CHALMERS
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The Practice of Value Stream Management and Lean Leadership in a Matrix Organization

A Case Study in the Aerospace Industry

Master's Thesis in the Master's Programme Quality and Operations Management

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Gothenburg, Sweden 2017
Report No. E 2017:023

MASTER'S THESIS E 2017:023

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Chalmers Reproservice
Gothenburg, Sweden 2017

Acknowledgement

This research was conducted as a Master's thesis at the program Quality and Operations Management at Chalmers University of Technology. We would like to take the opportunity to express our sincerest gratitude to all persons which has supported us by providing support and wisdom.

Firstly, we would like to thank our supervisor, Professor Mats Winroth, who was always just a phone call or email away. Through your useful input, responsiveness and positive attitude we were able to find the path for our research.

We are thankful for all support provided by GKN EPS. Thank you Rosmarie Östensen for your immense involvement, passion and guidance, which ensured that the quality of the report was secured. By providing full transparency and trust, we would like to thank Tomas Lindsta for enabling this research to take place at GKN EPS.

This research could not have been conducted without the assistance from all Value Stream Managers at GKN EPS; Jannica Andersson, Klas Oscarsson, Martin Ericson, Martin Svensson and Roberth Söderqvist, who gladly answered any questions we threw at them and allowed us full insight to their daily work. Furthermore, we would like to express our gratitude to all interviewees who set aside time to meet with us.

Lastly, we would like to thank our partners without your support, this thesis would not have been completed.

Jennie Thuresson & Maria Östman

June, 2017
Gothenburg, Sweden

Abstract

Many manufacturing organizations experience the need to use several strategies to compete where globalization and the quest towards high quality while reducing costs characterizes the business environment. The aim of this research is to identify the potential relationship between the multi-strategy organizational matrix design, Value Stream Management (VSM) and Lean leadership in a manufacturing organization. The purpose is to investigate important factors in creating a cross-functional team, working in accordance with the three theories. To guide the research three research questions were developed; "*How can an organization be structured in a multidimensional matrix organization and work with Value Stream Management in parallel", "What prerequisites are required of a Lean leader in a multidimensional matrix organization working with Value Stream Management"* and "*What are important factors when creating a strong cross-functional team, given the three concepts of matrix organizational design, Value Stream Management and Lean Leadership".*

The relationship between the three theories has been investigated through reviewing approximately 50 literary sources, collecting empirical data by conducting 30 interviews and through observations. The literature presented similarities between the theories, which together with the case study showed a possibility to combine the theories. Influence without authority, empowerment, communication, alignment, and resource allocation were identified as important parameters in this constellation. The result of the study show the maturity of the theories in an organization play an important role and to be successful, there is a need to have VSM as core business. A leader for an organization combining the theories must possess soft skills to reduce barriers and there is a need to balance the organizational structure with processes, rewards, strategy and people.

Key words:

Design, Complexity, Leader, Leadership, Lean, Management,
Matrix, Organization, Structure, Value Streams

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Abbreviations

4M	Man, Machine, Material, Method	Concept
5S	Sort, Store, Shine, Standardize, Sustain	Concept
CAM	Computer Aided Manufacturing	Role at GKN
CME	Chief Manufacturing Engineer	Role at GKN
DSQR	Delivery Supplier Quality Responsible	Role at GKN
EI	Emotional Intelligence	Concept
EPS	Engine Products Sweden	Division at GKN
ERP	Enterprise Resource Planning	Concept
GAS	GKN Aerospace Sweden	Division at GKN
GKN	Guest, Keen, Nettlefolds	The case organization
GM	General Manager	Role at GKN
HR	Human Resource	Role at GKN
IT	Information Technology	Role at GKN
KPI	Key Performance Indicator	Concept
LTA	Long-Term Agreement	Concept
ME	Manufacturing Engineer	Role at GKN
MEQE	Manufacturing Engineer & Quality Engineer	Role at GKN
OMS	Operational Management System	Concept
PD	Policy Deployment	Concept
PDP	Performance Development Process	Concept
RACI	Responsible, Accountable, Consult, Inform	Concept
RRSP	Risk and Revenue Sharing Partner	Concept
SQA/QA	Supplier Quality Assurance	Role at GKN
SQD	Safety, Quality, Delivery	Concept
SSP	Service and Special Products	Division at GKN
TL	Team Leader	Role at GKN
VS	Value Stream	Concept
VSM	Value Stream Management	Concept

1 Introduction

This introductory chapter aims to provide a background to the research and its area of investigation, purpose and aim together with a brief problem description, research questions and delimitations.

