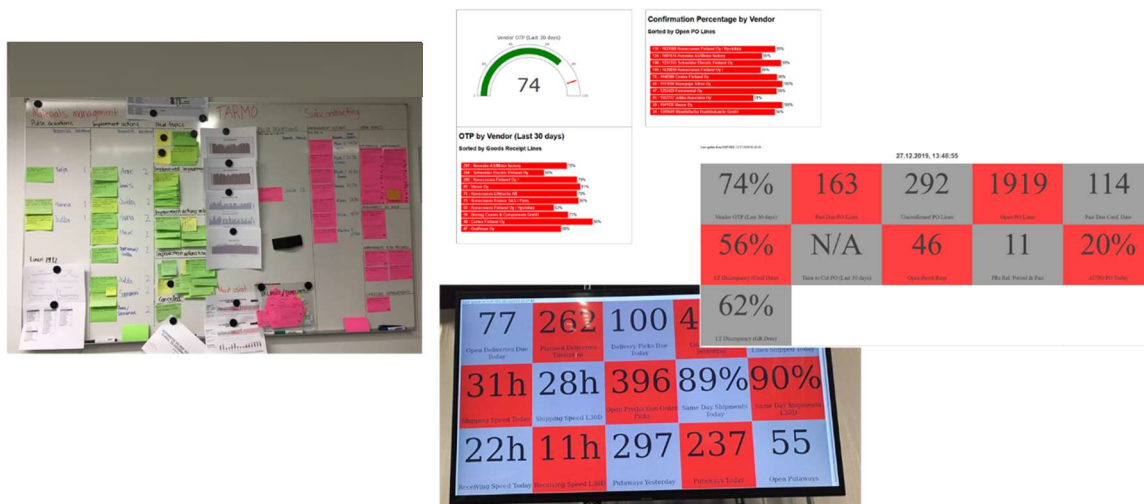


Figure 10: Some example from current company visual management

From the knowledge management point of view, team has created 'BA' for the knowledge sharing. According to Material manager, team has started changing the focus of the problems identified from the external team to improving the actions in their own team. There has been also change of Material manager being responsible for all improvement actions, to everyone taking responsibility of few improvement actions. Cycle of knowledge can be identified in the team since Material manager has noticed that in the beginning only few improvement ideas were shared, but little by little more and more ideas are coming to support long term development.

### 4.3. Research findings

Analysis was started by re-organizing the research material according to different concepts after filtering and cleaning the relevant comments from the interview transcripts. This allowed the terminology used in the case company to be heard and the main themes to be created.

Interview questions were grouped according to following theory framework to enable efficient analysis and analysis, see below in table 5 and detailed interview question mapping to the related themes in appendix 3.

Table 5: Research questions, theory framework and analysis structure

<b>Research questions</b>	<b>Themes for content analysis</b>
How visual management could be best utilized in strategic supplier relationship management?	BASICS of LEAN and visual management BENEFITS LEADERSHIP
What is the most relevant knowledge in SRM?	SRM BEST PRACTISES SKILLS PROCESS / TOOLS / BA
What kind of data, information and knowledge should be visualized?	DATA / INFORMATION / KNOWLEDGE VISUALIZATION

Findings of the research were structured to different themes when analysing the content and main findings are presented on table 6. Main findings are connected to the research questions.

Table 6: key findings and themes based on research questions

Research questions	Main findings
<p><b>How visual management could be utilized in strategic supplier relationship management?</b></p> <p>(Visual management and SRM connection)</p>	<p><b><u>Strategic supplier relationship management</u></b></p> <p>Supplier segmentation / Supplier relationship type  Supplier management process  Communication with suppliers  Expectations of strategic suppliers, future prospects and opportunities  Supplier performance management, target setting and co-operation planning with supplies  Performance measurement with strategic suppliers, visibility to performance development with trends  Action plans  Fact based E-2-E performance management and visibility with agreed and defined KPIs  Knowledge, information and data required for efficient SRM improving the efficiency with the supplier relationship management.  Network and stakeholder management: internal and external, visibility for organization and co-operation, stakeholders, org structure from supplier side.  Personality  Technical knowledge  Supply chain understanding  SRM tools  Project management methodology and communication  Product management and development, new product releases  Efficient and professional supplier base management and segmentation: preferred and strategic suppliers, approved suppliers, supplier management model with nominated supplier and category managers</p>
<p><b>What is the most relevant knowledge in SRM?</b></p> <p>(SRM and knowledge management connection)</p>	<p><b><u>Knowledge management and leadership</u></b></p> <p>Preferred leadership methodology  Different opinions on current leadership methods  Internal communication content  Data, information and knowledge sharing, distribution and availability  Defined data and distribution channel and methodology  Knowledge, information and data content, content of information sharing  Knowledge, information and data sharing frequency  Experience, maturity and capability level of the organization  Supplier relationship management skills and knowledge  Knowledge and information sharing processes, tools and methods  Meetings  Currently missing elements of data, information and knowledge visualization and availability  Visualization  Experience and tacit knowledge</p>

<p><b>What kind of data, information and knowledge should be visualized?</b></p> <p>(Visual management and knowledge management connection)</p>	<p><b>Visual management</b></p> <p>Transparency and visibility: Real time E-2-E process and S-2-S transparency and visibility</p> <p>Current state of performance and target setting: Open communication of performance management, target setting and current performance level</p> <p>Visible for all team members and levels in organization</p> <p>Problem solving and continuously improvement planning</p> <p>Efficiency improvement, process efficiency with reminders and alerts, avoiding mistakes</p> <p>Improved internal team performance due to visualization</p> <p>Fact based self-motivating / -oriented performance management for all organization levels enabling action planning for staff</p> <p>Agreed KPIs, targets and indicators if corrective actions are required: what you measure is what you get?</p> <p>Automated reporting, manual data collection avoided, actual performance status visualized</p>
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In the following findings chapters direct quotes from interviewees, will not include any comments of the exact tool or system names or names of the suppliers or case company. This ensures the anonymity of the key informants. If some of the sentences have been taken away to avoid using exact names quotes have been made shorter from longer answer, following marking will be used: “xxx” ... ”xxx”.

#### **4.3.1. Lean procurement and visual management – Are there any benefits?**

Let's start from the understanding of basics of Lean and visual management in the case company and organization. During the interview it became clear that even the basics of Lean are not that clear for everyone and it have not been implemented yet widely to case organization. Many of the key informants understood the basics of visual management and benefits of visualizing data, but still some basic training of Lean and operational excellence will be still required, based on their inputs. When asking a question: “What are the basics of the visual management in the Lean ideology?”, the most simple way of describing this was: *“In my opinion, it is.., it's only for visualizing the current performance and involving the direction the organization wants to take.”* (Procurement Director, Direct categories) and the most complicated answer was describing different elements of Lean and possible visual management methods in details. Lean is seen different ways in case organization.

*“Let’s say everything, you need to see, to find the problems, solve the problems, to have the Kaizen in your mind. (Director, Procurement, China)”*

This also is the case with the strategic suppliers. Some of the suppliers are having already Lean methodologies in use, some are improving their processes and ways of working with some elements from Lean toolbox, even they might not have full Lean approach in their operations. All participants were able to name several benefits of Lean and visual management, even the basics of Lean ideology were not that clear. Conclusion is that, to get the maturity of understanding Lean and different ways of working, still require further implementation work and trainings. Strong commitment from management is needed.

When asking about the benefits of Lean and visual management from the key informants, they all indicated the importance of visualizing the KPIs, targets and the gap between the target state and status. Overall, the importance of visualizing the performance internally or with external suppliers were indicated by all of them. Half of the interviewees also raised the importance of target setting and not only visualization or visibility of the current performance level. More advance answers indicated the action planning and expectation clarification based on different types of the suppliers. Preferred and strategic suppliers would have different kind of expectations than the rest of the supplier base. One of the interviewees raised the importance of the process efficiency and the tools supporting all the steps and co-operation with the suppliers. This can be achieved with system-to-system end-to-end process visibility and transparency.

*“It is direct link to how these teams or persons are performing. When you start to keep this open, it’s visual management. If you have monthly report, it is not working. If you have weekly report, it is not working. But if you have it visual and it was open for all people, customers, suppliers, people is changing totally their performing to better way. Because they don’t want to show that they are not performing.”*

*“So, all this kind would be great if we have clear expectations for what is, what is our expectation towards supplier. Or strategic supplier or preferred supplier. And*

*this could be somehow, if we talk about scorecard, I guess this could be somehow adapted, that we have on the one hand the actual performance, on the other hand what is our expectation and then you can easily compare.”*

From the supplier interview, it became clear that in the supplier’s own organization, they have identified the benefits of Lean and visual management. Examples of Lean from supplier’s organization are more related to shopfloor operations as they are using visual management in production line to identify the material shortages or bottle necks in production line.

Other kind of benefits of visualization were discussed in addition to daily performance management. Two interviewees raised the topic of the supplier visits and possibility of seeing the actual end products where suppliers are delivering components and importance of being prepared for those supplier meetings. Two interviewees raised the importance of visibility to the network and who is contacting suppliers and when. Importance of the organizational knowledge was also raised by the supplier during the interview. Especially in the situation, when there are challenges for example with on time delivery or material shortages, it would be important to know who to contact when solving the problems and communicating of the status updates. Being prepared and having correct data and information available when meeting suppliers or having internal meetings, gives professional image and is more efficient according to key informants.

*”So, sometimes you know, you tend to meet suppliers and you know, drink a coffee. How are you doing? I’m doing good. Oh, you as well. Bye, see you next time. Right? And then this is not really efficient for the organization, nor for the company. But you and me, we know that some of the supplier managers or procurement people tend to do this. Same from the supplier side. And I think this is a very professional way, as I said, to present ourselves. And that’s also a benefit. Because if supplier visit us and they know, ok they are always prepared. They always have the latest overview, on what’s happening with us as a supplier. It’s a very professional impact we are doing.”*



*“Other topic, much smaller topic, might be, that we, if we, if we know all the contacts, who is working with supplier? When do they have contacted, etc.? It will improve our network. And this has a value of itself. “*

Clear impacts of the using data and information in the supplier relationship management have been identified already in the case organization. Visual management would bring benefits and systematic approach for the work also. One of the interviewees had previous experience of using visual management in the daily work. Role specific data and information sharing would be preferred by the key informants. Also, KPIs should be specified by role and organizational layer. Role specific information sharing would make it easier for the organization to recognize the most relevant information they should pay attention and use the working time.

*“It was actually, how to say that? We didn't need manager or superior to one over to control that. They are self-oriented to do actions and that was that the purpose for that visual management and it visible all the time in the office. And if there is any red lights and difficulties, you can't put that away. So it is all the time visible for all and you know that after that it is, mean that, every people who can affect to that they are putting the effort to correct that or try to change that way to green way.”*

*“If all that information what we have been gathering over the years and decades, would be available, I strongly believe that we would be able to avoid some mistakes.“...” At least you probably would avoid repeating same mistakes you did in the past. I believe so. “*

Even Lean have not been fully implemented to the organization, nor the daily or visual management methodologies systematically in use, the key informants were able to identify possible future benefits of the methods. Main benefits would be visibility for supplier performance, key stakeholders, and end to end process transparency, which would improve overall efficiency and lead to improvement actions.

#### 4.3.2. Leadership – What is the role of leadership when implementing Lean?

Next theme of the findings is leadership. As it was indicated in the research literature review, implementing harmonized ways of working might be challenging as implementing Lean or efficient knowledge management into organization. There are several different methods management teams can indicate their support and importance of change. The main communication channels in the case organization are different kind of meetings, info calls, trainings, and info letters, but there are several different ways organization can share experience and knowledge. Leadership role is to ensure organization has needed knowledge, information efficiently available and will ensure role specific needs for the trainings and individual need for the support.

*“And that’s kind of a slightly a critic in how we are doing it currently. You know there are invitations. You are doing, you are getting like half an hour. Someone shows it to you and then we are expecting that then people are able to use it like 100%. I guess for the management and the leadership, they should be aware, that implementing new tools is not easy. So, people, kind of are stick to the things they already are doing for 10 or 20 years. And to introduce new tools and especially, new ways of doing it, like change management, right, and this area. You need to know that A) it takes time, it can be exhausting and difficult. And you need to hang in there. Right. So, it really takes time. You have to remind the people. You have to check the people. You also have to collect input and feedback. “*

Leadership can either support or make it challenging to the organization to take in use new operational model. There was also some critique about the current leadership methods. This still seem to require some attention and improvement for efficiency of communication and meeting practises. Clarifying the roles and responsibilities was also raised by the interviewees and change management challenges. Two-way communication and open information sharing inside the organization is valuable for key informants. Lot of information is shared and distributed only through unofficial communication chains and networks. It is seen challenging to identify the correct communication chain or stakeholders. The importance of communication is clear, but what to share, how frequently and to whom, still require clarification.

*“Again, we are, we are still having a lot of meetings. For the long run, leadership could also thinking of, can we reduce the amount of meetings. And can some of this information sharing be done through a tool. So, would it be more efficient? Would it be time saving to more and more concentrate on specific tools, but for me, this also would mean that we really have to have a clear picture in the roles and responsibilities.”*

Interviewees pointed out that one way of leadership does not fit for all and management should understand and evaluate the maturity of the organization. This kind of maturity evaluation is needed to understand what kind of support team or individuals in the organization require.

#### **4.3.3. Data, information, and knowledge – What is needed for efficient SRM?**

To be able to manage supplier efficiently, interviewees were able to identify different kinds of skills and know-how required from the procurement organization. All agreed that supplier relationship management requires many kinds of skills and knowledge. On the table 7 below, you can see how often each type of the skill or knowledge was mentioned, when asking about the skills, knowledge, and know-how (tacit knowledge):

Table 7: Knowledge needed in SRM according to key informants

<b>Type of skill or knowledge</b>	<b>Number of times</b>
Technical skills like understanding of the products purchased from suppliers, product design ownership, technical knowledge, documentation, and tolerances Negotiation skills	4
Quality	3
(Collaboration) tools, both sides Personality Contractual terms and contract content and availability	2
Supplier financial status, supply chain and network, legal, sales skills, good communication, market trends and prices, stakeholders and suppliers' organizational charts, supplier management model, supplier performance	1

Most commonly interviewees brought up the importance of technical knowledge and negotiation skills. This have been identified as a training requirement earlier in the internal studies. See appendix 4 of other training requirements. Suppliers also request a lot of information to be able to server their customer better. It was pointed out during the interviews that annual spend, purchasing volumes and future forecast are especially interesting for the suppliers to build the future co-operation and keep the relationship strategic for both parties. Interesting finding was that this was mentioned especially from both key informants from China:

*“Still they are interested in the volume. The, the purchasing volume is supplier interest. The other is, what new product we are going to sell to our customer.” ... “What I’m trying to say that supplier is also interested to see our new products ramping up, because it will bring new business to the supplier site. Of course, we are public list stock market supplier their orders financial information is visible in stock change market. They will see our growth. From that growth they can see our volume, that supplier clearly would like to know.”*

It was interesting to notice that during the supplier interview the most critical information to them seemed to be the forecast. According to supplier with the future volume information, they can serve customer better. Forecast would help them to prepare the needed materials and resources in time to ensure deliveries on time according to agreed lead times.

