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Key Performance Indicators of transportation category management

On-time delivery performance

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Description

Thesis was carried out for Valmet Oy whose transportation team manages standard cargo transportation network and agreements in the company's internal and external processes. To manage, analyse, develop and follow processes, Valmet transportation team must have indicators which are valid, reliable, relevant and actionable.

The company pointed out two main problems for the research, which was: Unsureness about the relevant content of Transportation team's KPI dashboard and doubts about the real status of on-time delivery performance indicator in road category. The objective of the research was to establish the KPI dashboard and solve out how Valmet transportation team could improve their on-time delivery performance measuring process and by what tools and action the loss of the indicator could be prevented and overall reporting could be improved.

Thesis was divided in two different parts in according to addressed research problems. First part was conducted mainly by qualitative research were literature was reviewed by thematic analysis and founded tools were deployed in creation phase. Second part was conducted by case study research strategy were the shipment data produced by suppliers was examined by qualitative and quantitative methods.

Thesis made resulted interactive KPI dashboard as well as data upload portal that was integrated in principle's transportation management system. The research included classified material that is only presented in appendixes.

Keywords (subjects)

Supplier relationship management, Performance measuring, Key performance indicators, Case study

Miscellanous

This is public version of the thesis (appendixes removed)

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Tiivistelmä

Opinnäytetyön toimeksiantaja oli Valmet Oy:n kuljetushallintaosasto, joka vastaa yrityksen kuljetussopimuksista ja kuljetusverkoston hallinnasta sisäisissä ja ulkoisissa standardirahtikuljetuksissa. Seuratakseen kuljetusverkostoa kuljetushallinnalla tulee olla asiaankuuluva mittaristo, joka mittaa oikeita asioita luotettavasti ja johon voidaan omalla toiminnalla vaikuttaa.

Toimeksiantaja esitti tutkimukselle kaksi tutkimusongelmaa: He halusivat tietää, mitä suorituskykymittaristoon tulisi sisällyttää, jotta siitä saataisiin mahdollisimman pätevä työkalu yrityksen käyttöön sekä mikä on tiekuljetuskategorian suorituskyvyn oikea taso. Tutkimuksen tavoitteena oli luoda suorituskykymittaristo sekä selvittää kuinka toimeksiantaja voisi parantaa kuljetuskategorioiden suorituskyvyn mittaamistapoja ja prosessia sekä ehkäistä suorituskyvyn tason laskua.

Osoitetut tutkimusongelmat jakoivat tutkimuksen kahteen erilliseen osaan: suorituskykymittaristo tutkimukseen sekä raportointi tutkimukseen. Näihin tukimuksiin lähdettiin hakemaan vastausta kvalitatiivisen ja kvantitatiivisen tutkimusotteen kautta, niin että opinnäytetyö rakennettiin aiheille yhteisestä teoriaosasta. Suorituskykymittaristo tutkimus tehtiin kvalitatiivisena kirjallisuuskatsauksena, josta löytyneet apuvälineet implementoitiin mittariston luomisprosessiin kun taas raportointi tutkimus tehtiin tapaustutkimuksena, jossa tutkittiin kuljetusliikkeiden raportoimaa dataa kvantitatiivisin ja kvalitatiivisin tutkimusottein.

Opinnäytetyön tuloksena luotiin uusi interaktiivinen suorituskykymittaristo ja prosessi vaihe, jossa kuljetusliikkeiden tuottama raportti validoitaan ennen tietokantaan latausta. Alkuperäinen tutkimus sisältää liikesalaisuuksia, joten osa tiedoista löytyy vain liitteistä.

Avainsanat (asiasanat)

Toimittajasuhteiden hallinta, Suorituskykymittaristo, Suorituskyvyn mittaaminen, Tapaustutkimus

Muut tiedot

Tämä on julkinen versio opinnäytetyöstä, liitteet poistettu perustuen Julkisuuslain 621/1999 24§, kohta 17, yrityksen liike- tai ammattisalaisuus.

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1 INTRODUCTION

Thesis was carried out for Valmet transportation team that manages standard cargo transportation network and agreements in the Company's internal and external processes. To manage, analyse, develop and follow processes, Valmet transportation team must have indicators which are valid, reliable, relevant and actionable. Transportation team have existing measures which includes indicators that measure transportation team's processes but the proper dashboard has not been created. One of the indicators differs from the others with its measurement target: On-time delivery performance indicator measures not so much Valmet's performance as suppliers' performance. Indicator's level forms basis for analysis and follow-up of suppliers' performance level and with that, to realization of agreements and reward system.

The company have noticed that on-time delivery performance measurements needs development and currently the performance of road category is on low level. Principle have also doubts about supplier's way of reporting in the category and wants to know the real performance status of the suppliers. Invalid performance indicator belies functionality and quality of the company's transportation network and the suppliers, which caused the need of the research.

Third party involvement to the company's operations increases always a procurement risk. Transportation operations' procurement risk has high dependency on suppliers and the supplier can effect on organization's product quality, brand image, production efficiency and more. Well managed supplier relationship can avoid supply chain risks and disruptions, protect company's brand and reputation, avoid costs and achieve savings, improve internal processes and tighten collaboration with the supplier. One important character of the supplier is on-time delivery

performance, which reflects on the supplier's service level and reliability. As a vast company, Valmet must have reliable suppliers which can produce their services on certain level of service and reliability. Reliable suppliers construct reliable transportation network and ensures shipment movement through the supply chain.

1.1 Problem description and research questions

The company pointed out two main problems for the research, which was: Unsureness about the relevant content of Transportation team's KPI dashboard and doubts about the real status of on-time delivery performance indicator in road category. The objective of the research was to establish the KPI dashboard and solve out how Valmet transportation team could improve their on-time delivery performance measuring process and by what tools and action the loss of the indicator could be prevented and overall reporting could be improved. To full fill the research objective and find the solutions to addressed problems, the following research questions were adjusted:

Question 1: *What are the most important strategy elements and value creators which Valmet transportation team should measure as their Key performance indicators?*

Question 2: *What Valmet transportation team should include in their KPI dashboard?*

Question 3: *What is the real status of on-time delivery performance indicator in the Road category?*

Question 4: *What is the root cause for invalid on-time delivery performance indicators?*

2 RESEARCH PROCESS AND APPROACH

2.1 Research outlines and perspectives

The research was divided into two parts on account of premise of the research problems. Parts were identified as KPI dashboard research and reporting research.

The KPI dashboard research focus on Valmet transportation team's strategy, operations and used measurements. Overall performance measuring and measurement procedures in the company, and its other departments, were outlined from the research. In this case, the KPIs are the indicators which measure the performance of the Valmet transportation team, thus relevant research perspective was chosen to be the team's perspective. Valmet transportation team consist of the Head of indirect procurement and category managers whose performance reporting is meaningful for all other functions and the company's management.

Reporting research was the deeper investigation part of the thesis. Subject of the research was on-time delivery performance indicator which measures suppliers' performance in all three categories. However, Courier category as well as Air & Ocean (A&O) category was excluded from the research because of agreement negotiations in A&O and earlier established reason codes in Courier category. Research target group determined by nominations in road category which consist of group of contracted suppliers. Research was in the interface between Valmet and the suppliers but in according to principle's organisational structure the supplier contacting was excluded from the research. Thus, research was conducted from Valmet transportation team's reporting perspective.

2.2 Research orientation

Methodological orientation of the research was both quantitative (quantity) and qualitative (quality) research. Research methodological orientation were chosen to compose total research which involves methods, that are complementary to each other. Discrepancy of these methods is usually highlighted and debated even if it can be used at the same time and the research objects can be explained in different ways with both orientations. As a research strategy, the case study compiles these research methods, hence was deployed in the research. Research strategy and methods will be discussed and motivated in upcoming chapters.

2.2.1 Research material

Qualitative research material was mainly gathered from literature, company's documents and by participant observation. However, vendor data templates were also used as a part of qualitative research. Theoretical framework of the thesis was based on theories of supplier relationship management (SRM), performance measuring and key performance indicators (KPIs). To run up the author's knowledge about research environment, the participant observation research method was used when author was working for Valmet alongside the project.

Quantitative research material consists of vendor data templates, which are produced monthly by the suppliers, and data from principle's super data model (SDM). Vendor data template contain information about shipments that have been carried by certain transportation company in running twelve-month observation period. SDM includes all relevant data from principle's transportation network, funds and other operations.

2.2.2 Case study research strategy

Case study research is usually seen rather as a research strategy than a method where both qualitative and quantitative research orientation can be deployed. The method focuses on one case, which can be an individual, an institution or a community. The method can include also multiple cases like different transportation companies. Case study research is not striving to represent generalizations; thus, it is interested in individual cases and focuses on descriptive explanation rather than interpretation. Case study strategy is beneficial for gathering background information, illuminating integral processes and interactions. (Gillham 2010, Virtuaali Ammattikorkeakoulu, 2007)

The characteristics of case study served the performance indicator research, where fundamental set of the research consist of transportation companies. Fundamental set of the research was decided by the means of principle's nominations in the road category. Selected suppliers are not dependent to each other, so the generalizations cannot be made and detailed root causes (explanations) for performance loss are desired outcomes. Therefore, the strategy was applied for the research. In addition, overall information gathering as well as measuring and reporting process knowledge, were the essence for the author, when earlier experience from the functionalities and processes of Valmet transportation team was tangential.

2.2.3 Qualitative research methods

Qualitative methods are often seen as soft methods because of the essentially descriptive and inferential character. All statistical results, including scientific research, must be interpreted and described. Focus of the qualitative research methods are primarily on the evidence that enables researcher to understand the meaning of what is going on. That makes qualitative research methods as primary in case study research strategy because of the essence of understanding the context and research evidence (Gillham 2010, 9-10).