1.1 Background

In all organizations, a balance must be found between trade-offs such as cost, time, quality, technology development and customer satisfaction (Skinner, 1969). Often one of these objectives is in focus but during the last decade, focus has shifted and many market demands high quality products to a low-cost (Bergman and Klefsjö, 2010). It started in the automotive industry in the 50's where automotive manufactures were experiencing declining profits and recessions, but one organization remained profitable; Toyota Motor Company (Liker and Convis, 2012). The world caught an interest in what they were doing differently but it was not until 90's that two researchers launched the first edition of their book "*The machine That Changed The World*" where Toyota Motor Company's production system was introduced and the concept of Lean was born (Womack et al., 2007). Thereafter, Lean has become a widespread philosophy, adopted by several manufacturing organizations even though the practices slightly differ (Abolhassani et al., 2016). The purpose of Lean is to reduce waste in order to surface underlying problems which affect quality and cost. Multiple tools have been developed to assist organizations in their quest towards perfection using the Lean methodology of which one is Value Stream Mapping. The tool aims at identifying value-adding activities in a value stream (VS), from supplier to customer (Rother and Shook, 2003). Even if the tool assists in identify waste in production, a lack of link to strategy was identified (Hines et al., 1998) and the philosophy Value Stream Management (VSM) emerged and took Lean to the next level (Tapping and Shuker, 2003). The purpose of VSM is to align Lean tools with the organization's strategy to increase competitiveness when the strategic objective is to focus on the flow of high quality products to a low cost.

But what happens when an organization must compete on additional strategic objectives, such as leading technologies, customer satisfaction simultaneously as remaining high quality and produce products to a competitive price? Many authors suggest a matrix structured organization can assist to execute two or more objectives simultaneously (Galbraith, 2009; Gottlieb, 2007; Hall, 2013; Martin, 2005). The organizational complexity will increase with the number of strategic objectives hence organizations must continuously strive to reduce this complexity. Organizations who can execute complex multi-objective strategies have a competitive advantage over organizations that can only manage a singular focused strategy (Kesler and Kates, 2011). A matrix design is complex and comes with challenges such as lack of accountability, increased uncertainty and unclear goals (Hall, 2013). To reduce any ambiguity with the matrix design, leadership is crucial.

Cross-functional teams play a vital role in both organizations operating in VSs and in matrix organizations (Baggaley and Maskell, 2003; Galbraith, 2009; Kinor and Francis, 2016). To lead cross-functional teams' leaders must possess the right attitude and qualities. Lean leadership has proven to be a successful way to work with leadership in a Lean organization. The characteristics of a Lean leader are to lead through empowerment of employees and train them to work with improvements continuously (Halling and Renström, 2014; Liker and Convis, 2012; Poksinska et al., 2013). Whether the characteristics of a Lean leader can be useful in an organization using VSM in a matrix structure is interesting to investigate further based on the progression of the two theories.

1.2 Aim and Purpose

The aim of this research is to identify the relationship between matrix organizational design, Value Stream Management and Lean leadership in a manufacturing organization. The purpose is to investigate important factors in creating a cross-functional team working in accordance with the three theories mentioned above. A case study will be conducted at GKN Aerospace at the business unit Engine Products Sweden (EPS) as a basis to assist in identifying key characteristics to achieve the aim and the purpose. EPS is a three-dimensional matrix organization that operates in six VSs and in accordance to Lean philosophy, which is essential to GKN's corporate strategy and way of working throughout the organization.