*“Basically, the most important input for us is, is your forecasts. So, we know what to prepare. That is most important thing for us, that we know what will you order and when you will order and what quantities.” ... “In end of the day, if you let supplier know, what would you need in future, supplier can meet your needs. And it means bigger business for all of us.”*

Another point of the knowledge sharing raised by supplier was document and drawing sharing to ensure product quality. For some product customer is responsible of creating and sharing for example working instructions.

*" This is in a scope of documents you should share with us. These working instructions. If we have agreed that you will provide working instructions, these are as important as drawings."*

In procurement organization there are different processes which require different kind of data, information, and knowledge. During the interviews, different elements of visual management and performance management in procurement organization were on a specific attention of key informants. Interview questions and themes raised by key informants were related to external strategic supplier relationship management, procurement processes and the work of supplier, sourcing and category managers and directors, but also operative materials management and purchasing.

*"It is somehow visual management is also somehow a bit ... Makes it... Makes it easier for them to understand what is the target and makes it easier to see where are we now and where do we want to go. And so, I guess we will also improve our own stuff in there, their capabilities as category or supplier manager if you have proper visual management."*

*"First you have to have the data and then you have the... in a way... the structured way of following the progress. So, then you define for example meeting practises. You set the agenda for the meetings as an example." ... " Very good example is for example the quality performance or delivery performance, if we see based on data that, hey, things are not as those should be, then obviously we organize ourselves around that topic and we start to follow that. How do we improve and what kind of activities are needed for the improvements? "*

*"We have monthly meeting with them, we have supplier relationship with supplier, we just call them. Hey, your performance is dropping, we need to improve. So, they are timely recover, not waste of couple of weeks even months to recover their delivery or their quality performance. People may make mistake, but if we have a system to track and push that will bring a lot of benefit for both." ... " Those, I think management side can decide, hey this is good cost level supplier. Can we develop more with this supplier? This supplier performance is dropping prices, high lead time, longer payment term is short. Then orders, information is*

*visible. So, that facts, I mean, they are facts. Visible facts viewed by our management team.”*

Data availability and data quality are examples of the concerns key informants raised during the interviews. One of the concerns raised was the related to different data sources, where case organization loses time of searching more information and other to data security and handling confidential information.

*“Data is missing or that is, that we have several data, different kind of data. So, what is the best one?” ... “At least if I can say in that indirect part and logistics part, we are clearly missing that data. How many transactions between what and what is then the details and what is the cost elements and so on. We are actually running that with half data. So, it is second half is still missing.”*

*”What definitely is missing, is this, this network topic. Who is in, who is in contact with the supplier, talking about what? Is it somehow documented? Who was dealing with the supplier in the past? So really this network component. Who is on out end acting with the supplier on the other end? And who from the other end? This is completely missing.”*

*“For example, how difficult it is currently to collect, for example the basic demand data, payment terms globally, performance, delivery performance. It is a, it is a hell of a job today to collect all that information. It’s not easily available and in a visual form.”*

Also, supplier raised also concern of the data reliability. This was mostly related to the volume forecasts. Key informants see that the information shared is done with best intentions, but as data changes over time, timely communication is needed about the changes. It was also important to the supplier to receive information as early as possible about the high peaks of order intake. This enables better customer service from their side. At least with the strategic supplier, who participated to the interview seemed to be happy for the current information sharing activity, methodology and communication frequency, when talking about forecasting and order intake.

Key informants from case organization identified several areas where they are lacking visibility. Another concern raised during the interviews was the amount of the information, what is available, how it is distributed, information overflow.

*“You know you are getting a lot, a lot, a lot of information and only 1% is important for you and that leads to the fact that this information are available. But people are not checking it. Because it is work to get it and the maturity of the information I’m getting is not important for me. And that’s why people are not recognizing it. And are not seeing it as beneficial. So, again, I think to personalize the visualized data.” ... “ So, the data we are providing and visualizing, the really need to be, let’s say, to be tailored to the different positions. And then it’s, I guess, it is very, very interesting.”*

When we discussed with the interviewees about the most important data, information, knowledge and different KPIs, they listed several issues which would support or are already supporting the supplier relationship management work. Different kind of data information and knowledge is needed in procurement organization based on different roles and responsibilities. In materials management roles organization processes are more transactional and operational and in sourcing and category management roles processes, data, information, and knowledge is more strategic. Basic understanding of different kinds of tools and processes were also mentioned by the key informants.

*“Because at the end today, best thing or many things are still going just due to the point that you have network that you know whom to call. Who are in charge with... of the supplier? Who has experience with this and that. So, today a lot information is going really via, via our network.” ... “What is our plan with this supplier in terms of category strategy? Who are all the key stakeholders? So, that you have somehow a one page overview. But this is more, more document for the managers, for the supplier manager or category. It’s maybe, maybe something else that is more important to make their life, more efficient. For me as a manager, this would be great if I go to meeting with this supplier, that I have this one page overview.”*

It is important for procurement organization to identify targets and main key performance metrics to be able to manage the internal work and external suppliers.

According to case organization key informants main KPIs needed for efficient supplier relationship management work would be overview of performance metrics, visibility to the contract terms and clarity of key stakeholders internally and with supplier organization. Contractual term, annual spend, supplier category and segment, performance levels are the basic data required for efficient SRM, which is already mostly available for procurement organization, but key informants had also ideas to increase the visibility of relevant information.

*“If I could choose, the most important thing would be that I would be somehow, been the customer of choice. So, how to say that? I wanna be somehow preferred customer. From, from, from our suppliers. So, I wanna be in, in their priority list if it comes to shortages. I want to be in their priority list when it comes to new development and new products we launched. I would like to be asked in that case. This would be main, main KPI. I’m not sure how to calculate that, how to get that information, but that would be the preferred or this would be most interesting. How I’m ranked as a customer from our supplier.” ... “From a supplier manager overview, it would be great to see on financial development, how much spend do we have?”*

During the interviews, key informant from supplier organization, was also indicating the importance of understanding their performance level with the eyes of the customer. Based on their experience open information sharing helps to create open and honest communication.

*“I might be very proud of our organization and see that everything is running well, and we are having 100% on time deliveries, but if customers don’t see it. If there, if there is any issue in customer site for example, that our goods are not received in correct date for whatever reason. And figures show that customer is, that Konesko is not a good supplier because of that, I would like to know it. Because somebody somewhere is making decisions based on that. “*

This was also interesting information to the case organization. They would also like to understand how supplier is rating the case organization as a customer. This information would help to understand for example how high case organization is in



case of urgency and priority when serving customers. This also would ensure the latest information of supplier product development and possible changes of product offering. Case organization still would like to get better visibility for the data and improve the current data management, like the tool accesses, data availability and distribution. Different kind of alerting system would enable more efficient supplier relationship management.

*“People who are running those categories they are getting that red flag directly. So, it is like the current setup is that those persons have to be manually looking that data or asking that data, but we have to have some, something red flag process for if something is going to wrong direction. Then they can look than and do actions and correct that one. So, it is total manual process for this.” ...*  
*“Depending on the numbers and reports, we are getting that daily based or weekly based. And if there was something what was on the red, we can raise up that directly that, hey we have to put an action point for that and looking what is behind of that and after that analyse that we can do that action point and then we are following that is it going to right way.”*

In global organization it is challenging to ensure the similar maturity level of the processes and tools and to ensure suitable knowledge level of the organization especially when knowledge sharing, information and data distribution is not yet harmonized globally. There is some interaction between the units and individuals, but not systematically defined methods agreed. Trainings are seen important, but some feel already an overflow of the information and data, too many tools and processes available, so there seem to be a wish of further classifying the distributed information, arranging meetings and trainings specifically for the role and responsibility area. It would be important to identify the key informants in the organization who have experience of the current network, stakeholders, tools, and processes. Knowledge and experience are a basic building block of efficiency and good results of one's work.

#### 4.3.4. Tools and processes – How to share and distribute data, information, and knowledge?

There are already several knowledge sharing methodologies and tools available in the case organization. Most common way to share and store data, information and knowledge have been identified to be either e-mail, info letters, trainings, face-to-face or online meetings or using Microsoft Sharepoint. There is a lot of information or data available in different procurement tools also.

*“It can be that we have that SharePoint where are, those who is responsibility per category, they are looking that by self. It can be also that is daily based, weekly based, monthly based report, what is coming automatically.”*

*“Knowledge sharing... I believe we those Sharepoint, TeamSites, e-mail, phone calls, meetings, trainings. Several ways of sharing the information what we currently have. “*

Sometimes in a bigger company it might be a valuable knowledge itself, that who knows what, as that might help organization to improve the performance. It is also important for the organization to have visibility to changes in the responsibilities and to arrange handover of the relevant knowledge efficiently.

*“The most important thing was that I, that I know who was dealing with the certain topic or certain supplier earlier and... So, that I can reach out to them and call them. But this won't help, I... To make it in a, in way like, okey, get the data and things like that. Transparent also for the case, since that supplier manager is maybe not anymore in the company. So, but what we need somehow is a track where we see, who was dealing with the supplier in the past. So, that we really have the names. And if they, those persons are still in the company, then we can just call them or something.”*

According to the key informants, knowledge sharing processes are not harmonized, but a lot information sharing is done through info calls and meetings, both one-way information sharing or two-way-communication. In global organization it is important to identify your key stakeholders, but also the people from whom you can learn. Basic

knowledge of the expectations, tools and processes should be well documented and trained to the organization.

*“But it should be so that monthly or quarterly based information sharing or something, some other way to share that best practises to other countries. Because we have several factories, several operations, and cultures and so on. We should have some channel to share. If we have improved something very well in some country, we should get that information shared to other countries also.” ... “So we should have and share that knowledges between the people, but also we have to have some process what is the minimum level how we are working, how we are documenting, but then we can open that, that work area for the persons. And they can proceed how they want.”*

*“Certain things you can, you can obviously handle, maybe if not about the information sharing, than can be done via Skype, but then more complicated matter you have, then obviously, it’s much easier when you are face to face. And, ... and then you are able to see if somebody in a way didn’t get the point or somehow lost. It’s easier to see and you can go back to things. Or go back into details if needed.”*

*“Knowledge about the company and the and the people and who are the, who are knowing and what at the moment, because not everybody is familiar or coming with the similar background.” ... “When we have a global category that they have some regular, regular calls and about like aligning with the, let’s say, different regions about their strategies. Because when we have like, let’s say, global category manager roles, then we have supplier managers, in different locations globally, so it requires some, let’s say, alignment.”*

Sharing information with suppliers happens in different ways. People use different methods to share relevant information with external suppliers. There are of course meetings and e-mails, but what was pointed out by key informants is to document the actions and sharing the meeting minutes or action plans to be able to follow the progress. One of the informants also raised the importance of getting to know your suppliers more in personal level, which will help the co-operation in the future. A lot of

information is shared also during different kind of improvement projects, not only during monthly or weekly meetings where operative issues are followed up.

*“Locally we tried the JIT, Just-In-Time, that concept with our key suppliers. We do the stock commitment with the supplier, but that stock commitment with supplier need to have a, let’s say, our factories, manufacturing plan. That quantity of the products or parts has to be aligned with our production.” ... “Another thing is the delivery time. What lead time we agreed with the supplier. And what supplier do for us. We are currently doing very good project, we call it lead time reduction for our supplier. We do a value stream mapping, how much time needed or needed for machine, welding, we do the process together with our SQE team (Supplier Quality Engineers). That value stream mapping improved supplier delivery time to our factory, but that also bring us benefit, because cut of our lead time. That’s a really, really good approach, but all I would like to say, without the information sharing, without bring some in visible, we can not do that.*  
“

According to supplier there are several knowledge sharing practises already in place. As examples they explained the co-operation with production line layout development where photos, videos and layout examples have been shared with case organization. Supplier also indicated that this kind of knowledge sharing in development work is challenging if face to face meetings cannot be organized. With strategic supplier where efficiency is bringing benefits for both organizations, early involvement for product development work was indicated as one key activity.

*” So, we are working together with your designers and we are hoping to get when we are, as early as possible, make our suggestions. So, to, how to, maybe even change the design so that this is more efficient, easier and in end of the day, it is cheaper to produce and we will gain both from that.”*

There are limited number of systematic knowledge sharing processes in the case company, but there several good examples how knowledge sharing have been included to daily work and there are for example global events where organization can share best practises and hear latest news. There are also new tools developed and implementation started to create better visibility of performance for procurement

organization. There are also some knowledge sharing processes and tools already in place with strategic suppliers. All key informant emphasizing the importance of efficiency and easy access for the data, information, and knowledge. A lot of information is shared traditionally in the daily, weekly, and monthly meetings by managers and knowledge shares through the networks unofficially. Personal relationships help to understand the needed data, information and knowledge which should be shared. Efficiency of data, knowledge and information sharing can help organization to avoid same mistakes and to improve efficiency and enable better results.

#### **4.3.5. Visual management – What should be visualized?**

Visual management is one methodology of performance management in Lean and there are several different aspects of visualization. One target of this research was to take knowledge management and strategic supplier relationship management approach to identify needed data, information, and knowledge to efficient strategic supplier relationship management. There is a lot of different kind of data, information, and knowledge already available in the organization, but bringing it easily available for the organization can be improving the efficiency of the organization. Key informants were concerned that what is the correct amount and level of visualizing data, information, and knowledge. When asking what should be visualized then, key informants mentioned the performance metrics, but also some other ideas were raised. It is important to notice that the visualization should be used in the case organization, but also with the external suppliers for efficiency improvement.

*“It need to be very clear and that information what we are sharing via visual management have to be that kind of data that people can really understand where we are and what we have to do. So, it mean that even team members or superiors or managers, they need to be able to do decisions related to that data or that information. Not nice to know information, that is denied.”*

*“We should have some track where we say how much cost savings supplier delivered to us? If we talk about design to cost ideas and design to cost savings. That is something that I would expect from a preferred supplier helping us to*

*reaching to the cost. And then we should have somehow an overview about meetings, which meetings has happened, when and where? And with whom? And obviously the contact details from, from supplier. Who is, not just who is the general manager, but who is in charge of the claim handling? Who is in charge of finance? Who is in charge of this and that?"*

Visualization should not only include the key performance indicators, but also present basic knowledge and skill requirements of the organization. Like many other organizations, also in the case organization, there are team members with different background and experience. Visualizing of the tacit knowledge is seen difficult or at least challenging in the case organization.