Qualitative research method was used in both research parts, when theory basis was created, vendor data templates were examined and basic information about the environment, processes and Valmet transportation team were studied. Theoretical basis was conducted as **thematic analysis**, where literature and theories that support the research problems was exploited and reviewed. The same analysis method was deployed in the first part of the performance indicator research as well.

The idea of **thematic analysis** is to find out what have been told and what have been discussed in the context. In the analysis method, the qualitative research material will be firstly cut into pieces and regrouped into themes, that forms from central matters that recur in the material in one way or another. Thematic analysis is the most commonly deployed research method in structured literature reviews and theory basis creation. (Saaranen-Kauppinen & Puusniekka 2006a)

Participant observation is an activity where researcher try to obtain general overall view from the research object. Researcher's role can be active or passive but the presence and participation is always visible at some level, because the researcher's appearance is anyhow on the record. (Saaranen-Kauppinen & Puusniekka 2006b) Participant observation is a research method which improves researcher's ability to understand research object and the research problem in the natural environment. Participant observation research was conducted from September 2016 to December 2016 while working for Valmet transportation team. Actual notes were not written; only present state description were made and the information was confirmed by short unstructured discussions with VTG business responsible. Diary of observations was made during the working for Valmet and is presented in the Appendix 1.

2.2.4 Quantitative research methods

Quantitative methods involve counting and measuring and it is a subject of statistics. Statistics are two of kinds: Descriptive and inferential. Descriptive data describe the

data as a summary, like averages, and inferential data enables inferences and significant findings from quantitative data (Gillham 2010, 9-10).

Quantitative research method was used in performance indicators research, where status of on-time delivery performance indicator and Valmet transportation team's overall statistics were searched in detailed level. Fundamental set of the research consist of one dependent variable, overall on-time delivery performance of road category, where suppliers' performance effect as independent variables. The statistics related to these variables are examined by descriptive and inferential content analysis when root causes for performance loss are explored.

3 COMPANY PRESENTATION

3.1 Valmet

Valmet is a global, publicly listed, company that develops and supplies technologies, automation and services for pulp, paper and energy industries. Valmet's net sales in 2016 was 2.9 billion euros and company have approximately 12 000 professionals in 30 countries. Company aims to be the best in customer service and is committed to take their customer success forward with their services and innovations. (Annual review 2017)

Valmet have four different business lines such as Automation, Pulp and energy, Paper and Services. Operational area of Valmet is shared to North America, South America, EMEA, China and Asia Pacific. The most of the business volume is on EMEA market area, which includes Europe, Middle East and Africa. Significance of EMEA business area is partly due to history, many of the company's operations have been

established there. Nordics is the area where the most of the standard cargo shipment volume is. (Flow 2017)

Transportation team of Valmet provides their services globally and its responsibilities are standard cargo transportation, packing and harbour agreements, transportation operation development, measuring and reporting. Transportation team has categorized transportation modes into three groups, which are Courier, Road and Air & Ocean. Transportation team analyses, develops and tests Valmet Transportation Gateway (VTG) system which is Valmet's own Transportation Management System used for transportation bookings, contract and pricelist management and reporting in Valmet logistics, suppliers and nominated transportation companies.

3.2 Valmet tools

Super Data Model (SDM) is a reporting tool which gathers all important information and data into one database. SDM presents results of Valmet transportation measures and calculations from various data sources. Two data sources of SDM were relevant for the research: Valmet Transportation Gateway (VTG) and vendor data.

VTG is company's transportation management system (TMS) which is used in Valmet logistics, suppliers and nominated transportation companies. VTG is a tool for executing daily bookings to transportation companies, shipment tracking, pricing and scheduling. VTG is also an important tool enabling Valmet to measure, analyse and follow-up transportation network and the realization of transportation contracts. At the moment of the examination, the majority of European transportations are handled through VTG and the aim is to globally expand the usage of the system so the more benefits and data could be gathered for analysing and follow-up the transportation network.

Vendor data is Valmet's excel based data workbook which is used to gather shipment data from nominated transportation companies. The workbook is formed from vendor data template, example sheet and instructions sheet. Vendor data template includes important information from every shipment which is carried by certain carrier. Information such as, package information, consignee and consignor information, despatching and delivery information is compiled in the template. It includes also information which can be used to connect vendor data shipments to VTG shipments and invoicing system. In addition, the template includes information about on-time deliveries and reason coding for delays.

Viewpoint is company's data preview tool which presents data from SDM in visual form as readable figures and clear complexes. Statistics from transportation network, funds flow and reporting are available in Viewpoint environment. Viewpoint is a platform for transportation team's KPIs where the indicators are obtainable for all interest groups.

4 DESCRIPTIONS OF PRESENT STATE

Information that proved to be relevant for forthcoming chapters and the research part will be discussed in this chapter. Descriptions of present state was done to chart the initial situation when the research was started, so the comparison between the starting point and the end as well as conclusion with reasonable result analysis could be done. Understanding of the problem context, the environment and processes where the problem occurs was essential for the author, so the solutions for research problem and adjusted research questions could be find.

Current descriptions were made by reviewing written documents and by participant observation. Information was gathered from September 2016 to December 2016

alongside working for Valmet and short, unstructured discussions were deployed when information was needed for burning questions. Present state descriptions were made in according to observations and discussion with VTG business responsible. Notes was not made, only descriptions were written and the facts were confirmed by the person discussed with.

4.1 Valmet strategy and transportation team key initiatives

The strategy forms a foundation of the company's overall operations and actions which are taken to full fill the mission and achieve the vision. Valmet's objective is to serve their customers in optimum way by offering sustainable process technologies, services and automation from renewable resources. Valmet emphasize the importance of excellence, competitiveness, innovation and sustainability in their strategy. Daily basis decision making and behaviour is driven by four values: Customers, Excellence, Renewal and People. Figure 1. Presents Valmet strategy that is a long-term strategy which ties up all departments in the organization and guides units to take actions towards common goals and vision.

Figure 1. Valmet strategy briefly (Valmet's Way forward 2017)

The organizational strategy is put into practice to operational level by business units and departments. Strategy of Valmet transportation team lean on Valmet's overall strategy and the team executes the common goals and organizational vision to standard cargo transportations and transportation network level.

Valmet transportation team is part of Valmet Indirect Procurement and SC Development department and operations are mostly focused on process excellence. Valmet transportation team have yearly action plans which are presented in the end of the year and key initiatives for the next year are presented. The initiatives are highlighted in the figure (See appendix 2.) that represent the strategical elements of Valmet transportation team. Initiatives remains mainly the same, only focus can vary by the year. Permanence of key initiatives was confirmed in yearly iPRO Forward meeting, where strategy of next year was presented. (Loikkanen 2016)

4.2 Supplier management in Valmet transportation team

Transportation team have identified and nominate the most important suppliers in all three categories. Contracts with the suppliers are managed by category manager and perspectives such as reporting, demanded integration level and agreed performance level is considered in contracting phase. Transportation team have quarterly business reviews in action with the nominated transportation companies, where annual plan of business performance is monitored and followed. In the end of the year annual business reviews is taken place where the work of past year is summarized and the plans and goals for next year are set. Category manager together with the global category team participates to supplier management procedures. Global category team consist of personnel from various business lines and areas and gathers multiple outlooks from different perspectives per certain transportation mode and the suppliers in the category.

Valmet have implementation process of SRM running in several departments which are mostly related to procurement. Valmet transportation team has started the SRM process and have already supplier management practices which are fundamental and typical for SRM process. The process will continue and was presented in action plan for 2017. (Loikkanen 2016)

Figure 2. illustrates sections of the company's supply chain where Valmet transportation team's SRM process would be located. Category manager's responsibility is to take care of interface between the company and the logistics provider whereupon their responsibility will be the SRM process performing in the future.

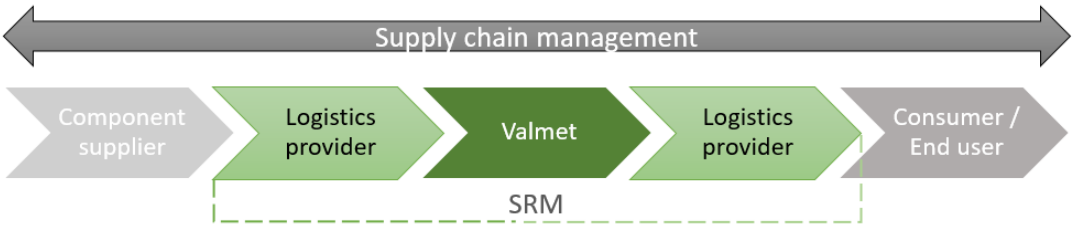

Figure 2. SRM interfaces of Valmet transportation team

4.3 Road category

See appendix 3. for detailed road category description where status of delivery performance is also presented.

4.4 Currently existing indicators

Valmet transportation have indicators which have been presented in 2016 action plan and Viewpoint. These indicators are named as main KPIs and were categorized as savings, process, lead-time, quality and sustainability indicators. Team have measured indicators such as total savings, contracts compliance, delivery performance and CO2 emissions in different periods. Table 1. Presents active indicators and the indicators which were considered to be a part of the KPI dashboard. The focus of the active indicators is savings in one way or another and the team have drafted indicators that would measure spend, process and network.

Table 1. Existing key performance indicators of Valmet transportation team

KPI	Category	Status
Contractual savings	Savings	ACTIVE
Margin of transportation savings	Savings	ACTIVE
VTG savings:		ACTIVE

Operational savings	Process savings Lead-time	ACTIVE
Consolidation savings	Process savings	ACTIVE
Load Plan savings	Process savings	ACTIVE
TOTAL SAVINGS		ACTIVE
Contract compliance	Process savings	ACTIVE
On-time delivery performance	Process quality	ACTIVE
CO2 Emissions	Sustainability	ACTIVE
Total spend	Spend	DRAFT
Top 10 lanes by spend	Spend Network	DRAFT
Share of shipment types	Spend Network	DRAFT
VTG shipments	Process	DRAFT

In addition to presented KPIs, the team have 19 other indicators that presents data from SDM in tables, figures, histograms and line charts in Viewpoint or in management level reports. Detailed list of existing indicators is presented in the appendix 4.