1.3 Problem Description and Research Questions

Organizations can choose from a variety of theories to compete strategically today. In matrix organizational theory multiple strategies are executed simultaneously and VSM theory is used to create efficient and effective flow of value. The traits of a multidimensional matrix organization and VSM both appear to be two theories which organizations apply in practice to stay competitive and from this standpoint, the first research question emerged:

Research Question 1

How can an organization be structured in a multidimensional matrix organization and work with Value Stream Management in parallel?

As mentioned earlier leadership is crucial to succeed in any organization, and plays an important part in creating and leading cross-functional teams. Both VSM and Matrix theory highlight the importance of cross-functional team with different competences to be competitive. Since VSM is a part of Lean theory, Lean leaderships potential impact on a leader for a team in a multidimensional matrix organization was of interest hence the second research question was developed;

Research Question 2

What prerequisites are required of a Lean leader in a multidimensional matrix organization working with Value Stream Management?

If a leader possesses the required skills according to the three theories, what are the important factors in creating a cross-functional[1] team? This leads to the third research question;

Research Question 3

What are important factors when creating a strong cross-functional team, given the three concepts of matrix organizational design, Value Stream Management and Lean Leadership?

1.4 Delimitation

This research is delimited to a case study conducted at GKN Aerospace at the business unit EPS located in Trollhättan, Sweden. The focus of the research is on VSs located in Operations, one of the three dimensions of the matrix design at EPS. However, Operations has shared resources with supporting functions and these resources will not be delimited from the scope of the research, as their input is considered valuable. In this research only one type of cross-functional team has been investigated, namely the employees affecting the VSs. While other cross-functional teams operate at EPS these have been delimited from the research.

Furthermore, the focus is not on creating Value Stream Maps or optimizing physical flow, but rather on managerial and organizational aspect of running VSs. From this research, no structural changes will be suggested in the matrix design and no evaluation of functional or VS roles will be made. In the case leaders are delimited to managers.

1.5 Thesis outline

The disposition of the master thesis is as follows:

Chapter 1 – Introduction

The first chapter presents a background to the research together with purpose and aim, problem description and research questions, and delimitation of the research.

Chapter 2 – Method

In chapter two the chosen research strategy and design are presented together with the three methods used in the research; interviews, documentation and ethnography. Furthermore, how quality of data and ethical considerations is addressed and how to mitigate these are presented.

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[1] In this thesis the term 'cross-functional' (i.e. cross-functional teams) is used to describe cross-functional as well as cross-dimensional, which in the case of EPS is between two of the dimensions; Program, Functions and Operations.

Chapter 3 – Theory

The third chapter provides the theoretical framework of the three theories used in the research: matrix organization, Lean leadership and Value Stream Management. The theories are later used in the analysis together with empirical findings.

Chapter 4 – Empirical Findings

In chapter four the findings from the case study of EPS is presented. The empirical findings from interviews, observations, and documentations are summarized to provide the reader with the context of the case. The chapter begins with presentation of the organizational structure and goes further into the Operations dimensions and VSs, teams and how EPS works as an Lean organization. The chapter ends with a summary of four challenge areas which has been acknowledge during the case study.

Chapter 5 – Analysis

Chapter five systematically combines theory and empirical data in order to answer the three research questions. The subchapters are structured in accordance with the research questions, starting with the first question. After each question a short summary of key findings is presented.

Chapter 6 – Discussion

The sixth chapter starts with a discussion of the research purpose, theory and methodology and is followed by a discussion of the key results of the analysis. Limitations of the study are elaborated from both a theoretical and case perspective. The chapter ends with recommendations for future research.

Chapter 7 – Conclusion

In the seventh chapter the aim and the purpose are to be addressed and the major findings of the research is presented.

Chapter 8 – Recommendations

In the eighth and last chapter, the researchers provides recommendations to the studied organization, EPS. The recommendations are based on both theoretical findings as well as challenges discovered from the case study.

2 Methodology

The methodology chapter provides an outline of how this research was conducted including choice of research strategy and design, data collection methods, how quality of data was secured and what ethical considerations needed to be addressed.