*"I don't know, for visualisation it's difficult, but it is more or less that face to face and via Skype and via phone. But it is mentoring process and that way we are sharing that knowledge for younger people. But visualisation, in that way, if you are, if we are talking about visualisation board or visual management, that we are, that is, I think that is difficult. That need to be that face-to-face or Skypes. But it is good, when we have those younger people in the team, so it is we have also those kind of people who is working very long, so it is they are sharing that background, but in other hand also, it's that it is very good that we are getting young people also on board."*

*"Maybe, maybe that's ... that is stupid, but maybe it's an idea to make somehow, if we talk about visualization, what about making somehow some kind of, let's say cartoons or things like that for a certain topics, so that you have something that you can give some on hand as a small reminder. There is... If you have this or that situation. Not making a hundred-page presentation, just one to three pages for a certain topics. And then making really in pictures. That's why I said cartoons." ... ". I feel so often reminded on certain circumstances and that makes, makes a complex situation which we might have with a supplier, bring down in the complexity level and then you see and understand why people are having or acting like this. And I think you can use such kind of, making complex situations more simple, in two or three pictures, and this may have to share some, some, some knowledge."*

*“Maybe you could partly visualize it through the organizational charts for example. Like, because if you have the people who know, some key roles in different place, so if you would describe it in a way that if you don’t have, let’s say, so many processes in place, but you have those, let’s say, gate, key persons. So, the people who knows a lot, a lot of knowledge, so you, let’s say, visualize that one, so for example for the new team members who are coming in a company. So, then they know more like, where to get the information and so on. “*

Visualization is seen in the organization as a strategic initiative, which needs to be supported by management and the organization should be involved to the development work. This is one of the enablers for the efficient strategic supplier relationship management and improving supplier performance.

#### **4.4. Development ideas collected during the interviews**

Many of the key informants were sharing their ideas and proposals during the interview and seemed to be very interested and eager to develop the supplier relationship management efficiency further. There seems to have still some improvement ideas in the organization considering the leadership methods including roles and responsibilities, tools, and processes in supplier relationship area. On the other hand, there are already several development activities on-going at the same time and like pointed out already also earlier, challenge is the implementation and organizations capability to take new tools and processes into use. There are simple and practical ideas, with which information sharing would be improved, like for example documenting supplier meeting minutes and action plans more systematically.

*“We have planned yearly plan per supplier that how we are looking that what is that operational follow up, when it is that some strategic follow up and so on.” ...  
“So, we are keeping with supplier meetings, but we don’t have any written memos of those and action plans, timetables, who is responsible of those actions and where we are putting those. So, it is: How to follow, that we really do? What we really agreed with suppliers.”*

Because there is no standardized way of sharing the best practises in the case organization currently, there were some proposals from the key informants to develop this kind of process.

*” Would it be possible, we build up a successful story, then share with different business areas and business units? The successful story either to supplier change, success for price negotiation, what have you done, what have you negotiated with the supplier? What kind of... What change you have made to achieve the cost saving? If some category manager or some sourcing manager can bring successful story to share with us, that give to some other people a lesson or is a lesson, is example then they will learn how to ... for their ... They will learn from the successful story and then try to learn from the story and then develop from his own. “*

Few improvement ideas were discussed also with one Material Manager from one case organization when getting familiar with the current visual and daily management methods. This was not part of the official interviews, but more background knowledge collection when interviews were prepared. Now in this business unit there is no automated KPI distribution, reports, or statistics available of the efficiency of the management system. Even if continuous improvement ideas are collected in case organization, those are not followed systematically or prioritized, which leads to slow development. Long term visibility for the root causes are not available, so systematic long-term development is not currently a systematic process. The improvement action effectiveness has not been evaluated currently, even in the case organization this would be needed.



## 5. DISCUSSION AND CONCLUSIONS

Target of this research is to identify the key knowledge, information and data which could be used in visual management to enable efficient strategic supplier relationship management. Visual management have been identified as a methodology to support internal and supplier performance improvement. It shall be used also to create visibility, systematic processes, and tools to share data, information, and knowledge systematically in the case organization. This research is a first of all important to the case company for further development work, but also supporting the possible application of knowledge management methodologies in strategic supplier management which is implementing Lean to the organization.

Target of the following chapter is to summarize the findings and review those against the theoretical background. Conclusions of findings will be reviewed with theory framework. Based on this review target is to be able to answer to the research questions. According to Eisenhardt (1989, 544) theory framework and research findings shall be reviewed to identify the which findings contradict with theory framework and which are endorsed by the theory framework.

Theory framework for the research presented three main themes: Supplier relationship management, knowledge management and visual management from Lean ideology. Scope of the research is a procurement organization in multinational company where there are centrally managed operations, but also some local and regional specialities in the supplier relationship management. Knowledge management processes and tools, roles and responsibilities and trainings are offered and defined by the central organization. This creates an environment where implementation of visual management needs to be planned, prepared in co-operation of central and local organization. The research questions of this research are:

- How visual management could be best utilized in strategic supplier relationship management?
- What is the most relevant knowledge in SRM?
- What kind of data, information and knowledge should be visualized?

Based on the research findings there are different elements of visual management which needs to be defined to enable full potential of visualization. It can be used for performance management internally and in co-operation with strategic suppliers. There is both tacit and explicit knowledge elements in the supplier relationship management. Knowledge creation, sharing, transfer and distribution processes enable improved performance for global procurement organization. With different kind of visualization of data, information and knowledge organization enables efficient strategic supplier relationship management. For implementation of visual management for efficient strategic supplier relationship management will require proper planning and alignment on the global level to ensure equal experience and maturity level of the organization in strategic supplier relationship management. This all require strong support, commitment, and leadership from top management.

### **5.1. Visual management in strategic supplier relationship management**

Understanding the possibilities of strategic knowledge management methodologies when implementing Lean and developing visual management in global procurement organization enables more efficient visual management implementation and strategic supplier relationship management. There are several ideas to improve the current performance management by visualizing data and information. Knowledge visualization is seen more challenging in the case organization, but there are great ideas to improve visibility in that area also. Visual management has more potential than only visualizing KPIs.

#### **How visual management could be best utilized in strategic supplier relationship management?**

Most simple statement of the visual management methodologies indicate that you get what you measure and if you bring it visible organization will try to improve if they are not in the target. This was a harsh and strongly simplified summary of the findings of this research. Luckily organization sees a lot of potential for the future development possibilities of visual management. By identifying key knowledge, information, and

data for case organization and with strategic suppliers, visual management can be further enhanced.

Lean office and Lean procurement require similar activities as it would be required in the shopfloor Lean development. Similar steps of stabilize, standardize, visualize, and continually improve are needed when planning implementation for the Lean and visual management into case organization. Visualization in Lean includes different elements from performance management, standard work description, process flow mapping and continuous improvement. Identification of muda, meaning waste, in operations and deviation from target levels of key metrics would lead for requirement for continuous development. According to Chiarini (2013, 105, 141-145, 150-152) typical performance metrics include availability, efficiency, and quality. Similar indicators of problems can be identified from office processes as from manufacturing operation. They lack information or longer time of handling standard work indicate problems as lack of material or production stops in manufacturing facilities. KPIs should be followed frequently, preferably daily, and same information should be available for staff and managers. In supplier relationship management visual management can be used for example to observe internal and external capabilities and performance. Internal and external performance management have been also indicated to be as one key focus area during the interviews. Bititci, Cocca & Ates (2016, 1590-1591) called this VPMS, visual performance management system. VPMS can support cultural changes, enhance information flow, boost transparency and discipline and provide input for VSM. Like in the case organization, expectation is, that this kind of system would facilitate performance measurement, continuous improvement and improve communication.

When implementing Lean with external suppliers, according to Locher (2011, 105-109), long term relationship is needed. Target is to improve supplier performance and agree exception handling procedures. As procurement organization is working with internal and external stakeholders, it is important to understand and create visibility to e-2-e processes. Focus should be in more advanced development actions and process automatization when and where possible according to supplier categories. This have been indicated also by key informants during the interviews. Case organization have

also added the importance of more strategic procurement activities in addition of performance and operative purchasing process visibility to the future requirements for visual management. Visibility have been required also for key stakeholders, like organizational charts with clear responsibilities, actions plans and projects and contractual terms. Visibility for the organization, roles, and responsibilities, but also the current and experience of individuals have been indicated one key knowledge in the organization. This would help to share best practises and to avoid repeating similar mistakes in the future. Professional visualization also gives professional image of the company towards their strategic suppliers. One interesting element of visualization was brought up by key informants. By providing information the strategic suppliers, that how their products, components or services are linked to the end product, it will help them to understand possible requirements or limitations better.

When considering the current maturity level of the organization with Lean and visual management implementation some basic elements have been already implemented to some parts of organization. According to the visual management synthesis by Jaca et al. (2014, 1758), 5S, kanban and Andon lights are first level of the visual management. These are something which have been already in use in the case organization and are further developed currently. There are some more advanced visual elements like some tools sending reminders and increased transparency to the processes already available for procurement organization, like order collaboration tool with external suppliers and global ERP system. There are still more advanced visual management methodologies and IT solutions available to ensure improved visualization and transparency. Like Jaca et al. (2014, 1767) have stated, the importance of using the visual controls and display indicators as it is difficult to control and improve something that cannot be measured or seen. This have been also in general feedback from the key informants from the case organization. Identifying the gap between the required state and the current performance is lacking from many of the current KPIs, reports and dashboards. Jaca et al. (2014, 1767) also addressed the importance of showing relevant information of the performance as by doing that, company promotes innovation, commitment, and awareness of employees. This also encourages organization to participate to continuous improvement. Case company have put a lot of efforts for improving data and information visibility and transparency, improving tools

and techniques, and is currently working for further implementing characteristics of visual elements. Continuous improvement process has been already partially in use, but it will further enhance when visual management and knowledge management related processes will be harmonized.

According to research findings there have been some challenges with the development work and high commitment and attention from management is needed while implementing visual management in the case organization. Like Locker (2011, 62-73; 129) explained that resistance might occur while implementing Lean. While defining standard work in the organization and bringing performance metrics visible for everyone, organization need to adjust their ways of working to meet the targets and requirements. This requires also change of the management methods and team leaders in the case organization. Management should concentrate more on ensuring process flow without problems, motor demand and available resources and not organizing daily work. This have been recently discussed in the case organization, even it was not clearly brought up by key informants. It is the future target in the case organization is to change the managers' role to be more enabler than organized and problem solver. Organization needs to take responsibility of the improvement activities and problem solving. Management need to pay attention to identify the training requirements and clarify the needed skills for each role. This is like the finding from Andreadis et al. (2017, 7076) who identified differences when implementing Lean tools. Some of the tools require specific training and resources for implementation. Implementation is easier if organization understands the benefits, but monitoring is still required.

Bhasin (2013, 125-138) identified the potential challenges of Lean implementation. By paying attention to the target setting, ensuring needed trainings, involving organization and well-prepared communication plan of Lean implementation management can mitigate the risk of failing to change. Commitment from management means ensuring time, money, and resources for the change. Commitment from management is needed even after the first implementation as Lean is continuous process and takes time to change the culture in the case organization also. Challenges of the change management were indicated also by the key informants and there was some criticism of the trainings, quality of the tools and organization involvement. Also, according to

Hermano & Martín-Cruz (2016, 3455-3456) management should create supporting environment to allow organization to perform needed activities. Involvement of top management might enhance the change. As implementation of Lean is not isolated from daily work, it is important for case organization to understand the targets and benefits of the changes.

Waste reduction in Lean office is part of the benefits of implementing visual management. There are different methods how this can be implemented into the global procurement organization. Value stream mapping have not been done to identify the waste in processes, but some of the processes haven been already documented in the case organization, so it would be beneficial to continue to value stream mapping after the standard work have been defined with needed performance metrics. With the value stream mapping it would be important to also understand the information flow in the case organization. This would require further documentation of the processes, roles, and responsibilities in the case organization. As Alavi & Leidner (2001, 119-121) suggest organizational knowledge transfer is driven by communication processes and information flows. Knowledge transfer in and between the organizations is important process in knowledge management.

Waste in process can be as simple as too much time needed for information collection, which is also seen as a challenge in the case organization currently. There are several tools, information and data sources in the company and sometimes looking for correct information is taking time or data cannot be trusted for a reason or the other. According to Chiarini, 2011, 98 waste can be for example order backlog, waiting time for approvals, waiting signatures. Visual controls help organization to identify problems or bring visibility to the roles and responsibilities or standard work instructions. Locher (2011, 36-58) suggested that visual control in Lean office targets to bring transparency for process flow, queues and bringing problems visible. Visual signals help organizations to maintain flow, recover from problems without management interference and guidance. There are some applications of visual managements in the case company and some visual management boards taken in use in procurement organization, but systematic approach for implementation would be needed and this is not currently implemented only by global procurement centrally, but there are several

local solutions in place. Target is to harmonize the visual and performance management and KPIs globally in the case organization. Current visual management elements not been implemented globally, but rather local design, solution, and ways of working. There are some generic performance metrics and KPIs agreed and communicated in global level, but as indicated by the key informants, the target levels and action planning related to low performance are not in place systematically. As continuous improvement and kaizen is a key element of Lean operations, the clear target levels should be indicated, and related improvement actions tracked accordingly. Continuous improvement toolbox like flow charts, pareto charts and cause-and-effect diagrams are widely known by the organization even visual management is not directly linked to those currently. For example, escalation process and reclamation handling processes are including already root cause investigation steps.

Visual management solution according to key informants should include mainly improved visibility to the performance and KPIs, improved visibility internally and enhanced information sharing with strategic suppliers and clarified roles and responsibilities and segmentation of strategic suppliers. Visualization can be done with different kind of solutions, like with screens or whiteboards, but there are several systems and platforms available how visual management elements can be created. Especially for the global organization like case organization, which is working with different time zones and countries, electronic system would be preferred solution. What should be then included for the visual management in addition of performance management is further discussed in chapter 5. 2..