4.5 On-time delivery performance indicator

Valmet transportation team have developed on-time delivery performance indicator in order to measure delivery reliability of the suppliers in their standard cargo shipment network. The indicator illustrates the service level of the whole network, certain category or certain supplier and it is presented for Valmet personnel in all business units. Valmet have deployed reward system that is based on suppliers' service level and it helps to supervise the realization of the contracts.

On-time delivery performance indicator represents the supplier's capability to deliver shipments on time in according to promised delivery date and agreed lead-times. On-time delivery performance of the transportation network and suppliers' effects on Valmet's own service level in product supply, when the company have involved third party service providers to their supply chain. Third party involvement makes performance measuring crucial, so Valmet can supervise transportation network's capability to deliver shipments on agreed time for manufacturing process phases and end customers.

Calculation method and source data

On-time delivery performance indicator uses vendor data and VTG data as source databases. The indicator forms the status from difference between agreed delivery date and actual delivery date from both databases with crosswise updating. However, in this context it is important to emphasize that VTG is the data source with higher priority and overruns vendor data information if conflicts between the data appears. Crosswise updating means that, the system use delivery dates from VTG and if dates are missing, then information is used from vendor data. Calculation categorize the shipments as early, on-time or late shipments. Delayed shipments are once more categorized per reason codes, so that reason for delay is taken into account in on-time delivery performance indicator. Late shipments are categorized as due to action of Valmet, vendor or force majeure by agreed reason codes.

VTG date information

In road category, estimated delivery date from VTG is based on booking day and a pricelist that is defined by the supplier. The pricelist includes lead-time information by shipment weight and booking day. VTG use the pricelist in delivery date estimations and records the estimated delivery date into shipment data. When shipment is delivered the system records barcode scan into the data and forms actual delivery date from scanning action.

Vendor data date information

Vendor data date information is supplier's conception about agreed and actual delivery dates. Shipment information is gathered from supplier's own databases and is delivered for category managers in vendor data template. If shipments have delayed, the supplier is obligated to inform reason code for the delay. Calculation system recognize certain reason codes and process shipment data in according to agreed codes.

4.5.1 Data gathering and performance measuring process

Performance measuring process starts from the need of performance measuring of Valmet. Valmet needs to measure the performance of their transportation network to supply standard cargo shipments on right time, to right place and in right condition. The performance measuring customs and processes are agreed on contracting phase that binds the suppliers to report their performance for the company. Valmet have certain demand of service level for their transportation network and to follow-up contract realization and establish the reward system, the on-time delivery performance measure is applied. The suppliers are obligated to produce vendor data on excel based template developed by Valmet.

Every supplier has person who is responsible of data production and data delivering to manager of certain category. Currently the data is delivered to Valmet transportation category managers via e-mail. Vendor data is produced monthly and the observation period varies between the categories. For example, three months' period in courier category is enough to cover multiple status updates for shipments. In this time suppliers are capable to pick-up, deliver and invoice the shipment.

Category manager's responsibility is to review and check the quality of produced data before it is approved and forwarded to third party service provider, whose responsibility is to gather, process and upload data as well as administrate the SDM. When data is uploaded category manager can preview and analyse data from

Viewpoint or from SDM. By analysing the data, the category manager supervises the contract and reward system realization in the category and organize the quarterly business reviews (QBR) for the suppliers. QBR is a part of supplier relationship management process in Valmet transportation team. Flowchart of vendor data gathering and performance measuring process (see appendix 5.) is based on author's observations during working for Valmet transportation team. Generated flowchart reveals that vendor data templates are transferred through many phases that include data receiving and delivering actions by several parties.

5 THEORETICAL FRAMEWORK

The literature was approached in systematic way and the theory basis was conducted as thematic analysis, where relevant topics were explored. The basis was compiled from few main literature resources and the supportive publications were reviewed to complete the found theories. With wider scale of preferences, the facts could be presented and addressed in the research. To compile a wide, reliable and up-to-date theoretical framework, the publications were chosen to be publicized within ten years. Founded theories in prior publications were confirmed from later publications.

Theoretical framework of the thesis consist of supplier relationship management and performance measuring part of the business approach, where importance of measuring and performance monitoring will be discussed. Key performance indicators are usually related to performance measuring so the supportive theory basis for the research could be compiled from these theories.

5.1 Supplier relationship management (SRM)

Supplier relationship management is systematic and comprehensive approach of collaboration in supply chain and managing the whole interface between supply and buying organisations through the whole life of the contract.

In according to literature the SRM have same activities and primary goals than alliance management which key practices endorse creating alliances and collaboration between supply chain entities, such as buyers, suppliers and third-party providers. The SRM context differentiates from conventional contracts management because the focus of the practice is on the whole interface between the buyer and the supplier. The aim of the SRM is to achieve the supplier's maximum contribution towards the buyer's long-term strategic goals. As a term, SRM is usually connected to procurement and strategic sourcing and generally, it is connected to suppliers who provide parts or products for manufacturing company. (Emmett & Crocker 2009, 77; Engel 2012; Hughes & Wadd 2012, 22; Brekalo, Albers & Delfmann, 2012) However, the SRM is reasonable to include to every operational relationship within businesses regardless of functions or traded products or services.

The purpose of SRM is to streamline and improve effectiveness of processes between the company and its suppliers. When all interactions with the supplier are coordinative planned, executed and managed, the working with the supplier is more collaboratively and delivers significant value for both parties. Functional SRM drives supplier behaviour, encompasses the relationship between two enterprises and enables the company to leverage its size by coordinating across divisions, functions and hierarchies. At its best, SRM can give more out of relationship with the supplier and relationships can even develop to ecosystems which gives competitive advantages for the company. Supplier relationship management encompasses all interactions with suppliers and includes elements which are applicable to all

suppliers and elements which are applicable to only selected suppliers. (Hughes & Wadd 2012, 24; Engel 2012; Schuh, Strohmer Easton, Hales, & Triplat 2014.)

5.1.1 Foundational elements

Foundational elements are applicable for all suppliers regardless of their importance for the business. Performance management, risk management and supplier segmentation are foundational elements of supplier relationship management. (Schuh et al. 2014.)

Supplier Performance management is a business practice from supply chain management that is used to monitor, analyse and manage supplier's performance. Successful performance management can reduce costs, lower supply chain risk factors, identify supply chain execution issues and promote continuous improvement. (Schuh et al. 2014) Supplier performance management ensures that company gets services which are on agreed level and contracts will be realized so that the performance meets the expectations against the market norms.

Risk management is a third foundational element of SRM. Well managed risk management mitigates externalization risks and tightens collaboration with the supplier when both companies have common goal to improve continuity and safety of operations. In tight partnership, both parties have the willingness to share risk of the supply chain and they have common understanding of occurred risks in operations. (Schuh et al. 2014; Jack & Powers, 2015; 130. Hudnurkar, Rathod & Jakhar 2016, 633-635) In transportation operations, the procurement risk has high dependency on a supplier thus, functional risk management is important practice. When transportation company operates between the links in supply chain, the company can effect instantly on organization's product quality, brand image, production efficiency and more, thus risk management is remarkable practice for transportation functions.

Supplier base segmentation defines extend of business with supplier and how supplier is treated within the organisation. Treatment bases on supplier classification and how important the supplier is for the business. It improves supplier follow-up and evaluation and ability to respond to supplier-related risks which improves overall risk management in supply chain. (Schuh et al. 2014; Hudnurkar et al. 2016, 625)

5.1.2 Strategic suppliers and strategic elements

Strategic suppliers are the most important partners which provide their services on lanes which are remarkable for the business or have special tasks in transportation network. Usually strategic supplier is misinterpreted to a large supplier, which does not stack up. A strategic supplier can be the company which is not particularly large organization. E.g. Transport Company which have small fleet, operates only in certain country or route can be strategic supplier if rival firms do not exist for undefined reason.

Strategic elements are applicable for selected suppliers, which can be called as strategic suppliers. As a strategic element, **coordinated communication** with the strategic supplier, is important when it tightens relationship, commitment and co-operation between two companies. Coordinated communication includes personnel involvement, like category manager's role, and organisation involvement which gains more trust for the relationship between parties. Coordinated communication and trust improves the quality of relationship with the supplier. When coordinated communication is done across all business units, functions and hierarchy levels, the supplier relationship is more rigorous and the company can communicate as a single voice. The organisation can avoid conflicts, achieve competitive advantages, have better understanding of supplier's placement and agreements when they are communicating by single voice. (Schuh et al. 2014; Jack & Powers, 2015, 131)

Co-operation and commitment between strategic supplier and the company is on higher level than with the other suppliers. When relationship is on higher level and

rigorous, it maximizes vendor value, enables innovations and improvements in operations and supply chain. (Schuh et al. 2014; Hudnurkar et al. 2016, 630)

5.1.3 SRM in organisations

As Emmert and Crocker (2009) addressed in their book, from 2005 to 2010 global procurement have performed poorly on contract management and internal competency of contract managing have been a minor. Too many organisations believe that after placing the order, the contract manages itself and the procurement department can move on to the next negotiation or deal.