2.1 Research Strategy

There are two research strategies acknowledged by Bryman and Bell (2011); quantitative and qualitative research strategy and is described as a general orientation towards research. Quantitative research strategy emphasizes collection of numerical data and through hypothesis testing, identifying the relationship between theory and research. Qualitative research strategy aims to let new theory emerge from the research. In comparison to the previously described research strategy, qualitative research strategy focuses on words rather than numerical data when collecting and analyzing data. The process is initiated by identifying research questions to be investigated through the research, followed by selection of site or subject to be studied where appropriate data will be collected and identified. This thesis investigated how to operate according to Value Stream Management and Lean leadership in a matrix organization and how it affected the leaders and the teamwork in an organization. To reach the desired result, a qualitative research strategy was chosen. A quantitative research strategy was not considered to be suitable since the research is not focusing on collecting numerical data nor testing established theory, but rather adding new perspectives by combining theory of matrix organization, Value Stream Management and Lean leadership which is in line with a qualitative research strategy.

2.2 Research Design

When the research strategy has been chosen, the design can be determined. Bryman and Bell (2011) define the term as a framework of collecting and analyzing data. Five designs exist and are outlined as experimental, cross-sectional, longitudinal, case study and comparative. A case study was chosen for this research as the description of the design in a qualitative research strategy fit well with the situation; *"The intensive study by ethnography or qualitative interviewing of a single case, which may be an organization [...] a group of employees within an organization [...] or an individual."* (Bryman and Bell, 2011, p. 68). The key in a case study design is the researchers' interest in the complexity of the chosen case and an in-depth analysis of it. Yin (2009) mention there is no standard criteria of when to use case study as a research design, however an indication can be when research questions contain "how" or "why". This statement supported case study as a research design for this research due to the formulation of the first and main research questions.

The relationship between research and theory is divided into two key concepts; inductive and deductive approach (Bryman and Bell, 2011). A deductive approach, related to a quantitative research strategy, test existing theory in a clear and logical way through constituting a hypothesis based on theory and use empirical data to accept or reject the hypothesis.

An inductive approach, related to a qualitative research strategy, let new theory emerge through empirical observations or findings. As this research is conducting a case study in accordance with qualitative research strategy, the inductive approach was selected. However, one potential issue when conducting a case study is the cohesiveness of elements where unanticipated empirical findings and theoretical insights may lead the researcher's in an unintended direction (Dubois and Gadde, 2002). Rather than consider the qualitative research to generate theory, a way is to look at it as development of already existing theory where the framework, here the case study, is modified over time. Dubois and Gadde (2002) refer to this as a systematic combining approach and was applied in this research.

2.3 Literature Review

A literature review is conducted in order to support the research design and research questions aiming at scoping the research; what should be included and what should be left out (Bryman and Bell, 2011). The purpose is to form a base by identify relationship between already established theory and the proposed research and evaluate which contributions can be made (Maxwell, 2005). Interpreting written sources of theory is used to identify potential issues within the research such as controversies, inconsistencies, and key concepts and theories (Bryman and Bell, 2011). As a literature review is performed, the researcher is likely to obtain benefits such as learning from previous researchers' mistakes, identify what is already known and provide new insight to the research. Furthermore, it may assist in develop an analytic framework and gain a deeper knowledge in the field. A literature review is always expected when conducting research.

This research used published books, e-books and scientific articles for the literature review, approximately 50 literary sources were used. Google Scholar and Chalmers Library were used to identify useful theoretical sources and recommendations from supervisors were also obtained. Keywords used in different combinations were; *matrix, structure, lean, organization, leadership, design, value streams, behavior, management, complexity* and *task ownership.* As useful sources were established, their references were used as guiding towards finding further books and articles which might had been relevant to the research.

2.4 Empirical Study

In a case study, it is required to collect qualitative data and several methods can be used (Yin, 2009). Maxwell (2005) states that there is no correct or incorrect method to use in an empirical study, as it is dependent on the research situation. Yin (2009) refers to six sources of evidence where data can be collected; documentation, archival records, interviews, direct observations, participant-observation and physical artifacts. Due to time and resource restriction, interviews, documents and participant-observation ethnography was conducted in this research.