Eaidgah et al. (2015, 187-192, 204-205) introduced the elements of performance management: performance planning and implementation, performance measurement and performance evaluation, corrective actions, and continuous improvement. These are also the actions started in the case organization. According to Parry & Turner (2006, 77-88) when using electronic boards, it requires additional facilitation and system experience and the selected systems than physical boards. According to the key informants possible visual management solutions do not be more expensive or require more time for implementation than physical boards if current toolset and

knowledge in the organization is used, which was mentioned as one potential issue by Parry & Turner (2006). Creating the visualization is not enough as the follow up and performance reviews internally and with external suppliers require regular meeting patterns and constant focus towards efficiency.

## **5.2. Knowledge management and leadership in supplier relationship management**

In global procurement organization it is challenging to ensure that harmonized usage and implementation of tools and processes are in use and organization has the needed knowledge to operate efficiently. Management can affect a lot by selected leadership approach to how well organization will be able to benefit from efficient knowledge management. According to Dyer & Singh (1998) there are four potential of interorganizational competitive advantages. Those include interfirm resources and routines include relation-specific assets, knowledge sharing routines, complementary resources / capabilities, and effective governance. This potential of the competitive advantage is in the focus of this research. To understand what kind of knowledge is needed to manage strategic suppliers and might be shared between the supplier and customer organizations. Target was to also identify what kind of knowledge sharing processes and tools are used and how those could be further developed.

Based on research findings case organization did not fully agree on how well current knowledge and information sharing is working and how well data is available for the organization. Others have experienced, that there are several ways of finding information and data, they have received needed trainings and support, there is active communication and meetings structure, responsibilities are clear, and also knowledge sharing through the network is working well. Some of the key informants see that there are more challenges, which should be solved like data reliability, role specific responsibility clarification, supplier segmentation further development, performance management and access and trainings ensured to the current and future tools. According to the research findings related to knowledge and leadership, those still require further clarification and communication. Main issues are summarized below:



- Preferred leadership methodology: Different opinions on current leadership methods, cultural differences, ensuring needed time and resources for change management
- Internal communication plan and clarification of content, frequency, and methodology
  - o Meetings and trainings: content, frequency, purpose defined based on roles and responsibilities
- Ensured and enabled data, information and knowledge sharing, distribution, and availability:
  - o Defined data and information distribution channels and methodology
  - o Content of information sharing and suitable frequency, tools, processes, and methods
- Experience, maturity, and capability level of the organization: Supplier relationship management skills and knowledge requirements, role specification, required tools and processes
- Development plan: Currently missing elements of data, information and knowledge visualization and availability to be improved
- Advanced visualization plan for data, information, and knowledge
- Experience and tacit knowledge visualisation and utilization in future

According to von Krogh et al. (2012, 258-269) different organizations require different kind of leadership activities and styles, which can be used to ensure the knowledge sharing efficiently. In core layer of knowledge management in organization, it is recommended to use distributed and in structural layer centralized leadership style. This means that there are different types of leadership requirements and possibilities in different situations. Distributed leadership enables knowledge creation in motivated and autonomous environment. Knowledge is created in organization, like in the case organization, in collaboration between employees and tacit knowledge shared in smaller groups through internal or external networks. This leads to the information sharing through discussions and sharing ideas. This also is clearly seen in the case organization and brought up by the key informants during the interviews. There are some centrally managed activities on-going, but business areas and business units have been designing their own performance and visual management methodologies, even the supplier and category manager roles have been defined globally. Harmonization of the supplier management methods would require additional time, resources, and support from top management.

Central and distributed leadership elements can be both identified in case organization. In an idealistic situation this leads into the internalized tacit knowledge in the case organization also. Case organization has already identified the need to externalize the hidden tacit knowledge in the organization even though that is seen challenging. This is indicating that the more structured knowledge strategies and defined knowledge creation and sharing practises. By motivating and rewarding people management can affect to knowledge creation and building by creating potential to business area in the case organization. This can be done through communication protocols, defined targets, prioritization and by creating electronic networks or integrating people formally or informally. Centralized leadership style is also needed for creating boundaries and control for knowledge creation process mechanisms. Knowledge management related processes according to Alavi & Leidner (2001, 115) includes knowledge creation, storage, transfer, and application. According to the findings from the case company knowledge processes require some formalization to enable structured knowledge related processes, but also distributed leadership to enable spontaneous knowledge sharing and innovation in the organization. By creating 'BA', like knowledge sharing culture and networks, and enabling tools like knowledge and document repositories leadership enables efficient knowledge processes. Most critical task for leadership is to provide accurate, timely and complete information for decision-making (Nonaka et al. 2006, 1190). There are different kind of platforms in use in the case organization like enterprise content management platform and Microsoft Sharepoint and Teams. There are other systems used by procurement organization, which have been efficient for information sharing, but systematic training and access management plan would still require improvement.

There are also cultural differences, that what kind of leadership methods should be used, and which will work in different parts of organization according to cultural background or experience. This finding is like von Krogh et al. (2012, 247), who stated that different leadership styles should be varied according to issues and problems on hand. Situational leadership style fit for broad set of situations.

*"It's not like one tool fits for all, but it depends that... First of all, it's like where are organization is like a current stage. We are like, ok, are we from one to ten? Are*

*we taking the first steps or are we more, more, ... more in a like a advanced level of the procurement understanding process." ..."* So, I think it has been more, more in a strict and higher hierarchy or some of the organizations, you can see that you might have the, let's say, experienced procurement people. They have been working ten, fifteen years in the area of procurement, but then they are same time, they are waiting for the instructions from the boss, even they would know what to do, but then they are waiting. Because it belongs to the culture."

According to Hartmann et al. (2008, 39) global organization central control strategy do not involve subsidiaries as often as transnational organizations. In global organizational setup knowledge sharing and interaction between subsidiaries is limited due to centralized control. This also affects to socialization and control mechanisms between central function and collaboration between the business units. This was also indicated by the key informants during the interviews. Some of the information is being shared through the networks, but there are also more official knowledge sharing processes like meetings and trainings, where information is being shared.

How is knowledge created in organizations? According to Alavi & Leidner (2001, 109) available data and information in the organizations needs to be identified to identify what is the most relevant knowledge for the organization, how it will be created shared, stored, transferred and applied in the case organization. In the case organization, there are several knowledge creation, transfer, sharing and distribution processes and tools withing the organization and in co-operation with strategic suppliers.

Global procurement organization requires efficient knowledge management like in the case company. Monteiro, Arvidsson & Birkinshaw (2008, 102-104) stated equal information sharing in multinational companies (MNC) require understanding of knowledge flows and organizational understanding. Centrally managed organizations have challenges sharing and collecting information equally. Organizational design will have impacts on the procurement strategy execution. According to Hartmann et al. (2008) global strategy aims for standardization and are brining global systems and processes from headquarters to subsidiaries. Transnational strategy also supports location-specific advantages with multinational flexibility and usage of worldwide know-how. Identifying information processing capabilities and control mechanisms are also

part of strategy planning. In the case organization there are more centrally managed approach selected for knowledge sharing and trainings, but with the support of the regional and local organizations in the different business areas. This helps to ensure the needed trainings, knowledge and information sharing globally.

In the case organization there is already knowledge sharing best practises in use even those are not systematically in use. From knowledge creation processes according to Nonaka et al. (2000, 9-12) socialization, externalization, combination, and internalization in case company socialization can be seen in more informal and formal meetings. Externalization with visualizing the tacit knowledge and making it transferable, key informants had example in practise, how this have been done in the case company. They also had further development ideas like creating cartoons instead of detailed working instructions or sharing success stories. Combination in knowledge creation processes could be identified from the descriptions of key informants in the case organization. There are different kind of electronic communication and information sharing platforms and databases in use. A lot of information and data can be collected through different tools or through active communication with network. There is also possibility of internalizing the knowledge in the organization as there are some working instructions, manuals, and documents available for the case organization. Like Nonaka & Toyama (2003, 4) and Nonaka et al. (2000, 12-14) stated that organization should choose the environment in which and how to build and sustain competitive advantages. Where competitive advantage is built with efficient knowledge creation process.

Nonaka et al. (2000, 30) stated knowledge creation processes are also possible for groups of companies, not only within single company. Companies can improve their performance and create competitive advantage by benefitting from interfirm knowledge sharing routines according to Dyer & Singh (1998, 661-666). Sharing knowledge with suppliers help to solve problems more efficiently according to Steinle & Schiele (2008, 5). More mature companies invest time of strategic activities which lead to potential cost savings according to Úbeda et al. (2015, 183-184). This have been also identified in the case organization where close co-operation and communication with suppliers have enabled performance improvement different kind of development activities with

suppliers. One finding from the supplier interview is that they see clear benefit of the open information and knowledge sharing. According to supplier, they see that co-operation will improve the delivery performance, possible cost savings in product or production development and bring more business for both companies. In this case organization have decided to explore the supplier's capabilities rather than exploit those. According to Kauppila (2015, 152-162) co-exploitation increases firm growth in short term, but in a long run co-exploration brings better results. According to supplier interview honesty is important and that can be increased by open communication and information sharing. Also, according to Cox (2004, 348-349, 353), trust helps to build Lean supply chain and transparency between supplier and buyer companies.

Research findings of Sluyts et al. (2011, 882-884) have pointed out the importance of top management support, information sharing and codification and organizational culture, which effects to alliance management and outcome of the relationship. They did not find significant effect of corporate culture on alliance capability, which is interesting. On the other hand, they found that knowledge codification and sharing are two processes standing out when improving alliance performance. Knowledge "stocks" are helping to develop alliance management capabilities. Top management support was also seen as crucial element for alliance capability development. These findings are in line with the dynamic knowledge creation processes and knowledge asset management importance presented by Nonaka et al. (2000), Nonaka & Toyama (2003) and von Krogh et al. (2012). In the case company change of the organizational culture more towards Lean have been identified to potentially improve the performance and the co-operation with strategic suppliers. Visual management as one element of Lean will potentially improve the communication and information sharing. If other elements of visual management like definitions of standard work, work instructions and continuous improvements will be taken into use, this will help to create knowledge stocks between supplier and case organization. There are already some Lean projects done in co-operation with strategic suppliers to improve manufacturing efficiency and delivery performance with visual management elements like kanban and VSM. According to (Imai 2012, 110-111, 243, 403) it is important to describe the best way of doing the work when creating work instructions and standardizing the work. This will help to identify the exceptions and to define guidance how to handle exceptions.

In complex global supply chains, like in the case company, different governance models might be selected and implemented. Due to product variance, product complexity and levels of codified information, which are purchased from strategic suppliers, governance and knowledge sharing processes are different. Supplier capabilities are also different and might increase over time. (Gereffi et al. 2006, 85-87). Within case company there are also changes and differences in supplier capabilities and performance. Different types of the supplier require different management methodologies and it is not only supplier capability, but also the power relations which effect to the control and co-operation mechanisms. In global procurement organization, like case company, different types of the management methods are is use with the strategic suppliers, varying for example based on the products they deliver, power relations with the supplier or their own performance capabilities.

There are several knowledge creation and sharing processes in use in the case organization but could further enhanced also in inter-organizational co-operation with strategic suppliers. The co-operation with strategic suppliers is different from other types of supplier. Case company is implementing new segmentation guidelines to manage supplier base efficiently and to identify strategic suppliers from the supplier base. There have been supplier A - preferred, B - Approved and C - conditional classification in use, but that has not been implemented into supplier and category management guidelines so far. There have not been specified guidelines for preferred supplier relationship management. According to new segmentation criteria strategic supplier definition and criteria will be evaluated in co-operation with key stakeholders internally. There are different kind of activities and requirements planned towards strategic suppliers, like enhanced performance management, contractual improvements, strategic savings projects, and product change projects. Enhancement of the visibility of the supplier segmentation was required by the key informants. Clarification would be needed of the roles and responsibilities, expectations and target setting with strategic suppliers. It would enable more efficient supplier management if visibility of the agreed actions and current performance would be improved. Further visibility for the key stakeholders, financial status, future volumes, and contractual terms would be needed. According to Lambert & Schwieterman (2012, 343) different supplier segments require different activities to manage supplier relationships utilizing

different methods and skills. Also, the management of the segments might be divided to the global or local organization. This has been done also in the case organization where responsibilities have been divided between the global procurement central team and to local business area and regions specific responsibilities.

One part of the new segmentation guidelines, which are planned in the case organization will take operational performance related metrics and behaviour of the suppliers under review when defining segment. This kind of behavioural segmentation concept is also introduced by Gattorna (2009), where behavioural segmentation characteristics of suppliers are and potential approach for relationship management: 1) trusted and reliable partners: close working relationship, 2) process driven: low cost and predictable demand, 3) planned creativity: rapid response to irregular demand and 4) opportunistic: fast and innovative solutions.

### **What is the most relevant knowledge in SRM?**

Trautman et al. (2009) and Rozemeijer (2000) defined the three main categories for possible purchasing synergies: economies of scale, information and learning and economies of process. As these can be counted as potential benefits of efficient supplier relationship management, case organization should identify the most critical data, information and knowledge which is needed in supplier relationship management and what kind of information should be shared with or transferred from / to suppliers. According to Kale & Singh (2007, 994-995) knowledge sharing routines between companies bring competitive advantage with complementary capabilities. With the economies of information and learning as well as with the economies of process the relationship management can be done efficiently with strategic suppliers. Target is to increase efficiency and improve performance of both companies.

Supplier collaboration tools and defined processes impact to supplier relationship management. Through the collaboration tool implementation organization have already improved the e2e process visibility, but there are still further improvements needed. Harmonized processes and systems enable efficient co-operation. Systems could provide information like approved suppliers, supply history, performance, and

details of contracts according to van Weele & Rozemeijer (1996, 155-160). Harmonized purchasing and sourcing processes should be arranged to be simple, transparent and focus to customer. There are different ways how case organization is co-operating with the strategic suppliers. Like Park et al. (2010, 498) listed JIT purchasing (JITP), vendor managed inventory (VMI) and collaborative planning, forecasting, and replenishment (CPFR) to be best known collaboration techniques between supplier and customer. Different kind of platforms and systems can assist in collaboration. Currently case organization is changing the supplier collaboration portal to improve the visibility of the order delivery process, claim handling, forecasting, document and drawing sharing and to improve contract management and RFQ processes. Hsin Chang et al. (2013, 38, 46-47) stated that different kind of electronic solutions will help to maintain information sharing and supply chain integration. With these electronic solutions organizations can contribute to the growth of supply chain performance, enable cost reduction and time savings. Electronic solutions may also include functionalities to document know-how and provide “electronic visibility”.