However, it is estimated that, in the near future more and more companies start to develop advanced Supply Chain Management (SCM) strategies and especially procurement and sourcing functions will value expertise and experience from effective and unique SCM technologies like performance management and relationship management. Not only for procurement department, this expertise will be important in upcoming trend for every department or function who is responsible for contacting or contracting with any supplier. Step towards better relationship management is crucial when companies are becoming more global and outsourcing will be wider part of the strategies. (Top 5 logistics and procurement trends, Robinson 2016; Emmett & Crocker 2009, 89)

“Research into leaders in SRM” case study of Emmett and Crocker (2009, 87), reveals that the leading organisations in SRM have same elements in their SRM processes. Following elements are founded to be congruent in the organisations:

1. Supplier segmentation
2. Contract management
3. Supplier performance management
4. Integrations and collaboration
5. Correct organizational structure

6. The right people whose skills are developed and deployed
7. The right technology to capture and assimilate supplier specific information and data

In according to Hughes and Wadd (2012, 24-26), the companies with the greatest success in SRM have firstly focus on changing organisational culture and transforming daily basis interactions within the organisation and with the suppliers. The research resulted seven principles that underlie successful SRM initiatives:

1. To identify the greatest potential to create value and reduce risk
2. To respect and treat all suppliers with a high degree of professionalism and respect
3. To Invest in understanding the suppliers better
4. To Invest in helping supplier to understand the buying company
5. To actively build and sustain trust with suppliers
6. To track benefits for supplier and invite the supplier to give feedback for the company
7. To emphasize open communication and innovation

5.1.4 Benefits of SRM

In these days, supply chains are developing more integrated, and the operations between supplier and buyer are increasingly elided. Therefore, it is more important to manage contracts and suppliers properly. When segmentation and rationalization of supply base reduces the number of suppliers, it makes the residual suppliers more powerful. Positive supplier relationships which are properly managed, can produce sustainable competitive advantages and add vendor value. (Emmett & Crocker 2009, 77-85; Hudnurkar, Rathod & Jakhar 2016)

The key components that drive SRM are trust and open communication, when both parties rely and communicate to each other, supply chain profiling can be made

more effectively which can reduce operating costs and improve quality of services. When trust and communication is unconstrained, SRM can improve supplier's performance and reveal supplier's opportunities to make a profit with process development and loss reduction. (Emmett & Crocker 2009, 77-85; Jack & Thomas, 2015, 131; Hudnurkar et al. 2016)

Every year, at least once, buying and selling organisations should meet and seek to understand each other's intentions, priorities, exploit common ground and deal with any problems. Meeting should conclude in to action plan which should be set in according to common goals. The nearest contacts should feel themselves as relationship managers and they should aim to relationship improvement and development. (Emmett & Crocker 2009, 77-85)

5.1.5 Effective supplier relationship management

Effective supplier relationship management can deliver value for the organisation in long-term contracts through supplier management approach from sourcing stage. Value will extend as organisation will focus on more collaboration and integrations with the supplier. Maintained and rebuild supplier relationships enables possibilities to achieve the real benefits and maximum long-term value from the supply chain links and connections. SRM offers the catalyst to acquire services that will meet or exceed organisation's expectations and to give them competitive advantages. Many organisations remain too "deal-focused" and are not good at all in managing supplier relationships. Supplier relationship management process should be clear to all those who have the contact with suppliers in order to develop it effective. (Emmett & Crocker 2009, 89-91; Jack & Thomas 2015, 130)

Effective supplier relationship management provides integrated communication and information driven management process and just like any process, which is taken into organisation for serious actions and purposely, SRM should have an iterative

element. Such a review process, it enables regular feedback which enables organisation to define changing business needs and supplier management objectives. Effective supplier relationship management process helps suppliers to improve their operations at all levels. When feedback is regular and analysing is done by their customers, areas of improvement are traced. The deeper relationship and collaboration level is, the higher level of feedback the suppliers expect. Regular measurement, review and feedback can help them to drive out costs and inefficiencies throughout their own supply chain and in the end that will benefit both parties. (Emmett & Crocker 2009, 89-91.)

5.1.6 Performance monitoring

Performance monitoring is a trinity of purpose, expectations and strengths and it should be done with a continual focus on future, not past. When indicators and measurement process are established, the relevant parties must be adhered to the process. If the implementation process requires significant changes and arrangements, it is necessary to create a plan that defines measurement parties' responsibilities and roles in time line. (Emmett & Crocker 2009, 175; 102)

Supplier performance measuring process must be beneficial also to supplier in order to achieve supplier's commitment. When supplier recognize advantages of performance measuring program, co-operation will be easier and data collection will be enabled. Without co-operation of suppliers it is impossible to collect necessary data for performance indicator measurements. In order to achieve success with performance indicators, it is important to supplier to clearly understand what is the role of them, what are the advantages of measuring and why measuring is done. (ibid., 102-103)

When supplier understand their role and the meaning of the whole monitoring procedure, it can have positive effect on commitment level of the supplier. Increased commitment reflects on satisfaction of the relationship which tightens the

collaboration between two companies. Data gathering processes should be designed to be simple and quick so process could be done with minor effort and time. Whereupon, people cannot rely on excuses of intractable or difficulty of usage of the instrument nor appeal to disruption in other processes. Nowadays generalization is that, the time is money and if something is not valuable it has to be done with minimum effort.

5.2 Key performance indicators (KPIs)

Key performance indicators are measures that focuses on current and future success from the most critical aspects of the organisational performance. Organisation have their own strategy, vision and mission which determines goals and aims for overall operations. Purpose of the performance measures is to supervise development and effectiveness of organisation's strategy, allocate difference between objective and results and confirm effectiveness of organisation and its operations. Performance measures control people's behaviour, support strategic decision-making, learning, reporting and compliance of the organisation. (Marr 2009, 99; Neely 2002, 176-177; Parmenter 2010, 4)

Bad execution of measures can have reverse effect in organisation and KPIs turn form a measure into a target, when even well-intended KPIs can turn in to a harm. Marr (2014) presented following examples in web publication, which visualize three different cases when performance measuring has gone terribly wrong:

- *An electrical wholesale group put KPIs in place to measure the relative sales performance of branches. It then created league tables and rewarded the best performing branches. The result was, stores that were hundreds of miles apart chased the same customers and even undercut the geographically closest retailers to the customer. In many instances,*

deliveries were made from the central warehouse to the shop hundreds of miles away, only for this shop to drive the parts back near the warehouse where they undercut the prices of the local store. (ibid., 2014)

- *A police force introduced KPIs to measure its performance. The government then turned some crime statistics into targets and measured every police force against these targets. As a result, a lot of gaming took place to improve the numbers, but not necessarily the underpinning performance. For example, one police force was told by their chief to prioritize burglaries of multiple-occupancy households because the system would count each occupant as a separate solved crime. (ibid., 2014)*

- *A Russian nail factory is one good example of bad execution of key performance indicators. When the government centrally planned the economy it created targets of output for the factory, measured in weight. The result was that the factory produced a small number of very heavy nails. Obviously, people in Russia didn't just need massively big nails so the target was changed to the amount of nails the factory had to produce. As a consequence, the nail factory produced a massive amount of only tiny nails. (ibid., 2014)*

5.2.1 Characteristics of the key performance indicators

Parmenter (2010, 6) defined following seven characteristics of the key performance indicators as a result of extensive analysis and discussion in the KPI workshops with over 3,000 participants from different organization types in public and private sectors. Key performance indicators:

1. Are nonfinancial measures
2. Are measured frequently
3. Are acted on by the CEO and senior management team
4. Clearly indicate what action is required by staff

5. Are measures that tie responsibility down to a team
6. Have significant impact
7. Encourage appropriate action

Measures can be an effectiveness or an efficiency measures. Effectiveness measures response to question “Are we doing right things?”, whereas efficiency measures response to question “Are we doing the things in the right way?”. Measures are made to check position, communicate position, confirm priorities and compel progress of the organisation in according to set goals. (Marr 2009, 100)

Check position: Measures are made to check position of the organisation and establish starting point of the operations and strategy determining. When position is established, organisation can define their strategy, plan improvement initiatives, monitor their progress and compare it to other companies in the same market. (ibid., 2009, 98)

Communicate position: Measures are made to communicate the position of the organisation for internal and external interest groups. Organisations have voluntary and legislative communications which are required in many industries. Organisations are forced to report their performance, for example, annual reports are legislative requirements for taxation and accounting purposes. Voluntarily reports are, for example, environmental performance report and social responsibilities report. (ibid., 2009, 98)

Confirm priorities: Measures enables organisations to highlight what matters the most, establish the judgement for comparison and create criteria for priorities, as well as communicate to stakeholder’s and take their needs into account. (Marr 2009, 98; Neely 2002, 68)

Compel progress: Measures drives people's motivation, change their behaviour and effects on their attitudes. Measures send a signal what is important for the organisation and provide relevant information to empower personnel to learn and enable actions of improvement. (Marr 2009, 98; Neely 2002, 107-108)

5.2.2 Types of KPIs

Key performance indicators can be divided into two main types, such as qualitative and quantitative measures, which describes format of the data and behaviour of the measurement. Qualitative KPI is descriptive characteristic, an opinion, a property or trait. Descriptive source data is the most difficult to measure and it requires well designed surveys with questions that will gain data in detailed level. (Parmenter 2010; The KPI Institute 2015; Neely 2002, 177)

Quantitative KPI is a measurable characteristic, resulted by counting, adding, or averaging numbers. Quantitative data forms the backbone of the most KPIs and is the most common measurements. Quantitative data is easy to collect and process to numerical formula. Qualitative and quantitative key performance indicators can be categorized in to current measures and future measures in according to the functionality. Current measures refer to 24/7 monitored or daily measures, whereas future measures record the actions in the future. (Parmenter 2010, 10)

Usually key performance indicators are categorized also to leading or lagging measures which, however, is not useful way to label measures because some indicators can be both. Parmenter (2010) expressed "late-planes-in-the-air KPI" as an example of situation where key performance indicator can be labelled as leading and lagging measure: it talks about the past and it is about to create the future problem when it lands. (ibid., 6)