2.4.1 Interviews

Interviews are the most commonly employed form of research method in qualitative research and is divided into two main types; unstructured and semi-structured (Bryman and Bell, 2011). Unstructured interviews can take departure from a single or few open questions. Compared to semi-structured interviews, unstructured can be compared to as a conversation where the interviewer only follows up and ask questions on points of interests. Semi-structured interviews are a flexible qualitative data collection method where the interviewer has prepared open-ended questions in the form of an interview guide. The aim is to gain rich and in-depth set of data to assist in answering the set research questions (Saunders et al., 2016). This data collection method will allow respondents to open up and speak freely regarding the areas of question, which will also bring value to the researcher as reasons for attitudes and opinions can arise (Bryman and Bell, 2011; Saunders et al., 2016). Yin (2009) states the advantages to be able to formulate case-specific questions and receive insightful information however he also states the possible disadvantage of bias result through poorly formulated questions as well as through respondent bias.

During a seven-week block 30 interviews, both unstructured and semi-structured, were conducted in person with management on different levels at EPS as well as a few additional stakeholders to grasp the complexity of the problem. By involving different level management positions, the researchers were able to gain a holistic view of the current situation, but also understand various opinions regarding the problem area. Initially, nine unstructured interviews were performed with VS managers and top management at EPS in order to provide an introduction to how the operational dimension works. In parallel with the interviews, observations were conducted. As an understanding of the problem was obtained, 16 semi-structured interviews were conducted with a set of chosen questions with a defined sampling group selected to represent roles from different dimensions. Simultaneously, the five VS managers were once again interviewed, this time following semi-structured interview questions. Almost all interviews, with few exceptions, lasted for one hour.

2.4.2 Documentation

Documentation reviewed for empirical purposes is not produced by the researchers and can take many shapes (Bryman and Bell, 2011). Saunders et al. (2016) refer to documentation as physical evidence, which can be transported in time and space to be analyzed several times with different purposes. Furthermore, documentation can be divided into two categories; text (databases, reports, letters and newspapers) and non-text (media accounts and voice recordings). The documentation which was reviewed in this research was text and what Bryman and Bell (2011) present as organizational documents which refers to both public, such as annual reports and press releases, and non-public, such as organizational charts and manuals, documents.

Organizational charts, role descriptions and process charts were accessed online through GKN's intranet, which assisted the researchers with comprehending the organizational structure. A booklet in how Lean is adopted at GKN was used to understand key points in their ambition in working with Lean. Bryman and Bell (2011) state ethnographers commonly use these types of documentation and can both provide background information as well as a description of an organization and their history. Yin (2009) states the benefits of using documentation as a stable and exact source of data, which can be reviewed several times. The researcher is able to gain information from a long-time span consisting of many events. However, Yin (2009) further elaborates on potential pitfalls of both reporting and author bias and biased selectivity. Documentation may also be hard to find and access.

2.4.3 Ethnography

Participant observation can be explained by a broader term, ethnography, which entails not only a research method but also the output of the research (Bryman and Bell, 2011). Ethnography is conducted by the researcher, or ethnographer, and includes the study of behavior, asking questions and listening in to conversations in a social setting. Both Bryman and Bell (2011) as well as Saunders et al. (2016) state four roles an ethnographer can take on a continuum from complete observer, covert and no involvement, to complete participant, overt and high involvement. In this research, the researchers were conducting ethnography as observer-as-participant, meaning they took the role mainly as interviewers and were open and honest regarding the purpose of the research.

Yin (2009) state if there is more than one observer, it will help to increase the reliability, or as Bryman and Bell (2011) refer to it, the dependability, of the research. Furthermore, direct observations will cover real-time events, which is a good compliment to documents that are not produced for the research. Five observations were conducted with one Value Stream managers at a time in order to complement interviews and documentations by obtaining practical insight to EPS daily operations. During observations questions were asked to participants in order to gain clarification in certain aspects and notes were taken on thoughts and comments, but in moderation to not interfere with the participants.