Operational excellence in procurement organization will create value to customer at the end of the day. According to van Weele & Rozemeijer (1996, 155) companies also use value chain management, process orientation and competence-based strategies to change business. Culture, business processes, management systems and computer platforms of company are all aligned to support that target. With value chain, companies can link organization’s knowledge, competences, and relationship with suppliers. In the case organization, according to research findings, supplier relationship management actions and knowledge requirements include:

- SRM trainings, skills mapping, role descriptions
  - o Skills and requirements of procurement team are for example sales attitude, specific type of personality, technical knowledge, supply chain understanding, negotiation and legal knowledge, tools, and processes in use with strategic supplier and internal supplier relationship management
  - o Identification of knowledge, information and data required for efficient SRM
  - o Improving the efficiency with the supplier relationship management with suitable tools and processes
- Supplier segmentation / Supplier relationship type



- Efficient and professional supplier base management and segmentation: preferred and strategic suppliers, approved suppliers, supplier management model with nominated supplier and category managers
- Communication with suppliers
  - Expectations towards strategic suppliers, prospects, and opportunities
  - Supplier performance management, target setting and co-operation planning with supplies
  - Performance measurement with strategic suppliers, visibility to performance development with trends
  - Action plans and project management
  - Fact based E-2-E performance management and visibility with agreed and defined KPIs
- Network and stakeholder management: internal and external, visibility for organization and co-operation, stakeholders, org structure from supplier side.
- Project management methodology and communication
  - Product management and development, new product releases, cost saving.

Knowledge management include the enabling tools for efficient knowledge related processes. According to Nonaka et al. (2006, 1186) information systems may include different kinds of electronic repositories, electronic communication tools like chat and e-mail, collaboration, and simulation capabilities. Alavi & Leidner (2001, 130) stated that implementing IT tools for knowledge management can lead to greater breadth and depth of knowledge creation, storage, transfer, and application in organizations. Chua (2004, 88-89) introduced knowledge management system architecture, where infrastructure, knowledge management and presentation services are combined with knowledge processes. These processes include presentation services, knowledge services and infrastructure services. Intezari & Gressel (2017, 72-73) added more recently developed knowledge management systems, which might be also be integrated into problem-finding and problem-solving processes. Analysing capabilities of data allow organization to take needed actions, develop business processes and improve customer service. Timely identification of the problems and efficient problem solving have been also key informants from the case organization. They see the benefits of internally storing, sharing, and distributing data, information, and knowledge through different kind of systems, channels, and platforms. One of the challenges is

that there are currently too many systems and information is scattered. In the case organization e-mails, meetings and different kind of calls are efficient information sharing process. Requirement for more advanced analysis capabilities have been identified and more role specific information sharing should be planned based on responsibilities. This kind of personal knowledge management would be also enabled by more advanced tools. Liu et al. (2017, 216) stated that in the future intelligent tools might be learning which data, information or knowledge is relevant for individual and supporting efficient knowledge usage. Personal knowledge management tools help to collect data, building self-knowledge maps and convert and extract knowledge into skills. According to Liu et al. (2017, 217-227) different kinds of mobile business apps and efficient usage of smartphones for example for searching, presenting, or storing data, will help organization to operate efficiently and to create new knowledge.

There are different kind of trainings available in the case organization according to the key informants. This can be also reviewed from the training calendar which is also available for procurement organization. Like Knight et al. (2014) defined the connection between global purchasing strategy and requirements for the resources and knowledge. Previous research has indicated that skilful and knowledgeable purchaser are a prerequisite for a strategic- oriented purchasing function. This is also identified in the case organization where target of operational purchasing it to increase automation and that will release time for the more strategic actions with the suppliers. This requires training of the organization. It also enables more efficient problem solving and continuous improvement. Knowledge and information are not only available inside of the case organization. Efficient knowledge and information sharing should be also enabled with strategic suppliers. Steinle & Schiele (2008, 5) also indicated that different kind of kind of networks and combination of competences might be source for competitive advantage.

Case organization have been collecting training and knowledge requirements from the organization, please see appendix 4 of training requirements which have been collected from procurement organization before this research was started. These are in line with the research findings where knowledge of category, cost and contract

management, legal and negotiation skills, project management, understanding of sourcing and strategic planning have been listed to the requirements.

### **5.3. Key elements of visual management for global procurement organization**

Visual management in Lean is used to alert of the problems, bring visibility to process flow and information of the department. Visualizing in Lean methodology aims for transparency to enable sustain standard work. According to Locher (2011, 36-72) visualizing should include also continuous improvement and it is important to know when process flow has problems, there are some abnormal conditions, low performance and when to stop the work. Escalation process should be defined to list the problems and to follow up corrective and preventive actions. There are different kind of visualizing methods in use like displays, signals, and boards. According to Imai (2012,110-112) work instructions should be easily available for the organization and visualizing can be used to communicate targets of the organization and current performance status.

#### **What kind of data, information and knowledge should be visualized?**

According to research findings main elements of visual management for case organization are:

- Transparency and visibility: Real time E-2-E process and S-2-S transparency and visibility
- Current state of performance and target setting: Open communication of performance management, target setting and current performance level
- Visible for all team members and levels in organization
- Problem solving and continuously improvement planning
- Efficiency improvement, process efficiency with reminders and alerts, avoiding mistakes
- Improved internal team performance due to visualization
- Fact based self-motivating / -oriented performance management for all organization levels enabling action planning for staff

- Agreed KPIs, targets and indicators if corrective actions are required: what you measure is what you get?
- Automated reporting, manual data collection avoided, actual performance status visualized

It is important to provide information and data to organization timely and frequently. This have been indicated as a basic requirement by the key informants during the interviews. Delays on receiving the data, data quality or restricted accesses have been identified as challenges in the current tools and processes. According to Locker (2011, 139-140) Lean management timeframe is very short, so performance should be reviewed frequently to address performance problems quickly. Ebert at al. (2002, 207-208) have also raised the concern of the organizations capability to understand and evaluate large data sets collected from business processes. This have been also challenging for the case organization according to information given by key informants. One challenge of data visualization might be the uncertainty of the data, but there are statistical analysis techniques which can be used to minimize uncertainty. Rothberg & Erickson (2017, 102) proposed to include operational experts and analysts need to cooperate to get most out of the data analytics and interpretation. Challenge in the case organization is also to identify the most important data and data availability. Organizations define different kinds of performance indicators and dashboards where data is used.

Based on the research findings performance metrics are seen most critical for visualization in the case organization to enable efficient strategic supplier relationship management. Setting targets and monitoring those will motivate organization or suppliers to improve their performance. Visual management will also improve the continuous improvement and identification of problems. Visual management can also bring additional value to the organization by identifying the key stakeholders in the organization or even the key contacts in the suppliers' organization. Visual management will improve the communication in the case organization. For both supplier and case organization would require better visibility to future demand and forecast. This is requested often, and supplier is stating that they would be better prepared to meet customer requirements with forecast. Key informants in the case

organization pointed out that sharing future demand is a possibility to build interest for future co-operation with the forecast with strategic suppliers. Visibility of the targets and past performance will be improving open and honest discussion with the strategic suppliers. From the KPIs organization have indicated following metrics to be highest priority:

- Delivery performance, on time delivery, punctuality, lead times, lead time development, agreed lead time, orders, cost development, quality performance, claim, claim ratios, parts per million rate, commercially our payment terms, MOQs (=minimum order quantity), our quality standard, cost savings, supplier financial status
- Focus area in a period should be visualized with KPIs as this might vary over time
- Possibility to compare supplier performance within category or segment
- Demand and forecast, business allocation
- KPIs should clearly indicate required target levels to enable efficient status to follow up
- KPIs would be linked with alerts, reminders and require action planning if KPI does not meet the requirement

Big data is bringing challenges to the case organization. How to select the correct data to the users and how to make it easily available to the users. It is expected that everyone has basic skills of analysing and reporting capabilities also in the case organization. Currently it is expected that everyone understands the basic reporting tools and methods for data collection. Dzemyda et al. (2013) described the data mining as a process where the human is integrated in the data analysis process. Visualization and different kinds of graphical presentations are used to analyse and share information. This is also basic communication content in the supplier performance review meetings. It is expected that individuals working with the suppliers can create, read, and analyse this kind of presentations and make action plans according to the data.

Davenport (2013, 66-67) introduced analytics maturity level. With this classification case company is getting to the level of Analytics 2.0. Case company is already working with robotics and complex visual reports. System development projects will support the transformation from manual data collection, analysis, and report preparation. Development is happening with agile methodology and more powerful tools are taken

into use for improved analytical capabilities. Procurement organization in the case organization have just recently invested into procurement back office operations to support improved data collection, reporting and analytical capabilities. This is not yet utilized fully to support optimizing the business processes and operational efficiency. According Intezari & Gressel (2017, 74-78) Increasing big data and dropping costs of databases enable organizations to make better, strategic, and operational decisions. Arranging advanced analytics capabilities is necessary to provide transparency through performance monitoring. Organizations need to solve the challenges of having too much or inaccurate data.

Case organization have tried to create global visibility to the supplier performance to harmonize the ways for measuring for example on time delivery, lead times, harmonize payment terms or indicate quality problems. Collecting data from several data sources and creating one-page overview have been also requested by the key informants as this is necessary to work with the suppliers. Creation of different kind of performance dashboards in the case organization have been the trial to ensure visibility to the organization. This is also suggested by Intezari & Gressel (2017, 79-80). According to them data can be converted also for scorecards to support business performance management and to be visualizing performance metrics. Electronic document management systems support organization in daily work. They allow search functions to find essential information, reports, policies, and documents. Potential measurement of efficiency and organizations' capabilities to grow according to Úbeda et al. (2015, 179-180) are the cost savings and the type of the actions taken to gain benefits.

It would be possible to build even more advanced visual management or knowledge management systems in the market and these have been studied also in the case organization. Rothberg & Erickson (2017, 93) suggest that it would be possible to build information systems to support prioritization and communicating critical data, information, and knowledge, but also monitoring processes and operations. Connecting big data and knowledge allows using key performance indicators, dashboards, and real-time observations. Sumbal et al. (2017, 191-192) have taken step even further with predictive knowledge. Predictive knowledge is combination of big data and interpretation of experienced professionals. Machine learning with the big

data algorithms become more and more robust and can be further utilized in the SECI process in the future. Case organization have not yet been utilizing machine learning widely, so this is seen as a potential development direction for the future. Machine learning could be used to provide needed data and information to the users according to their requirements, roles, and responsibilities or even performance and experience level.

There are several researches already in place how the big data and data availability will be improving business opportunities and efficiencies. For example, according to Rothberg & Erickson (2017, 102) the first wave big data is identifying KPIs and building dashboard to help decision making and improving data availability for management. More advanced usage of the big data would require analysts and data scientists to help to understand and interpret the data.

Another important point of the visualisation and knowledge management element in strategic supplier relationship management is supplier categorization. Case company procurement organization is structured in a way that category managers are responsible of the category of the products different suppliers are delivering and ensuring needed suppliers for each category. Supplier managers are working in co-operation with different category managers as they are taking full responsibility of single suppliers even it might deliver to several material categories. This require close co-operation of the organization. Suppliers are working daily with the different business units and even with case organization engineering teams, so the network is getting more and more complex. Information of nominated category and supplier managers is vital for case organization and for strategic suppliers.

#### **5.4. Contribution and implications**

Target of this research was to understand how visual management would improve strategic supplier relationship management in a global procurement organization. By brining knowledge management to the theory framework, idea was to support the possibilities of visualization and knowledge management best practises would support efficient implementation of Lean into the procurement operations. Base on literature

review, there have not been similar studies where knowledge management, supplier relationship management and visual management would be combined. This research is bringing more information of the possible application of visual management in global procurement organization. By identifying key knowledge and related knowledge processes, visualization can be enhanced beyond visualizing KPIs.

Research findings confirm that selected leadership methods in global procurement organization have a clear impact on how knowledge is shared and how knowledge processes impact on strategic supplier relationship management efficiency. This is in line with the previous research of leadership in knowledge management by von Krogh et al. (2012, 258-269), global organization control strategies Hartmann et al. (2008, 39), interorganizational competitive advantages by Dyer & Singh (1998) and Interfirm knowledge sharing routines which bring competitive advantage with complementary capabilities according to Kale & Singh (2007, 994-995).

Based on the research findings organization sees clear benefit of efficient knowledge sharing to ensure the needed skills and knowledge in the case organization, but also knowledge sharing will improve the co-operation and honest relationship with strategic suppliers. Visual management methods will enable efficient knowledge and information sharing. Research result have added the awareness of what kind of knowledge, information and data should be visualized and what kind of future development potential there would be for the case organization. Research findings have helped to create a proposal for the case organization of the first implementation steps for visual management and further development ideas will be evaluated in co-operation of the development organization and top management. Brining visibility to the required skills and knowledge organization can plan the training offering efficiently. This will be part of the knowledge strategy of the case organization, but also linked to the visual management solution in the future.

There are some actions already taken in case organization of implementing visual management, but as implementation process is not in the scope of the research it is left out from this report. To mention few elements which have been already either implemented or under preparation, following list introduces few ideas:



- Training plan for procurement organization and management team of Lean, performance management, main tools and processes and roles and responsibilities
- Knowledge management formal processes and tools defined and communicated to case organization
- Communication plan with daily performance management process
- Key supplier management concept
- Procurement excellence plan for case organization
- Document sharing platform, where both supplier and procurement organization from case company has access
- Knowledge management plan combined with strategic supplier lifecycle management, segmentation, and related procedures

There has been excessive work to align procurement KPIs and targets for the case organization, but the development and implementation work is still heavily on-going. This development work includes the visualization for the case organization and information sharing plan for strategic suppliers. Defining key performance indicators with relevant reporting, required data, and analysing for supplier and category managers in central function with visualization development will improve the efficiency and harmonize the ways of working. Visualization is done with different kind of dashboards for different user groups. This is still lacking more advanced analytical and predictive capabilities, but those are currently being studied and planned. Clarified roles and responsibilities will enable the knowledge creation and sharing planning for the case organization more efficiently for the future. This will create visibility to the case organization of the requirements and expectations and help to plan needed training, to evaluate maturity level of the organization in different countries and teams.

Below you can see some of the proposals done during the research period to the case organization. These include knowledge management plan, procurement excellence overview, performance management methods and elements of strategic supplier relationship management for the case organization.