5.2.3 Benefits of KPIs and measuring

Right information enables managers to make more timely decisions and take actions to serve customers better. Strategically valued data and information support analysis at the three levels of quality – individual, process and organisational levels. Bhat (2010), determined the types of information and how it is disseminated and aligned with organisational levels, as following:

- **Individual level:** data provide real-time information to identify assignable reasons for variation, determine root causes and take corrective action as needed. (ibid., 299)

- **Process level:** operational performance data such as yields, cycle times and productivity measures help managers determine whether they are doing the right job, whether they are using resources effectively and whether they are improving. (ibid., 299)

- **Organisational level:** quality and operational performance data from all areas of the firm, along with relevant financial, market, human resources and supplier data, form the basis for strategic planning and decision making. (ibid., 299)

5.2.4 Importance of information management

Information management and information management systems, such as performance management systems have key role on performance measuring. When performance measuring is based on automatic system, the process itself is easier and supports the key performance indicator measuring. Strong information system improves quality of the data and renews the information management which gains value of data in decision making and management. (Bhat 2010, 299; Neely 2002, 174-176)

Benefits of informative data and good information management are:

- The company knows that customers are receiving appropriate levels of services
- Workers can verify their progress in according to concrete feedback
- Reward and recognition can be enabled
- Signals need of corrective actions and provides a means of assessing the progress
- Improvement actions and better planning reduces costs

Relevant, practical and functional key performance indicators enable management and decision making to act based on facts. The most benefits are gained from a broad base of measurements, tied together by strong information systems. An integrated whole can help a company to align its operations with its strategic directions, streamline information sharing and improve problem solving. (Bhat 2010, 299; Neely 2002, 72)

5.2.5 Problems and common pitfalls in performance measurement

Intention of the measures is to form picture of the reality from important things, which are easy or not, to measure. Quantification and numbers are requirements of measuring and it works better in some areas than others. In transportation services and transport network management it is easy to measure, for example, utilization rate of certain transport company or route, usage of transport modes and transported tonnes. Whereas in global transport network, which includes 3PL companies and all transport modes, it is easy to measure lot of things but relevancy of indicators must be re-considered in according to transportation mode. For example, on-time delivery performance in ocean transportations can be measured, but the truth is that performance will vary in according to external factors such as the nautical circumstances. Therefore, supplier's possibilities to effect on performance level is minor.

Usually organisations measure business performance not only for itself, but for shareholders and organisation board. The board is accountable for shareholders for the proper conduct of business and results of performance metrics are easy way to give information which is based on facts. (Neely 2002, 123)

Since performance metrics are known source for facts it is regrettably usual, that organisations succumb to vanity with performance metrics. When pressure to perform in the highest level is substantial, it is obvious that no one wants to use measures which gives impression of poor performance. Vain metrics are developed from situations which are double-edged and easily manipulated. For example, order fulfilment measure is commonly used to measure operation's performance against promised delivery date. Companies can promise the date that is easily achieved and contains wide range of days. In the worst case, the company can measure order fulfilment from latest promised delivery day and then the metrics are always on good level. (Hammer 2007)

Another example of vain and narcissistic measurements are metrics that measure only from organisation's own perspective. Many organisation measures on-time shipping in terms of, whether the shipment left the dock on the date scheduled, or in terms of individual components. (Hammer 2007) For example, the company sends eighteen of twenty components to customer due to date scheduled and customer receives the shipment on time. The company would score itself a 90 % of purchase order fulfilment and 100 % of operational performance. However, the customer would score them 0 %, because of their machine needs all the ordered components to operate normally.

Often strategic metrics are determined too tightly by departmental or organizational boundaries, which makes measuring too dogmatic. For example, metrics with bond to budget can cause customer, quality and product or service consumption loss. Decrease of costs usually improves the status of this kind of metrics and when

organisation starts to rummage for the cheapest option I.e. for transportations, the price-quality ratio decrease is unavoidable. (Hammer 2007) Significant drop in transportation service prices usually bespeak of the black economy or other issues in the transportation company.

“Not everything that can be counted counts, and not everything that counts can be counted” said Albert Einstein in twentieth century and he was right. The thing that matter the most is usually difficult to measure and often impossible to express in meaningful numbers. Many organisations are too lazy to develop metrics which are relevant for their organisation. They usually have long list of possible indicators and often these are easy to measure and create from data which is already available. (Marr 2009, 100-101; Neely 2002, 158)

Regrettably often, these indicators, lead to a situation where organisation leap over the lowest hurdle and end up with the irrelevant and unpractical indicators which does not gain enough information to serve their strategy and overall goals. Too many indicators usually bring either insufficient data or too much data, whereupon measures are petty and in the worst case insane. (Hammer 2007) For example, if transportation category managers would get bonuses based on the number of contracts with the transportation companies. That would be insane metric in order to manage global transportation network and nominated transportation companies. Consequences of that metric could be that organisation would have contracts with the most of the transportation companies in the world. Which surely would not be to the purpose.

Culture of the organisation enables measuring and people’s commitment level increases effects of the measurements. If organisation does not have receptive culture, which is ready to apply itself to measuring and continuous improvement, the measurements will lose their effect. People in non-receptive culture usually find

excuses for poor performance rather than investigates root causes or try to improve the level of performance.

At the end, the measures capture only a fraction of total information that organisation would like to measure and that's why the indicators should be as specific as possible. Before creating indicators, it is important to know the most important elements of the strategy, identify what really matters and what does make the value for the organisation. Strategy and the understanding of value creation must be shared with the whole organisation to make performance measuring as efficient as possible. Regrettably often companies have a lot of measures but no one knows what they are measuring. (Marr 2009, 101; Neely 2002, 158; Bhat 2010, 304)

5.2.6 Data collecting and selecting indicators

As earlier common pitfall chapter expressed, the KPIs are the thing, where the most of the organisations follow the path of least resistance, and pick measurements which are the easiest to create from available data. However, while collecting the data companies can make mistake on collecting wrong type of data.

Two fundamental mistakes in data collection are: irrelevant or inappropriate measurements and not measuring key characteristics that are critical to company performance. In the first case, company waste time and resources on directing attention in areas which are not important for the organisation and in the second, company often fails to meet interest group expectations and possibly loses competitive advantages. (Bhat 2010, 304)

At first, the organisations should identify what they want to measure, instead of searching available data from IT systems. They should approach performance measuring from "What we want to measure?" – Perspective rather than create indicators from available data. Performance indicators should be aligned with business strategy and they should be actionable. Many organisations assume that all

available data is relevant and meaningful for their measurements and regrettably often organisations assume that performance data is collected easily with automation and IT systems. (Marr 2009, 108; The KPI Institute 2015; Bhat 2010, 304)

After the organisations have identified that what they want to measure, it is time to compare it to available data and create new indicators or new data collection procedures in order to fill gap between measurement demand and data capability. Data can be compiled with multiple techniques and methods, which can reduce biases and increase reliability of the data. Data from different methods can be compared to each other, which reduces data gaps and makes it more complete. (Marr 2009, 108-112)

Organisations should involve more people into data collection system rather than impose measures on them. Marr (2009, 109) expressed that assessing the performance, in particular area, is easy by asking the most closely people in the area. Marr highlighted that internal and external people involvement is critically important in data collection processes. (ibid., 109)

5.2.7 Creating the key performance indicators

Literature review revealed few different kinds of approaches which can assist to create the key performance indicators. Advanced performance institute's website (2010) presented key performance questions (KPQs) and Marr (2009, 108; 113) presented a value creation map as well as a template for performance indicators.

Advanced performance institute (2010) expressed that creation of key performance indicator should be started from strategy mapping. For this, Marr (2009, 108) afford the value creation map tool (see Figure 3.). Organisation's value drivers form the roots of value creation tree. These drivers are reflected from organisation's strategy, mission and vision and it represents the tangible and intangible resources of the organisation. Trunk of the tree represents core competencies of the organisation,

which connects the resources to deliveries and gives it its strength to operate and grow “apples”. The trunk provides the channel leveraging the resources to create value for output deliverables or value proposition. Each element on the map should have their own assessment or indicators and value creation map is made to guide the development of it.

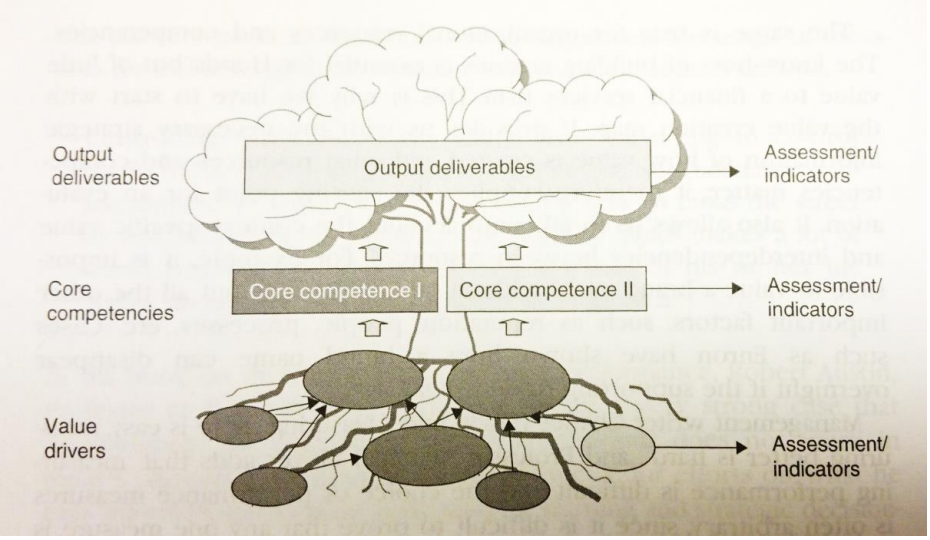

Figure 3. Value creation map (Marr 2009, 108)

When strategy is mapped out and organisation’s main goals and objectives are clear, the next phase is to create KPQs. These questions help to answer to the most critical business questions and guides organisations to create strategic, relevant and meaningful KPIs for every strategic element. When the most important business questions are established it then allows organisation to select or develop KPIs. (Marr 2010)

Marr (2009, 113) presented also more detailed approach, a template, for performance indicator creation. The template includes necessary and important data and gives clear picture about the indicator. Template gives information about strategic element that is being assessed, purpose of the indicator, data collection

method, ownership, targets and performance thresholds, validation and confidence level and much more.

6 RESEARCH PART

The thesis was carried out from September 2016 to December 2016, but the creation of KPI dashboard was carried out in January 2017. Altogether, the research was conducted in five months alongside working for Valmet. Research methods such as systematic literature review and descriptive content analysis were deployed in the research where data was gathered from suppliers, literature, written documents, statistics and by participant observation.

Research part of the thesis was divided in two parts because of the wide subject matter and to clarify the research process and reporting phase of the thesis. These parts were identified as KPI dashboard research and reporting research when adjusted research problems and the context of the research was explored.

Reporting research part was firstly conducted because the relevant data was gathered more quickly and the research was more practical when vendor data templates and statistics were reviewed and regular reporting meetings were scheduled. As expected, from the characteristics of a case study research strategy, the data was examined well before the supportive theory for problem solving could be identified.

KPI dashboard research part was also approached firstly from practical perspective. Possible indicators were searched from internet and web databases such as KPI libraries, so that greater picture about what others, in the same or related industries, measure could be created and new indicators could be identified. However, the

search made didn't result any new indicators that could be deployed for Valmet transportation team, thus, the research was approached theoretically. Forthcoming chapters will discuss about the research process and how research parts were conducted by successful matter.

6.1 KPI dashboard research

KPI dashboard research was done in according to adjusted research questions where identification of Valmet transportation team's value creators and solution for relevant content of KPI dashboard was desired.

Theoretical framework of KPIs was created and the literature was reviewed systematically by thematic analysis and the main purpose was to gain knowledge about what kind of indicators should be deployed and what kind of tools for creation the theory could bring out. Review resulted that, the purpose of the indicator is to measure things that are important for the company and bring value for the operations. The most important characteristic of the key performance indicator is the connection to the strategy whereupon the importance of measuring target is confirmed. Theoretical review revealed the strategy bonded value creation map tool that was deployed in the research in order to engage the chosen indicators to the strategy of Valmet transportation team.

The present state description of used indicators in Valmet transportation team was made by descriptive content analysis of statistics and internal reports. Present state description of indicators revealed that Valmet transportation team had a lot of indicators and data gathering customs that were presented in Viewpoint, management and transportation team reporting. As a backtrack to key findings of the theoretical review of key performance indicators and performance measuring, the common pitfall of performance measuring is that companies have too many

indicators deployed which hinders the indicators that are important for the company. This also makes KPI dashboard creation more difficult when multiple indicators are presenting same information in other figures and values. However, it was a relief that Valmet transportation team had a lot of existing measurement so the new measuring customs would not be necessary to create. Existing indicators were gathered and summarized in the table (See appendix 4.), where category of the indicator and reporting level and environment was identified. Valmet transportation team had KPIs that were common for team as well as management level reporting.

When key performance indicators are created, the audience of the dashboard must be considered. Transportation team needed KPI dashboard for operational and management level reporting. When KPIs are designed for internal and external audience the content of dashboard must be designed carefully. Because of multiple audience the values and figures must serve reporting with all interest groups. Basic idea of created KPI dashboard was that transportation team could use screen shots from the interactive dashboard so manually generated figures could be avoided and the information would be always available in Viewpoint.

Dashboard creation phase

In the dashboard creation phase the value creation map was created (See appendixes 6-7.) and the relevant indicators were identified. Within the creation process the chosen indicators were presented for transportation team and in according to team's comments the content of the dashboard was re-designed. When the value creation map was created the second phase of KPI dashboard creation was indicator and value creation map comparison. Indicators were compared to the value creation map and the indicators were considered from the measuring target perspective. Connection between the indicator and the strategy was confirmed by the analysis. Table 2. Presents the summary of the analysis and a list of chosen indicators. List presents the engagement between the strategic element and the value creation map element.

Table 2. KPI and value creation map engagement

KPI	Strategic element	Value creation map element
Total Spend (k€)	Cost management	Output deliverables
Share of spend (%)	Cost management Transportation categories	Output deliverables Core competencies
Spend by business line (k€)	Cost management	Output deliverables
Total savings (k€)	Savings	Output deliverables
VTG savings (k€)	Savings	Output deliverables
Contractual savings (k€)	Savings	Output deliverables
Contract savings (k€)	Savings	Output deliverables
Margin of transportation (k€)	Savings	Output deliverables
Standard shipment volume	Transportation network	Output deliverables
Top 20 suppliers	Cost management Transportation network Agreement management	Output deliverables Core competencies
Contract compliance (%)	Agreement management Cost management Savings	Core competencies Output deliverables
On-time delivery performance (%)	Transportation categories Transportation network	Core competencies Output deliverables
VTG Usage (%)	Transportation management system	Core competencies
VTG Shipments	Transportation management system	Core competencies
Share of number of shipments (%)	Transportation categories	Core competencies

The most of the chosen indicators were existing already, only layout of the indicators were developed more illustrative. As a new indicator, the list of top 20 suppliers was generated for the dashboard. Idea of the indicator arose from the management level reporting indicators where key suppliers and centrally managed contracts where presented. Information about the key suppliers, division of contracted spend and payment time were gathered into the indicator. Developed dashboard is presented in Appendix 8.

6.2 Reporting research

Reporting research was conducted in according to adjusted research questions where real status of on time-delivery performance indicator and solutions for reporting improvement where desired.

Fundamental set of the research consist of nominated transportation companies in road category and research material was gathered from the suppliers in September 2016. The observation period in the data was rolling twelve months backwards. Research material consist of vendor data templates which consist of all shipment data by certain carrier. The data was examined by descriptive content analysis when relevant details from the data was reviewed. Statistics from Viewpoint and data from SDM as well as VTG was reviewed during the research.

Before the actual research, the present state descriptions were made. On-time delivery performance indicator and the measuring process was described as well as the starting point of the indicator status in road category was explored. Present state description where made in according to observations that was made between the working for Valmet. Observations was made at the daily basis working environment, by discussions and system usage as well as in reporting development meetings. Notes from the observations was not made, only current state descriptions were made and the information gathered was confirmed by short discussions with the VTG business responsible.

With present state descriptions, the basic knowledge about the process was gained and the environment and the context of the problem was clarified for the author. The research included description of problems in measuring process, reason code implementation and descriptive analysis of statistics and vendor data. Occurred problems were identified and the reporting customs of the suppliers were explored so the answers for research questions were found and development proposals were

addressed. Problems of current performance measuring process is presented in the appendix 9.

6.2.1 Vendor data and reason code usage

Vendor data and reason code usage was examined by descriptive content analysis of produced data by supplier. All suppliers in road category use the original vendor data template developed by Valmet transportation team. However, some of the suppliers have add information that is not relevant for the measurements or the layout of the template have been changed. However, the current measuring process does not consider the layout of the template. In the content analysis, the data was firstly grouped by themes and information shortage was described (see Appendix 10.) Themes created were:

1. General information
2. Consignor / consignee information
3. Despatch / Delivery information
4. Incoterms
5. Package information
6. Booking information
7. Freight payer's information
8. Freight costs information
9. Invoicing information
10. Reporting information

Booking information included the data column for reason codes which was examined in more detailed level by descriptive content analysis. Detailed information about examination of reason code usage in road category is presented in the appendix 11. Used reason codes were compared to agreed reason codes (see appendix 12) then implemented into the on-time delivery performance indicator per supplier.

Reporting research part of the thesis was conducted as a case study and four case studies were created in according to revealed reporting problems per supplier. More detailed research of case studies is presented in the appendixes 13-16.

- **Route top 20 data problem:**
  Three top lanes were in a state where delivery country, dispatch country or both were unknown

- **High development level of performance and special transport relation:**
  Performance level of the supplier was suddenly improved during two quarters of the year in 2016

- **Differences in shipment statuses:**
  Supplier had reported shipments as on-time deliveries, even if the tracking system have notified the shipments as late deliveries

- **Over performance in shipment deliveries**
  The supplier had reported shipments in multiple times with different reference numbers

7 RESULTS OF THE THESIS

7.1 KPI dashboard development

In chapter 6.1 there was a discussion about the KPI dashboard research part, where value creation map was created and connections between the strategy and indicators were addressed. Value creation map was used to assist the KPI dashboard creation. The research made resulted that the most important strategy elements and value creators for Valmet transportation team are the following:

- Reliable and stabile global transportation network
- Cost management and profitability improvement
- Operational savings

- Transportation agreements and agreement management
- TMS system and integration level to service providers
- Transportation categories and category teams

The KPI dashboard research made resulted the dashboard for Valmet transportation team. Information and measurements for all indicators were already existing, so new measuring customs was not developed. Mode of representation of few indicators was redesigned to serve better Valmet transportation team reporting. Table 3. Presents a summary of developed key performance indicators. Developed dashboard includes more categories compared to indicators discussed in chapter 4.4. Most of the indicators were existing already only manner of expression was changed. Illustration of the developed dashboard is presented in Appendix 8.