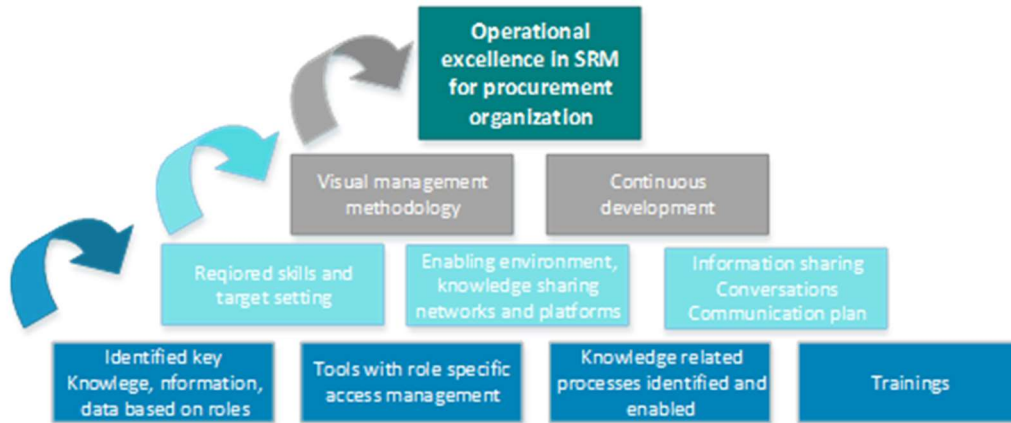


Figure 11: Knowledge management plan

Procurement Excellence for Sourcing Managers

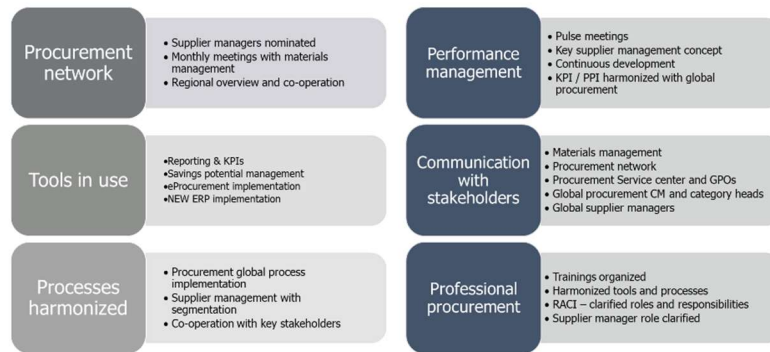


Figure 12: Operational excellence overview

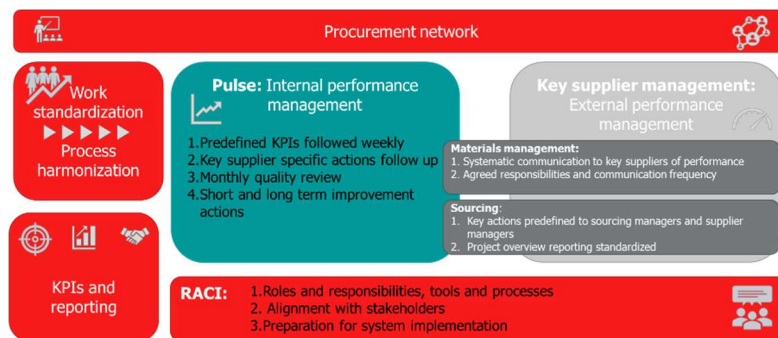


Figure 13: Performance management concept

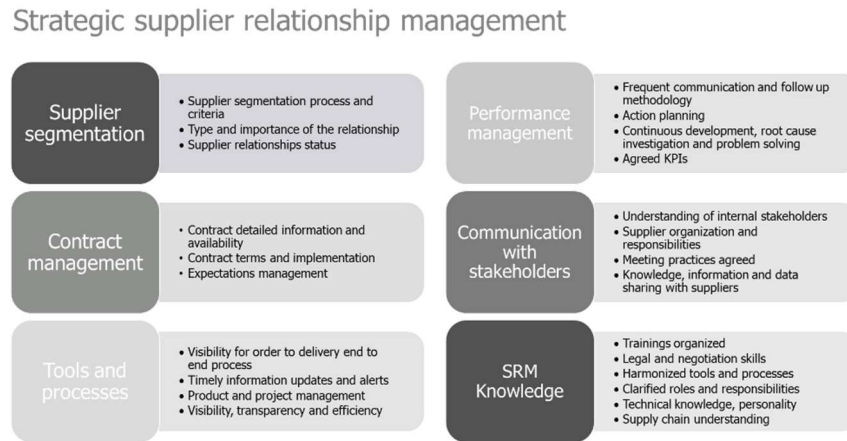


Figure 14: Strategic supplier relationship management elements

### 5.5. Further research proposals

There are several potential research directions which could be helping with verification of the research results and widening the knowledge of visual management and knowledge management connection. Even adding one more similar case for the research scope would enable further analysis of the research findings (Koskinen et al. 2005, 172-173). Another possible approach would be to take a deeper look for category specific knowledge management requirements or to research knowledge or information flows in the case organization with the VSM tools. Further research could also do further analysis of the knowledge assets in the case organization. Knowledge assets can be management efficiently within on organization or with interfirm relations. According to Nonaka et al. (2000, 20). One possible practical approach for the supplier relationship management would be to create evaluation model of the knowledge for the case organization and include knowledge sharing capabilities for the supplier segmentation criteria.

Nonaka et al. (2000) used Seven-Eleven stores as example where competitive advantage has been created through efficient knowledge creation process. It would be interesting to study the implementation and the effects of new knowledge creation processes and vision also in the case organization. As an example, these processes

could be audited with formalized auditing process and reviewed in the performance management meetings.

Dyer & Singh (1998, 666) has described different approaches of supplier relationships and brought up the effect of trust in knowledge sharing and creation processes. By having dedicated function to support and share supplier knowledge assets. That would be one possibility for further research direction, the effect of trust for supplier relationship management and supplier performance. The importance of honest relationship was also brought up in the supplier interview and findings of this research. Nonaka et al. (2000, 19) point out the trustful sharing of knowledge, which strengthen the relationship between all parties involved.

There is a huge potential of taking next steps with machine learning and adding analytical capabilities of the case organization. Enabling efficient decision-making processes for the case organization would further improve the performance and supplier relationship management. Brining predictive or prescriptive analytics proposing correct actions would help case organization to ensure correct actions taken in co-operation with strategic suppliers. Further research in this idea would be needed as there are already interesting solutions created to for example in logistics to support decision making process (Gallagher, 2017). Why this wouldn't work also in the procurement area for example in quotation or negotiation processes.

Organizational learning was left out from the scope of this research, but understanding of continuous improvement and link that to the double loop learning process introduced by Argyris & Schön (1996) would be interesting research and would bring additional value when understanding performance management and organizational learning processes like in the research of Huber (1991).

## REFERENCES

- Alavi, M. & Leidner, D. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *Mis Quarterly*, 25(1), pp. 107-136.
- Andreadis, E., Garza-Reyes, J. A. & Kumar, V. (2017). Towards a conceptual framework for value stream mapping (VSM) implementation: An investigation of managerial factors. *International Journal of Production Research*, 55(23), pp. 7073-7095.
- Argyris, C. & Schön, D. A. (1996). *Organizational learning II: Theory, method, and practice*. Reading (MA): Addison-Wesley.
- Bhasin, S. (2013). Impact of corporate culture on the adoption of the Lean principles. *International Journal of Lean Six Sigma*, 4(2), pp. 118-140.
- Bititci, U., Cocca, P. & Ates, A. (2016) Impact of visual performance management systems on the performance management practices of organisations, *International Journal of Production Research*, 54:6, 1571-1593
- Chiarini, A. (2011). Integrating lean thinking into ISO 9001: A first guideline. *International Journal of Lean Six Sigma*, 2(2), pp. 96-117.
- Chiarini, A. (2013). *Lean organization: From the tools of the Toyota Production System to lean office*. Milan: Springer.
- Chua, A. (2004). Knowledge management system architecture: A bridge between KM consultants and technologists. *International Journal of Information Management*, 24(1), pp. 87-98.
- Chung, R. & Kleiner, B. (2012). Dissecting Toyota's woes. *Industrial Management*, 54(1), pp. 12-15,5.
- Corbett, L. M. (2011). Lean Six Sigma: The contribution to business excellence. *International Journal of Lean Six Sigma*, 2(2), pp. 118-131.

- Cox, A. (2004). The art of possible: relationship management in power regimes and supply chains. *Supply Chain Management: An International Journal* 9(5), 346-356.
- Davenport, T. (2013). Analytics 3.0. *Harvard Business Review*, 91(12), pp. 64-+.
- Drake, P. R., Myung Lee, D. & Hussain, M. (2013). The lean and agile purchasing portfolio model. *Supply Chain Management: An International Journal*, 18(1), pp. 3-20.
- Duggan, K. J. (2007). Flowing Toward Excellence. *Industrial Management*, 49(6), pp. 20-25,5.
- Dyer, J. H. & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*; Oct 1998; 23, 4; ABI/INFORM Collection. pg. 660
- Dzemyda, G., Kurasova, O. & Žilinskas, J. (2013). Optimization-Based Visualization. In: *Multidimensional Data Visualization. Springer Optimization and Its Applications*, vol 75. Springer, New York, NY
- Ebert, D. S., Favre J. M. & Peikert, R. (2002). Data visualization. *Computers & Graphics*, 26(2), pp. 207-208.
- Eaidgah, Y., Maki, A. A., Kurczewski, K. & Abdekhodae, A. (2016) Visual management, performance management and continuous improvement: A lean manufacturing approach. *International Journal of Lean Six Sigma*. Vol.7(2), pp.187-210
- Eisenhardt, K. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550.
- Eisenhardt, K. & Graebner, M. (2007). Theory Building from Cases: Opportunities and Challenges. *The Academy of Management Journal* 1, Vol.50(1), pp.25-32.
- Eskola, J. & Suoranta, J. (1998) *Johdatus laadulliseen tutkimukseen*. 8. p. Tampere, Vastapaino.
- Gattorna, J. (2009) *New Supply Chain Models for New Times*. *Global Supply Chain „Thought Leader“*. Supply Chain Management Forum IX.

Gelderman, C., J. & Semeijn J. (2006). Managing the global supply base through purchasing portfolio management. *Journal of Purchasing & Supply Management* 12 (2006) 209–217

Gelderman, C. J. & Van Weele, A. J. (2003). Handling measurement issues and strategic directions in Kraljic's purchasing portfolio model. *Journal of Purchasing and Supply Management* 2003, Vol.9(5), pp.207-216

Gereffi, G., Humphrey, J. & Sturgeon T. (2006) The governance of global value chains. *Review of International Political Economy*. Volume 12, pp. 78-104.

Grönfors, M. (1985) *Kvalitatiiviset kenttätömenetelmät*. Porvoo, WSOY.

Gulati, R. (1998). Alliances and networks. *Strategic Management Journal* (1986-1998); Apr 1998; 19, 4; ABI/INFORM Collection. pg. 293-317

Harris, C. (2013). A metric to drive lean purchasing. *Industrial Management*, 55(6), pp. 10-14,5.

Hartmann, E., Trautmann, G. & Jahns, C. (2008). Organisational design implications of global sourcing: A multiple case study analysis on the application of control mechanisms. *Journal of Purchasing and Supply Management*, 14(1), pp. 28-42.

Hermano, V. & Martín-Cruz, N. (2016). The role of top management involvement in firms performing projects: A dynamic capabilities approach. *Journal of Business Research*, 69(9), pp. 3447-3458.

Heisig, P. (2009). Harmonisation of knowledge management - comparing 160 KM frameworks around the globe. *Journal of Knowledge Management*, 13(4), pp. 4-31.

Hjort, K., Lantz, B., Ericsson, D. & Gattorna, J. (2013). Customer segmentation based on buying and returning behaviour. *International Journal of Physical Distribution & Logistics Management*, 43(10), pp. 852-865.

Hsin Chang, H., Tsai, Y. & Hsu, C. (2013). E-procurement and supply chain performance. *Supply Chain Management: An International Journal*, 18(1), pp. 34-51.

Hua, C. C. (2018). The Kaizen Wheel – an integrated philosophical foundation for total continuous improvement. *The TQM Journal*, 30(4), pp. 409-424.

Hughes, J. & Wadd, J. (2012). Getting the Most Out of SRM. *Supply Chain Management Review*, 16(1), pp. 22-29.

Huber, G. P. (1991) *Organizational Learning: The Contributing Processes and the Literatures*. *Organization Science*, Vol. 2, No. 1, Special Issue: Organizational Learning: Papers in Honor of (and by) James G. March. (1991), pp. 88-115.

Imai, M. (2012) *Gemba Kaizen: A Commonsense Approach to a Continuous Improvement Strategy*. New York: McGraw-Hill. 448 pages

Intezari, A. & Gressel, S. (2017). Information and reformation in KM systems: Big data and strategic decision-making. *Journal of Knowledge Management*, 21(1), pp. 71-91.

Jaca, C., Viles, E., Jurburg, D. & Tanco, M. (2014) Do companies with greater deployment of participation systems use Visual Management more extensively? An exploratory study, *International Journal of Production Research*, 52:6, 1755-1770

Kale, P. & Singh, H. (2007). Building firm capabilities through learning: the role of the alliance learning process in alliance capability and firm-level alliance success. *Strategic Management Journal*, 28(10), 981–1000.

Kauppila, O-P. (2015). Alliance Management Capability and Firm Performance: Using Resource-based Theory to Look Inside the Process Black Box. *Long Range Planning*, Volume 48, Issue 3, June 2015, Pages 151 – 167

Knight, L., Tub, Y-H. & Preston, J. (2014). Integrating skills profiling and purchasing portfolio management: An opportunity for building purchasing capability. *International Journal of Production Economics*. Volume 147, Part B, January 2014, Pages 271-283

Koskinen, I., Peltonen, T. & Alasuutari, P. (2005). *Laadulliset menetelmät kauppatieteissä*. Tampere: Vastapaino.



Lambert, D. & Schwieterman, M. (2012). Supplier relationship management as a macro business process. *Supply Chain Management: An International Journal* 17(3), 337-352.

Liu, C., Wang, J. & Lin, C. (2017). The concepts of big data applied in personal knowledge management. *Journal of Knowledge Management*, 21(1), pp. 213-230.

Locher, D. (2011). *Lean office and service simplified: The definitive how-to guide*. Boca Raton: CRC Press/Taylor & Francis Group.

Marksberry, P. (2011). The Toyota Way - a quantitative approach. *International Journal of Lean Six Sigma*, 2(2), pp. 132-150.

Metsämuuronen, J. (2006). Tutkimuksen tekemisen perusteet ihmistieteissä: tutkijalaitos. *International Methelp*. 3. laitos, 2. korj. p. Gummerus. Vaajakoski.

Moeller, S., Fassnacht, M. & Klose, S. (2006). A Framework for Supplier Relationship Management (SRM). *Journal of Business-to-Business Marketing*, 13(4), pp. 69-94.