Table 3. Key performance indicators in the dashboard

KPI	Category
Total Spend (k€)	Spend
Share of spend (%)	Spend
Spend by business line (k€)	Spend
Total savings (k€)	Savings
VTG savings (k€)	Savings
Contractual savings (k€)	Savings
Contract savings (k€)	Savings
Margin of transportation (k€)	Savings
Standard shipment volume	Network Volume
Top 20 suppliers	Spend Sustainability Network
Contract compliance (%)	Process savings
On-time delivery performance (%)	Process quality
VTG Usage (%)	Process
VTG Shipments	Process

Share of number of shipments (%)	Network Volume

7.2 On-time delivery performance indicator levels

In chapter 6.2, there was discussion about the reporting research part, which was conducted as case study research. Case studies were made of separate problems that occurred in road category and caused invalid data in Valmet transportation team's statistics and databases. The research made resulted the overall performance level in Road category decreased only 1 % yet changes in performance level per supplier fluctuated from -6% to 4 %.

Occurred reporting problems greatly influence to on-time delivery performance indicator and prevented to run the reward system, when indicator cannot be defined reliably on Valmet side, because the level is on too high or low compared to the reality. Detailed values of performance development are presented in appendix 17.

In the reporting research part (Chapter 6.2) was discussion about suppliers' data reporting problems which formed the cases of the thesis. Reporting and databases were examined from the Valmet transportation team's reporting point of view and following root causes for performance loss or invalid reporting results were identified:

1. Shortage in delivery and dispatch information (Case study 1)
2. Amount of special shipments (Case study 2)
3. Differences in interpretations of pricelists (Case study 3)
4. Double reporting of shipments (Case study 4)

8 CONCLUSION

8.1 Key performance indicators and created dashboard

When theory of KPIs was examined, the most important characteristic of KPI proved to be that, the indicator should be connected to the strategy, so the measures are directed to right things. As a conclusion, the organisation should never approach the measuring from perspective that what others are measuring, because the things that matter the most and are valuable from the strategy point of view, can diverse a lot from other companies. However, general overview of what others are measuring can be explored so the knowledge about measuring targets in the same or related industries is noticed. Theoretical review revealed that the strategy engaged indicators could be created by identifying and mapping the value creators. So, the strategy of Valmet transportation team was examined and the value creation map was deployed in the research.

Theoretical findings of KPIs addressed that many of the organisation have a lot of indicators but the relevancy of the measures are not known. From here, one of the research problems of the thesis was determined. As theory went deeper, the role of the indicators was explained and the importance of measuring brightened up: If organisation does not have relevant indicators deployed the current situation and placement is hard to illustrate in according to desired goals. When current state is unknown the monitoring of development is impossible. Thus, operations cannot be directed anywhere.

Measuring and indicators are important for the whole organisation and the audience of indicators varies per interest groups and involved parties. Involved parties must be engaged to the measuring process and they must know the idea of the measurements. Thus, the final dashboard was created in according to comments

from transportation team, the indicators were designed carefully and several reporting audience were considered when illustrative design was created. Idea of the dashboard was that Valmet transportation team could use it straight for their reporting by taking screen shots from the indicators.

Key performance indicators must give greater picture of the operations and the indicators can be straight statistical facts or figures which gives space for interpretations. In the developed dashboard, the indicators were designed to illustrate the overall picture of operations so that transportation team could see number of used funds and the status of their network, each category as well as transportation management system. Indicators are roughly divided in the spend indicators, savings indicators, network indicators and transportation management system indicators. Detailed description of developed indicators is presented in the appendix 18.

8.2 SRM and reporting research

Supplier relationship management is important business practice, for businesses regardless of the size and markets. When third party involves in the global supply chain or transportation network the procurement risk appears at the same time. With the important supplier, it is more crucial to follow-up the realization of the contracts and confirm the level of received service. Usually these suppliers are segmented as strategic supplier if the role in the supply chain is remarkable.

When two organisations tighten their relationship and processes are integrated, the performance is monitored and measures are deployed for a reason. At the same time, the importance of coordinated communication increases and the organisation must communicate with one voice, so that all actions with the supplier is common to each close to supplier interface. SRM process is convenient approach to standardize

the communication and process with the suppliers. Within the process, the same requirements are applied to every supplier and the relationship is more closely monitored.

Performance monitoring is one of the supplier relationship management's key elements, but the process itself demands more. As it best, supplier management is a collaborative partnership where everyone knows their role and is committed to common processes. In the case of Valmet transportation team, the performance data is gathered from two resources: from suppliers and from automatic system. When suppliers are involved in the measuring process the importance of commitment level increase. Poor commitment level reflects in the quality of produced data that reflects on the measurements and increase the risk of invalid indicators. When measuring procedures or tools are designed the perspective of reporter part should be considered. Nothing is more annoying than unfunctional data gathering procedures that demands more time than any other work task.

8.3 IT-system as a part of process

Deployment of IT systems and databases are demanded more when amount of information is increasing and more precise and valid measurements are desired. Exploitation of IT-systems is even necessity when it is about to follow-up the status of global transportation network. It also enables to create clearer picture of entirety of operations when measurements are hold up.

Transportation companies plays the key role of transportation network and the on-time delivery performance of each must be captured by measuring. On-time delivery performance of suppliers reflects on performance of the network as well as the company's operational performance. It relates the status of shipments in internal transportations: have it been on-time or delayed. Consequences of late deliveries is

much more than only loss in performance indicator. It can effect on assembling or any other manufacturing phase of machines and other products and delay the whole supply process.

Status of global transportation network can't be followed around-the-clock but the awareness must be on the level where realization of contracts can be followed. Since the level of service is agreed with the suppliers, transportation team have deployed their on-time delivery performance indicator and vendor data reporting custom. IT-systems are utilized in the reporting when data from all shipments in transportation network is gathered per transportation companies. Amount of gathered data is huge when reporting period is rolling twelve months, as in the road category. But it does not ease even in courier category, that have three months' observation period. When amount of data increase the risk of quality issues increase at the same time. The utilization of IT-systems is crucial because manual handling of the data would be too difficult and would take too much resources.

As in the beginning of the research was mentioned that Valmet transportation team have three transportation categories which have their own category manager deployed. These managers are responsible of interface between Valmet and the suppliers and have agreed on reporting procedures with the suppliers. Majority of the reporting customs are aligned together but some of them differs from each other and are more applied in according to each category. For example, the earlier mentioned observation period. Valmet transportation team consist of group of specialists who work mainly as individuals which cause that the procedures are not fully harmonized within the team.

When vendor data templates were examined in more detailed level, the templates included shortage and was summarized in the table (see appendix 6.). For example, reporting customs of full container load in vendor data reporting of Ocean category was done so that, weight information from the shipment was filled with "FCL".

Moderation of this kind of data, with single typing error, is difficult to manage manually because it is hard to find from the mass of data. Single case accumulates quite fast and creates considerable data gap at short notice.

Valmet have advanced IT-systems that supports their reporting and measuring customs and they should seek more benefits from the automation of the systems. Automated settings and features can be qualified per used template if the integration platform is available. By the help of the IT-system and automatic features, Valmet can detect deviation in the quality or in the content of the data. IT-systems are quite relentless that gives advantages for rules and settings that are common to each user. When rules are set and IT-system is deployed the last step is to commit in the process with harmonized procedures. By common rules, procedures and deployed IT-systems, the reporting process can be forced to a state where it will be harmonized and the results of measurements can be improved.

Vendor data validation process phase

The reporting research made resulted vendor data validation process phase that was created based on key findings of the reporting research part where usage of vendor data was analyzed and content of the data was categorized. Idea of vendor data validation process phase is to standardize the shipment data made by the suppliers, so that noted statistical and reporting problems could be solved in the future.

Vendor data process phase is designed to replace all information flow via e-mail thereby suppliers will upload the data straight to principle's transportation management system via data upload portal. The system will validate uploaded data by means of validation rules. Validation rules are set by importance of certain data for Valmet transportation team's reporting. Data validation rules were made in according to data categorization in chapter 6.2 and the summary of the rules is presented in appendix 18. The summary presents the data which is mandatory and

content validated in data upload portal. In according to these settings the data validation will produce feedback for the user or reject the data.

Developed vendor data validation process phase and the data upload portal serves one of the principle's key initiatives in 2016: ITC and reporting development. The initiative concerned about expanding the VTG usage which was certain outcome for the vendor data upload that runs through the system. Within the limits of the project, the data upload portal was implemented in the principle's TMS and was left on testing phase.

8.4 Further development proposals

In chapter 4.2 there was discussion about plans of SRM process implementation in Valmet transportation team and the current supplier management procedures. When current state of procedures is compared to case study research of Emmet and Crocker (2009, 87), the result is that Valmet transportation team have all the same elements than Emmet and Crocker found out from the research. Figure 4. Summarises the results of the comparison between expressed elements and Valmet transportation team's current procedures.

Figure 4. Supplier management at Valmet transportation team

Currently Valmet transportation team should not have problems in SRM process implementation. However, as further development proposals, Valmet transportation team should consider to create more detailed supplier assessment procedure, where soft and hard aspects would be considered and suppliers could be rated and ranked. Continuing assessment procedure could improve the relationship between parties and give more information about the supplier's overall performance and help transportation team to recognize well performing suppliers and to reveal possibilities of improvements with the supplier that perform poorly.

Currently, Valmet transportation team have on-time delivery performance indicator as one assessment perspective. However, the performance indicator does not give a wide scale picture about the relationship and some of the important perspectives are not considered at all. Wider evaluation process could diversify monitoring and clarify the whole picture of the relationship with the supplier. Deployed process could benefit Valmet transportation team by way of activating the communication between parties and the best-case scenario could be that collaboration with the supplier improves and operations develop more transparent. The evaluation process could bring desirable results of SRM when current process would be fulfilled in category managing.

Transportation service supplier assessment procedure

Supplier evaluation process (see Figure 5.) could include three groups of evaluation:

1. On-time delivery performance, quality of produced data and invoicing accuracy for a performance evaluation
2. Sustainability, integration level and service capability for capability evaluation
3. Key Account Manager and average payment time for a relationship evaluation which also presents the collaboration part of the assessment.

These aspects are presented in figure below which derive its origin from AHP-model which was developed by Thomas L. Saaty in the 1970s. (Saaty 2003, ii) In AHP model

the hierarchy is used to structure and prioritize multiple criteria into specific clusters and elements. (Saaty 2003, 2) Supplier evaluation is a goal, performance, capability and relationship are the criteria that are evaluated by the alternatives. Currently the most of the alternatives are already existing in Valmet transportation team's supplier management procedures. However, only on-time delivery performance is pointed out in current supplier evaluation.

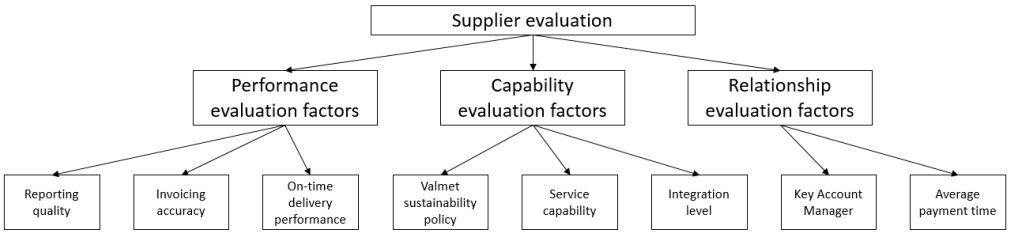

Figure 5. Supplier evaluation perspectives (Saaty 2003, 2)

Presented evaluation perspectives represent important aspects for Valmet transportation team from category manager's point of view, and should be considered to take into account when suppliers are evaluated. Developed evaluation model should be weighted model, where presented alternatives are rated and by weighting the total score would be compiled. Weighting of these perspectives should be considered with all category managers because the importance of different perspectives varies between categories. However, to rate suppliers in relation to each other the weighting should be same in all categories.

Summary of development proposals

This chapter will summarize and briefly address all the development proposals that was discussed in conclusion part of the thesis. Some of them was described more interlinear and hard to recognize and some of them was more visible. For a summary of development proposals, Valmet transportation team should consider the following aspects in their processes and procedures:

- Deploy the transportation service supplier assessment procedure, so the well and poor performing suppliers could be identified
- Harmonize the reporting procedures within the whole team by learning from each other
- Utilize and exploit more the advanced IT-systems such as VTG

8.5 Reliability and repeatability

Reliability of the research forms from main literature resources which was searched from experts, researches and of certain area who have create a career around publication context. Main information in every theoretical context was gathered from books which had praise from other experts and at the end some of them was cited in materials which was gathered to support the main theory. The main theory of the theoretical framework was compiled from following literature;

Strategic Performance Management (2009), authored by Bernard Mar.

> ***Bernard Marr*** *is one of the world's leading experts on strategic performance management. He specialized in the identification, measurement, and management of value creation and strategic performance drivers.* (Marr 2009)
>
> Bernard Marr is an acclaimed keynote speaker, consultant. teacher and award winning-writer. When references for performance measuring and management were searched, Marr was noticed in the publications. (Mts.)

Key Performance Indicators (KPI): Developing, Implementing, and Using Winning KPIs (2010), authored by David Parmenter "The King of KPIs"

> *DAVID PARMENTER is a writer, facilitator and an international presenter who is known for his thought provoking and lively sessions that have led to substantial change in many organisations. He is a leading expert in the development of winning KPIs, replacing the annual planning process with quarterly rolling planning, lean finance team practices, and management and leadership practices that will get you to the top. David has delivered workshops in 31 countries through professional bodies, event management companies and organisations who want in-house training.* (Parmenter n.d.)

Excellence in Supplier Management (2009), authored by Stuart Emmett & Barry Crocker

> ***Barry Crocker*** *is a lecturer in the Salford Business School at the University of Salford. He is currently Programme Leader for MCs Procurement and Logistics and MCs Supply Chain Management. (Emmett & Crocker 2009)*

Stuart Emmett: 30 years in commercial private sector, nowadays a freelance independent mentor / coach, trainer and consultant. (Mts.)

Supplier relationship management: how to maximize vendor value and opportunity (2014), Authored by Stephen Easton, Michael D. Hales, Christian Schuh, Michael F. Strohmer, Alenka Triplat and AT Kearney

The group of authors consist of procurement specialists that have lot of experience from transformation and improvement practices as well as project works with effectiveness improvement and much more. (Schuh, Strohmer Easton, Hales, & Triplat 2014)

Christian Schuch: doctorate in business administration

Michael F. Strohmer: doctorate in business administration and law
Stephen Easton: MBA, a first degree in politics, philosophy and economics
Mike Hales: Bachelor of science in business, Master's degree in management
Alenka Triplat: Economics and business administration degrees (Mts.)

Exiguity of the main resource material was supported with several other materials which consist of journals and web publications from Engineering Source database and Emerald Journals which are official databases of JAMK. Amount of resources remain quite narrow because of the lack of available publications even if the theoretical framework was expanded in e.g. procurement, supply chain management and any other themes which are related to addressed theories. Wider theoretical framework can be seen also from compilation of the resources. However, with good quality of the main resources the research is reliable and the theoretical information in the research is up to date.

Reliability of the research material

Quality of vendor data templates played a key role in the research. Operational factors such as, new customer agreements, maintenance demand of old customers and sub-contractors geographical position impact to the scale of vendor data, when amount of shipments and Valmet's need of standard cargo transportation varies. Further, suppliers' level of information technology has effect on accuracy of vendor data. Some of the suppliers can produce vendor data based on automatic system reports, whereas other produce reports manually. Some of them had clammy collaboration which reflects to quality of vendor data reports.

Participant observation will always have, at least tiny, effect on the research when information gathering is done by observing. Errors can be caused by misunderstanding or unintentional negligence. Even if the observation should be done as neutral perspective as possible the effect of author's mood and personal qualities is unavoidable. Especially in situations where author's knowledge about the

context or research object is tangential, the observation can distort because of pressurised atmosphere of new information systems, working tasks, procedures and processes. In this thesis, before mentioned working conditions did effect on the research when environment of the research problem was new for the author.

Because of the characteristic of on-time delivery performance indicator and running twelve months reporting period, the status of performance indicators is not precise when data can be updated monthly by the reporting of the supplier. The reporting period effects also in overall statistics where information about the whole transportation network is presented. Effect on overall statistics was not relevant for the research because the idea of descriptive analysis was that the size of the considered matter was illustrated.

The effect of data gathering procedures behind the on-time delivery performance indicator can be seen for example from the table that was presented in outcomes of the thesis. Changes in the performance level of one supplier caused by the reporting period and when reason codes are not used, the level of performance is calculated straight from VTG data. Margin of error in results of the development of indicator levels by supplier could be approximately 1 %. A phenomenon is explained by shipment data update feature of the automatic systems where supplier can update the shipment data during the whole observation period. However, the results of performance indicator research give a clue about the changes made by the research and clarifies that all suppliers had some problems in their shipment reporting procedures.

Repeatability of the research

If the thesis would be repeated, the probability of different results would be possible in one way or another. Results of the reporting research would change mainly because of implementation of the development proposals for the road category. The actions would have effect on vendor data and SDM data, when suppliers would have

implemented reason codes and developed their reporting in according to the proposals. However, duration of the development could vary a lot per supplier because of their attitudes about the reporting and development of procedures.

If the approach and content of KPI dashboard research would remain the same, the results would not change because the created dashboard is engaged to value creators of Valmet transportation team which have been diverted from key initiatives and Valmet strategy. However, if the research would have repeated and the transportation team would have more participate in the research the results could change on the grounds of their opinions.

What I would do differently is that I would make the value creation map as a workshop with the transportation team. So, all team members could be part of the value creation mapping and all perspectives could be considered. Now the value creation map is based on my own observations, even if the content was checked by my mentor. It can be possible that understanding of the value creation context was not precise when it was taken under consideration of VTG business responsible. Weaknesses such as lack of understanding of the context and my own observations can cause the error in the developed KPI dashboard. However, my aim was to find out tools and methods from the theory so the created KPI dashboard could be as relevant as possible so Valmet transportation team could measure the things that matters the most. Value creation map was convenient tool to approach the KPI dashboard since, connection between chosen indicator and value creation map was founded.

9 AFTERWORD AND COMMENTS

Supplier relationship management was not familiar for me as a theory whereas key performance indicators have been one of the subjects in lectures. However, the scale of the theory, founded tools and information was searched deeper than ever. Lots of SRM and KPI related literature was reviewed because the literature of the SRM was hard to find. Most of the literature was written from procurement perspective so the content was about to slip in the wrong perspective and needed to apply on the research context.

Occurred reporting problems could have gained deeper examination, if the suppliers would have involved in the research and the real root causes would have been solved also from their side. However, the scale of the thesis was already wide and the additional perspectives would have extended it more. The wideness of the subject complicated especially the reporting phase of the thesis and clearly occurred in the produced report.

What made the work a bit harder was my new employment at the Valmet transportation team. Help and advices from my mentor, an experienced VTG business responsible, was needed during the thesis so that I could gain more knowledge. Along with the employment, new processes, IT systems and working environment came in to the picture and the familiarization took time a lot. This, on one hand, made making of the thesis more challenging but on the other, also very interesting. In addition, the topic of the thesis was close to my studies and transportation management systems have been my all-time favourite subject at JAMK. So, the subject for my thesis came as on cue from the Head of indirect procurement.

During the work, any resistance from the team was not observed, but more participation into the research would have been hoped from all other team members than my mentor. It would have been nice to hear more comments and opinions from others about the work I have been done and how I should proceed with it. However, I'm thankful for the opportunity that I got to involve the team of professionals that have knowledge and experience in the field of logistics.

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