Monteiro, L. F., Arvidsson, N. & Birkinshaw, J. (2008). Knowledge Flows Within Multinational Corporations: Explaining Subsidiary Isolation and Its Performance Implications. *Organization Science*, 19(1), pp. 90-107.

Nonaka, I., Von Krogh, G. & Voelpel, S. (2006). Organizational knowledge creation theory: Evolutionary paths and future advances. *Organization Studies*, 27(8), pp. 1179-1208.

Nonaka, I. & Toyama R. (2003). The knowledge-creating theory revisited: Knowledge creation as a synthesizing process. *Knowledge Management Research & Practice*, 1(1), p. 2.

Nonaka, I., Toyama, R. & Konno, N. (2000). SECI, Ba and Leadership: A Unified Model of Dynamic Knowledge Creation. *Long Range Planning*, 33(1), pp. 5-34.

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5(1), pp. 14-37.

Park, J., Shin, K., Chang, T. & Park, J. (2010). An integrative framework for supplier relationship management. *Industrial Management & Data Systems*, 110(4), pp. 495-515.

Parry, G. C. & Turner C. E. (2006) Application of lean visual process management tools. *Production Planning & Control*, 17:1, 77-86.

Partida, B. (2014). Adopting Lean Processes in Procurement Can Lead to Efficiency and Lower Costs. *Supply Chain Management Review*, 18(4), pp. 78-80.

Ritter, T., Wilkinson, I., & Johnston, W. (2002). Measuring network competence: Some international evidence. *Journal of Business & Industrial Marketing*, 17(2/3), 119–138.

Rothberg, H. N. & Erickson, G. S. (2017). Big data systems: Knowledge transfer or intelligence insights? *Journal of Knowledge Management*, 21(1), pp. 92-112.

Rozemeijer, F. (2000). How to manage corporate purchasing synergy in a decentralised company? Towards design rules for managing and organising purchasing synergy in decentralised companies. *European Journal of Purchasing and Supply Management*, 6 (1) (2000), pp. 5-12

Sumbal, M. S., Tsui, E. & See-to, E. (2017). Interrelationship between big data and knowledge management: An exploratory study in the oil and gas sector. *Journal of Knowledge Management*, 21(1), pp. 180-196.

Sluyts, K., Matthyssens, P. & Streukens, S. (2011). Building capabilities to manage strategic alliances. *Industrial Marketing Management* 2011, Vol.40(6), pp.875-886

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks (CA): SAGE.

Steinle, C. & Schiele, H. (2008). Limits to global sourcing? *Journal of Purchasing and Supply Management*, 14(1), pp. 3-14.

Úbeda, R., Alsua, C. & Carrasco, N. (2015). Purchasing models and organizational performance: a study of key strategic tools. *Journal of Business Research*. Volume 68, Issue 2, February 2015, Pages 177-188

Tikkala, V. (2014). Cultural challenges in organization development. Development plan for quality organization in China. Master's Degree Final Year Thesis. HAMK University of Applied

Sciences. Degree Programme in Strategic Leadership of Technology-based Business.  
Visamäki

Trautmann, G., Bals, L. & Hartmann, E. (2009). Global sourcing in integrated network structures: The case of hybrid purchasing organizations. *Journal of International Management*. Volume 15, Issue 2, June 2009, Pages 194-208

Von Krogh, G., Nonaka, I. & Rechsteiner, L. (2012). Leadership in Organizational Knowledge Creation: A Review and Framework. *Journal of Management Studies*, 49(1), pp. 240-277.

van Weele, A. J., & Rozemeijer, F. (1996). Revolution in purchasing: Building competitive power through pro-active purchasing. *European Journal of Purchasing & Supply Management*, 2(4), 153-16.

Welch, C, Marschan-Piekkari, R, Penttinen, H & Tahvanainen, H. (2002) Corporate elites as informants in qualitative international business research. *International Business Review*. Volume 11, Issue 5, Pages 611-628

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks: Sage.

## **WEBINAR**

Gallagher, D. (2017) Free Webinar: Using Visualization to Connect Humans and Analytics in Supply Chain Decision-Making. *MIT Sloan Management Review*. ISSN (Print): 1532-9194 [Referred 5.10.2017]. Available:

[http://sloanreview.mit.edu/article/webinar-921-using-visualization-to-connect-humans-and-analytics-in-supply-chain-decision-making/?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+mitsmr+%28MIT+Sloan+Management+Review%29](http://sloanreview.mit.edu/article/webinar-921-using-visualization-to-connect-humans-and-analytics-in-supply-chain-decision-making/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+mitsmr+%28MIT+Sloan+Management+Review%29)

## Appendix 1: Research questions and interview question relation, first draft

- **How visual management can be best utilized in supplier collaboration management? (Visual management and alliance management connection)**
  - *How visualized data, information and knowledge would affect for decision-making?*
  - *How visualization would benefit efficient strategic supplier collaboration management?*
  - *How knowledge visualization enables efficient supplier collaboration management?*
  - *Des data visualization effect on decision-making in strategic supplier collaboration management?*
  - *Which knowledge sharing and codifying practices would help the most to develop supplier collaboration?*
  - *Are there any possibilities to compare collaboration management methods with supplier performance?*
  - *What kind of benefits / methods are identified in organization of efficient supplier collaboration management?*
- **What kind of data, information and knowledge should be used in visual management / should be visualized? (Alliance management and knowledge management connection)**
  - *What kind of key knowledge, skills, know-how is identified from supplier / category managers?*
  - *What kind of information supplier / category managers need in their work?*
  - *How information would be shared in most efficient manner in organization?*
  - *How organization could document, codify, share, and visualize tacit knowledge?*
  - *What kind of data, information and knowledge CAN BE visualized to enable efficient supplier collaboration management?*
  - *What king of visualization would be enabling efficient decision-making?*
  - *What king of best practices there are in supplier collaboration development according to alliance capability?*
- **What is the relationship between data, information in knowledge management and visualization in visual management? (Knowledge management and visual management connection)**
  - *What are the basics of visual management in Lean ideology?*
  - *What are the knowledge management, transformation, conversion, and creation processes there are in organization?*
  - *How new knowledge is created among supplier and category managers?*
  - *How data, information and knowledge is shared in organization?*
  - *Is SECI process and BA in place?*

- *How data and information is converted into tacit knowledge and how tacit knowledge is converted into explicit knowledge currently?*
- *How organization would be able to share tacit knowledge by using visualization?*
- *Which knowledge sharing processes are most efficient among supplier and category managers?*

## **Appendix 2: List of the questions of all interview rounds**

### **Test interview:**

#### **How visual management could be utilized in strategic supplier relationship management (SRM)?**

1. Does data visualization effect on decision-making in strategic supplier collaboration management?
2. How visualized data, information and knowledge affected for decision-making in supplier management?
3. How and what kind of visualization would benefit efficient strategic supplier collaboration management? (Visualization benefit to procurement?)
4. Do you see any similarities between supplier collaboration management methods and supplier performance?
5. What are the basics of visual management in Lean ideology in your opinion?

#### **What is the most relevant knowledge in SRM?**

1. What kind of best practices there are in supplier collaboration management?
2. What kind of key knowledge, skills, know-how is identified in (procurement) organization?
3. What kind of knowledge sharing practises are used in organization?
4. What kind of data and information organization needs in their work?
5. How information would be shared in most efficient way in organization?
6. Which knowledge sharing, and documenting practices would help the most to develop supplier collaboration?
7. What kind of leadership and management methods are used or needed in organization?
8. Which knowledge sharing processes are most efficient among in organization?
9. Are there any best practises there are in supplier collaboration management which you would like to share (which are not currently utilized)?

#### **What kind of data, information and knowledge should be visualized?**

1. What kind of data, information and knowledge from your opinion could and should be visualized (to enable efficient supplier collaboration management)?
2. What kind of visualized data/ information/ knowledge would enable efficient supplies collaboration management?
3. What kind of visualized data / information / knowledge is missing from current tools and processes?
4. How organization would be able to utilize tacit knowledge by using visualization?
5. How visualised data / information and knowledge could be best utilized in organization?

### **First round interview:**

#### **How visual management could be utilized in strategic supplier relationship management (SRM)?**

1. How and what kind of visualization would benefit efficient strategic supplier collaboration management?
2. Do you see any link/effect between supplier collaboration management methods and supplier performance?
3. How visualized data, information and knowledge affect for supplier collaboration management?
4. Does data visualization effect on decision-making in strategic supplier collaboration management?
5. What are the basics of visual management in Lean ideology in your opinion?

**What is the most relevant knowledge in SRM?**

1. What kind of key knowledge, skills, know-how is identified in organization?
2. What kind of data and information organization needs in their work?
3. What kind of knowledge sharing practises are used in organization?
4. Which knowledge sharing processes are most efficient in organization?
5. What kind of leadership and management methods are used or needed in organization (when thinking knowledge sharing)?

**What kind of data, information and knowledge should be visualized?**

1. What kind of data, information and knowledge from your opinion could and should be visualized (to enable efficient supplier collaboration management)?
2. What kind of visualized data/information/knowledge would enable efficient supplies collaboration management?
3. What kind of visualized data / information / knowledge is missing from current tools and processes?
4. How organization would be able to utilize tacit knowledge by using visualization?
5. How visualised data / information and knowledge could be best utilized in organization?

**Closing questions:**

1. Are there any best practises in supplier collaboration management which you would still like to mention?
2. What kind of best practices there are in supplier collaboration development?

**Second round of interviews:**

**How visual management could be utilized in strategic supplier relationship management (SRM)?**

1. What are the basics of visual management in Lean ideology in your opinion?
2. Are there any visual management processes or tools in use in your organization?
3. What kind of visualization would benefit efficient strategic supplier relationship management? How?
4. How visualized data, information and knowledge affect for supplier relationship management?

5. What kind of link or an effect there is or might be between supplier relationship management methods and supplier performance?
6. How data visualization might be used in strategic supplier relationship management?
7. How visual management would benefit organization the most?

#### **What is the most relevant knowledge in SRM?**

1. What kind of key knowledge, skills, know-how is identified in procurement organization?
2. What kind of data and information organization needs in their work?
3. What kind of knowledge sharing practises are used in organization?
4. Which knowledge sharing processes and tool are most efficient in organization?
5. What kind of leadership and management methods are used or needed in organization (when thinking knowledge management and sharing)?
6. How the knowledge is used to develop the SRM?
7. What are the main KPIs for efficient SRM?

#### **What kind of data, information and knowledge should be visualized?**

1. What kind of data, information and knowledge from your opinion could and should be visualized (to enable efficient supplier relationship management)?
2. What kind of visualized data/information/knowledge would enable efficient supplies relationship management?
3. What kind of visualized data / information / knowledge is missing from current tools and processes?
4. How organization would be able to utilize tacit (know - how, experience) knowledge by using visualization?
5. How visualised data / information and knowledge could be best utilized in organization?

#### **Closing questions:**

1. Are there any best practises in supplier collaboration management which you would still like to mention?
2. What kind of best practices there are in supplier collaboration development?
3. Experience

#### **Supplier interview:**

1. What kind of experience you or your current employee have about Lean or visual management?
2. How visualized data, information and knowledge affect for customer relationship management?
3. How data, information or knowledge visualization could or should be used in strategic customer relationship management?
4. How visual management would benefit co-operation with the case company the most?



5. What kind of key knowledge, skills, know-how is identified in your organization which helps to co-operate with this customer?
6. What kind of knowledge sharing practises are or should be used in customer organization with customers?
7. What are the main KPIs for efficient CRM?
8. What kind of visualized data/information/knowledge would enable efficient supplies relationship management?
9. How visualised data / information and knowledge could be best utilized in CRM?
10. Are there any best practises in CRM / SRM which you would still like to mention?

### Appendix 3: Analysis related question grouping and themes for content analysis

Theme	Questions related to themes			
<b>BASICS</b>	1. What are the <u>basics</u> of visual management in Lean ideology in your opinion?	5. What are the <u>basics</u> of visual management in Lean ideology in your opinion?	5. What are the <u>basics</u> of visual management in Lean ideology in your opinion?	
<b>BENEFITS</b>	3. What kind of visualization would <u>benefit</u> efficient strategic supplier relationship management? How?	7. How visual management would <u>benefit</u> organization the most?	1. How and what kind of visualization would <u>benefit</u> efficient strategic supplier collaboration management?	3. How and what kind of visualization would <u>benefit</u> efficient strategic supplier collaboration management? (Visualization benefit to procurement?)
<b>LEADERSHIP</b>	5. What kind of <u>leadership</u> and management methods are used or needed in organization (when thinking knowledge management and sharing)?	6. How the knowledge is <u>used to develop</u> the SRM?	5. What kind of <u>leadership</u> and management methods are used or needed in organization (when thinking knowledge sharing)?	7. What kind of <u>leadership</u> and management methods are used or needed in organization?
<b>SRM / BRM</b>	4. How visualized <u>data, information and knowledge</u> affect for supplier relationship management?	5. What kind of link or an <u>effect</u> there is or might be between supplier relationship management methods and <u>supplier performance</u> ?	5. How visualised data / information and knowledge could be <u>best utilized</u> in organization?	2. Do you see any <u>link/effect</u> between supplier collaboration management methods and <u>supplier performance</u> ?
<b>SRM / BRM</b>	3. How visualized data, information and knowledge <u>affect</u> for supplier collaboration management?	4. Does data visualization <u>effect</u> on decision-making in strategic supplier collaboration management?	5. How visualised data / information and knowledge could be <u>best utilized</u> in organization?	1. Does data visualization effect on <u>decision-making</u> in strategic supplier collaboration management?
<b>SRM / BRM</b>	2. How visualized data, information and knowledge affected for <u>decision-making</u> in supplier management?	4. Do you see any similarities between supplier collaboration management methods and <u>supplier performance</u> ?	2. What kind of visualized data/ information/ knowledge would <u>enable efficient</u> supplies collaboration management?	5. How visualised data / information and knowledge could be <u>best utilized</u> in organization?
<b>DATA / INFORMATION / KNOWLEDGE</b>	2. What kind of <u>data and information</u> organization needs in their work?	2. What kind of visualized <u>data/information/knowledge</u> would enable efficient supplies relationship management?	3. What kind of visualized <u>data / information / knowledge</u> is missing from current tools and processes?	7. What are the main <u>KPIs</u> for efficient SRM?
<b>DATA / INFORMATION / KNOWLEDGE</b>	2. What kind of <u>data and information</u> organization needs in their work?	3. What kind of visualized <u>data / information / knowledge</u> is missing from current tools and processes?		
<b>DATA / INFORMATION / KNOWLEDGE</b>	2. What kind of visualized data/information/knowledge would enable efficient supplies collaboration management?	3. What kind of visualized <u>data / information / knowledge</u> is missing from current tools and processes?	4. What kind of <u>data and information</u> organization needs in their work?	
<b>SKILLS</b>	1. What kind of key <u>knowledge, skills, know-how</u> is identified in procurement organization?	1. What kind of key knowledge, skills, know-how is identified in organization?	2. What kind of key knowledge, skills, know-how is identified in (procurement) organization?	
<b>PROCESS / TOOLS / BA</b>	3. What kind of knowledge <u>sharing practises</u> are used in organization?	4. Which knowledge sharing <u>processes and tool</u> are most efficient in organization?	2. Are there any visual management <u>processes or tools</u> in use in your organization?	3. What kind of knowledge <u>sharing practises</u> are used in organization?

<b>PROCESS / TOOLS / BA</b>	4. Which knowledge sharing <u>processes</u> are most efficient in organization?	3. What kind of knowledge sharing <u>practices</u> are used in organization?	5. How information would be <u>shared</u> in most efficient way in organization?	6. Which knowledge <u>sharing</u> , and documenting <u>practices</u> would help the most to develop supplier collaboration?
<b>PROCESS / TOOLS / BA</b>	8. Which knowledge sharing <u>processes</u> are most efficient among in organization?			
<b>VISUALIZATION</b>	1. What kind of <u>data, information and knowledge</u> from your opinion could and should be visualized (to enable efficient supplier relationship management)?	4. How organization would be able to <u>utilize</u> tacit (know - how, experience) knowledge by using visualization?	6. How data visualization might be <u>used</u> in strategic supplier relationship management?	1. What kind of data, information and knowledge from your opinion could and should be visualized (to enable efficient supplier collaboration management)?
<b>VISUALIZATION</b>	4. How organization would be able to utilize tacit knowledge by using <u>visualization</u> ?	1. What kind of data, information and knowledge from your opinion could and should be <u>visualized</u> (to enable efficient supplier collaboration management)?	4. How organization would be able to utilize tacit knowledge by using <u>visualization</u> ?	
<b>BEST PRACTISES</b>	1. Are there any <u>best practices</u> in supplier collaboration management which you would still like to mention?	2. What kind of <u>best practices</u> there are in supplier collaboration development?	1. Are there any <u>best practices</u> in supplier collaboration management which you would still like to mention?	2. What kind of <u>best practices</u> there are in supplier collaboration development?
<b>BEST PRACTISES</b>	1. What kind of <u>best practices</u> there are in supplier collaboration management?	9. Are there any <u>best practices</u> there are in supplier collaboration management which you would like to share (which are not currently utilized)?		

	<b>Interview summary</b>	<b>Content analysis</b>	<b>Main findings</b>
<b>How visual management could be utilized in strategic supplier relationship management?</b>	<p>visible for all team members up to date all the time how those operations is running visualizing the current performance involving the direction the organization wants to take. bring everything visible A3 is a big paper, you indicate the problem continuously improvement material demand is visible, material shortage This is visible in production. you cut the waste you need to see, to find the problems, solve the problems, to have the Kaizen in your mind We can take our supplier as our partner. The performance and compared always to expectation or target and then see the deviation. you see in an easy way, what is my target, where am I today comparison of target state we should have to be able to get and overview KPIs and some general overviews</p> <p>It is direct link to how these teams or persons are performing. But if you have it visual and it was open for all people, customers, suppliers, people is changing totally their performing to better way. Because they don't want to show that they are not performing. And as we know that, that is missing in our side now in KC. Let's say the KPIs and, and, and then according to those KPIs, the performance visualized, so that we are, we are seeing how the suppliers are performing. We need to look what we communicate with the supplier How suppliers has been doing, and referring in the past, past in terms of the performance and also then the future in terms of the forecast. So, it is easier to elaborate, let's say the, data and that way, running some new projects or components or such, there are components, and our products, and then how it is reflecting to the, let's say, to the end products, they would have opportunity also for future. That is if it comes to the visualization, you see actually the products and, and, what you are working with, order released to the supplier to the goods receipt in the warehouse. But if we have a good system, so details in system, for</p>	<p>Transparency and visibility Current state of performance and targets Visible for all team members and levels in organization Problem solving and continuously improvement planning Efficiency improvement Strategic supplier relationship management</p> <p>Open communication of performance management, target setting and current performance level Improved internal team performance due to visualization Enhanced and structured supplier base performance level and efficient communication, visibility to performance development with trends Fact based E-2-E performance management and visibility with agreed and defined KPIs: What performance level do we expect from suppliers in different categories and segments? Possibility to compare supplier performance inside of the category / segment. Expectations of strategic suppliers, future prospects and opportunities Project management methodology and communication Product management and development, new product releases Real time E-2-E process visibility and S-2-S transparency Process efficiency with reminders and alerts Efficient and professional supplier base management and segmentation: preferred and</p>	<p><b>Strategic supplier relationship management</b> Supplier segmentation / Supplier relationship type Supplier management process Communication with suppliers Expectations of strategic suppliers, future prospects and opportunities Supplier performance management, target setting and co-operation planning with supplies Performance measurement with strategic suppliers, visibility to performance development with trends Action plans Fact based E-2-E performance management and visibility with agreed and defined KPIs Knowledge, information and data required for efficient SRM improving the efficiency with the supplier relationship management. Network and stakeholder management: internal and external, visibility for organization and co-operation, stakeholders, org structure from supplier side. Personality Technical knowledge Supply chain understanding SRM tools</p> <p>Project management methodology and communication Product management and development, new product releases Efficient and professional supplier base management and segmentation: preferred and strategic suppliers, approved suppliers, supplier management model with nominated supplier and category managers</p>

	Interview summary	Content analysis	Main findings
<b>What is the most relevant knowledge in SRM?</b>	<p>that was that we are looking that every day in that what happened? What was behind? Are we in the target and what is the actions? 5 times the question marks.</p> <p>What we do and how we do the corrective actions? So it is, so it as very, very good for the people to see that it is not the finger feeling. It was the facts.</p> <p>it was manual work to pick up those facts from actually those team leaders took in that, but in the office it was more or less automatically coming from the system. So, it was very good to manage white collar people in that way.</p> <p>Because otherwise without that visual management people can think, that we are in good shape or bad shape, but actually fact-based data is showing that where we are really and how are we working.</p> <p>you have bonus related to that KPIs and visual management they are very, very interested into get that in good shape. we didn't need manager or superior to one over to control that. They are self-oriented to do actions and that was that the purpose for that visual management and it visible all the time in the office. And if there is any red lights and difficulties, you can't put that away, so it is all the time visible for all and you know that after that it is, mean that, every people who can affect to that they are putting the effort to correct that or try to change that way to green way.</p> <p>And those companies who are not performing so well t's direct link that they are not controlling that, what is happening. It is ...That is they are controlling or managing their operation with finger feeling</p> <p>Actually it is normally what they are asking, that suppliers, that how we see that how we are growing, is it going up or down. What are the volumes? They are actually, this is not actually visual management, but they are asking that, how we negotiation skills, what is happening in the market. market trends. market prices.</p> <p>open mind and really when needed change that supplier also it is really important that documentation is very well done. Without that, it is really difficult to change suppliers.</p> <p>Documentation with critical measurement and tolerances is needed.</p> <p>technical knowledge. how to build up quality.</p> <p>a way supply knowledge. Negotiation, legal.</p> <p>there is a lot of different kind of know how, what is needed in a supplier collaboration management.</p>	<p><b>Fact based self-motivating / -oriented performance management for all organization levels enabling action planning for staff</b></p> <p><b>Automated reporting, manual data collection avoided, actual performance status visualized</b></p> <p><b>Target setting and co-operation planning with supplies</b></p> <p><b>Agreed KPIs</b></p> <p><b>Defined data and distribution channel and methodology</b></p> <p><b>Supplier performance management: drive suppliers to the direction we want to go with them.</b></p> <p><b>Agreed targets and indicators if corrective actions are required: what you measure is what you get?</b></p> <p><b>Avoiding mistakes</b></p> <p><b>E2E process visibility</b></p> <p><b>Experience, maturity and capability level of the organization</b></p> <p><b>Supplier relationship management skills and knowledge</b> negotiation skills, good sense of, smart sense of negotiations skills, legal improving the efficiency with the supplier relationship management. knowledge. What kind of account we provide to the supplier. What we need to pay attention to? To avoid some data leakage. knowledge how to operate the tool and the system. contracts. Like do we have a frame contract? What</p>	<p><b>Knowledge management and leadership</b> Preferred leadership methodology Different opinions on current leadership methods Internal communication content Data, information and knowledge sharing, distribution and availability Defined data and distribution channel and methodology Knowledge, information and data content, content of information sharing Knowledge, information and data sharing frequency Experience, maturity and capability level of the organization Supplier relationship management skills and knowledge Knowledge and information sharing processes, tools and methods Meetings Currently missing elements of data, information and knowledge visualization and availability Visualization Experience and tacit knowledge</p>

	Interview summary	Content analysis	Main findings
<b>What kind of data, information and knowledge should be visualized?</b>	<p>we are clearly missing that data. How many transactions between what and what is then the details and what is the cost elements and so on. We are actually running that with half data. So, it is second half is still missing</p> <p>That is difficult to find or identify good actions, because the data is missing. Or right data is missing. If we are getting data, some data is showing some numbers and other data is showing totally different numbers. So, we are getting data, but there is a lot of differences between those.</p> <p>So, it is not good way to run actions with finger feelings.</p> <p>It is generally that it's should be that way that, if there are some deviations or some issues which need to raise up</p> <p>People who are running those categories they are getting that red flag directly. So, it is like the current setup is that those persons have to be manually looking that data or asking that data, but we have to have some, something red flag process for if something is going to wrong direction. Then they can look than and do actions and correct that one. So, it is total manual process for this.</p> <p>So, it is difficult to find good actions without the facts.</p> <p>it is better to understand that what are the good direction to proceed in the future.</p> <p>What is the market demand? Market outlook.</p> <p>I would say that not too much information, because then it is, I would say, that then it is mess for the people to understand that. It need to be very clear and that information what we are sharing via visual management have to be that kind of data that people can really understand where we are and what we have to do. So, it mean that even team members or superiors or managers, they need to be able to do decisions related to that data or that information. Not nice to know information, that is denied. Only that to making that directions that what we need to do actions to get better results after this information. That is clear. I don't know directly how use those, but for example we need to keep those good or experienced people in the board and keep actually in the team.</p> <p>And now I split that his responsibility area to the road part and it is a much more less that before, but at the same time he is sharing this knowledge and this history with younger people in the team. And that is one part of his work also. it is more or less that face to face and via Skype and via phone.</p> <p>But visualisation, in that way, if you are, if we are talking</p>	<p><b>Currently missing elements of data, information and knowledge visualization and availability: CHALLENGES</b></p> <p><b>Knowledge, information and data required for efficient SRM</b></p> <p><b>Current and future demand visibility</b> - performance. We need different KPIs for strategic supplier compared to all of our supplier base. - leadtime and payment term.</p> <p><b>Data needed for customs compliance and documentation (import / export)</b></p> <p><b>Product development and other kind of projects</b> - supplier financial stability - structure in our categories.</p> <p><b>Visibility for organization and responsibilities</b></p> <p><b>Overview of supplier performance and relationship</b> - network</p> <p><b>Role specific information and knowledge</b></p> <p><b>Why it would be needed</b></p> <p><b>Visualization</b> - Data visualization: Performance and metrics, KPIs - Main KPIs, key performance metrics: Delivery performance, on time delivery, punctuality, lead times, lead time development, the lead time we desire from our supplier, the orders, cost development, quality performance, claim, claim ratios, PPM rate, , commercially our payment terms, MOQs (=minimum order quantity), our quality standard - how the companies are doing a region and in globally. - how the supplier is then doing themselves in a terms of our eyes, our point of view. - what is our own focus area in a period of time, classic data from the supplier performance - General KPIs are a good overview. - compare. how is this one performing in</p>	<p><b>Visual management</b> Transparency and visibility: Real time E-2-E process and S-2-S transparency and visibility Current state of performance and target setting: Open communication of performance management, target setting and current performance level Visible for all team members and levels in organization Problem solving and continuously improvement planning Efficiency improvement, process efficiency with reminders and alerts, avoiding mistakes Improved internal team performance due to visualization Fact based self-motivating / -oriented performance management for all organization levels enabling action planning for staff Agreed KPIs, targets and indicators if corrective actions are required: what you measure is what you get? Automated reporting, manual data collection avoided, actual performance status visualized</p>



### Appendix 4: Training requirements collected from Procurement organization

<b>Category Management</b> Category Analysis Category Management - The Initiation Phase Category Strategy Development Category Strategy Implementation Continuous Improvement Introduction to Category Management Spend Analysis Stakeholder Management
<b>Contract Management</b> Contract Management - Supplier Development Contract Management - Supplier Performance Measurement Contract Management in practice Corporate Governance of Contract Management, part 1 Corporate Governance of Contract Management, part 2 SLA or Service Level Agreement
<b>Cost Management</b> Cost Calculation Cost Estimation, Should Cost Introduction to Strategic Cost Management for Buyers Total cost of ownership (TCO) Value analysis, Value Engineering
<b>Finance</b> Financial Ratios Importance of Cash Flow Quiz on Return on Total Assets (ROTA) Reading the Balance Sheet Understanding Profit & Loss Account
<b>Legal</b> Basic Principles of a contract Contract Terms Important Clauses Limit Company Exposure Incoterms 2010 Introduction to Legal Aspects in Procurement Resolving Disputes Statutory Rights of a Buyer
<b>Negotiation</b> Biases in Negotiations part 1 Biases in Negotiations part 2 Closing a Negotiation Game Theory How to Bargain How to open a Negotiation Negotiation Preparation Negotiation Tips Using NLP to influence stakeholders part 1 Using NLP to influence stakeholders part 2 Win Win Lose Negotiation
<b>Project Management</b> Developing a Business Case Project Controls Project Stakeholders Project Time Planning Risk Management
<b>Sourcing</b> Basic Contract Negotiation Basic Negotiation Tactics Contracting How to develop Specifications How to write an RFQ and RFI Market Analysis Needs Assessment Portfolio Analysis Risk Management Supplier Relationship Analysis Supplier Selection The Role of Procurement Professionals
<b>Strategy</b> Supplier Relationship Management (SRM), Part I Supplier Relationship Management (SRM), Part II Value Management, Part I Value Management, Part II