Potential negative aspects pointed out by Yin (2009) are biased result due to poorly formulated questions and reflexivity, meaning the respondent replies what is expected, not the truth and is a common problem when conducting overt research. By allowing anonymity to all participants, and by clarify the purpose of the research the respondent biased was hoped to be reduced. Lastly, Bryman and Bell (2011) mention the problem of "going native" where the researcher get caught up by the environment which they conduct their research in which may result in difficulties collecting and analyzing data. Being located both at EPS, where the case study is performed, as well as at Chalmers University of Technology, the researchers believed assisted in reducing the chance of "going native".

Often ethnographers use key informants to provide deep insight in the social setting of an organization such as important events and relations (Bryman and Bell, 2011). The researchers for this research used their supervisor at EPS and Head of Operations as key informants to get access and insight to knowledge.

2.5 Quality of Data

Yin (2009) uses the terms construct validity, internal validity and external validity when determining the quality of data. Construct validity refers to the identification of correct measures are used, internal validity seeks to establish a causal relationship and external validity is mentioned where each domain must be defined in order to allow generalization of result (Yin, 2009). Bryman and Bell (2011) however use the term trustworthiness containing four categories; credibility, transferability, dependability and credibility. As Bryman and Bell (2011) further argue there is no single truth in a qualitative research hence use the terms credibility, to mirror internal validity, and transferability, to reflect external validity. Credibility ensures the research is following good practice by allowing all participants, or a selected group, to review documented collected data to verify the authenticity. By doing this, quality of data is secured through what Bryman and Bell (2011) refer to as respondent validation. Yin's (2009) solution to construct validity is in accordance and suggests key informants should review draft prior to publishing. Before the publication of this Master's thesis involved employees were provided the opportunity to review their contribution. Another method to confirm the validity is to use is triangulation where more than one source of data or data collection method is used (Bryman and Bell, 2011). Ethnographers often use triangulation to confirm observations through interviews. In this research, several sources of empirical input were gained, hence triangulation was used. Transferability aims to address the problem of transferring one situation to another one as depth in qualitative research is more often examined rather than width (Bryman and Bell, 2011). By using thick descriptions, such as rich details of organizational culture, the researcher can leave the decision of applicability in a different setting to the person reviewing the research. Yin (2009) arguments support Bryman and Bell (2011) by stating the researcher should build explanations as well as address rival explanations. Chapter 4 provide the reader with detailed description of the operations EPS, leaving the reader the option to evaluate whether it is applicable to their case.

Reliability is the factor demonstrating operations of a case study and is outlined by if the case study can be repeated, obtaining the same results (Yin, 2009). This term is also referred to as dependability and is suggested to be addressed by institutionalize an auditing process (Bryman and Bell, 2011). Complete records, including field notes, interview transcripts and problem formulations, should be kept allowing peers to audit the process. The peers are also responsible of confirming if a proper procedure has taken place, however the auditing often takes a lot of time due to the large set of data used. Yin (2009) proposes thorough use of theory when a case study is used, but also support the importance of keeping documents. All interviews at EPS, unstructured and structured, were recorded with the interviewees permission in order for researcher to further analyze the result by reviewing the material multiple times.

Bryman and Bell (2011) add a category in trustworthiness which Yin (2009) does not include; confirmability. Even though complete objectivity is impossible, it should be minimized and the researcher should not allow for personal values to interfere. Neither should the theoretical inclinations steer the research. The issues of biases are raised by Saunders et al. (2016) mainly when collecting empirical data. There may be a problem during interviews where the interviewees only provide the answers they want to share, which may not show the complete truth. There is also a risk of interviewer biased, linked to confirmability, where personal values and thoughts are pushed onto the interviewee. The researchers personal impact on the case study was acknowledged and actively addressed to minimize the risk of conflict the result of the research.

2.6 Ethical Considerations

There are four main ethical issues to address when conducting research; harm to participants, lack of informed consent, invasion of privacy and deception (Bryman and Bell, 2011). Although they are divided, the issues are overlapping and all need to be considered. In this research, several interviews and observations were conducted. Ensuring participants in these activities were treated correctly and in accordance with the ethical considerations presented below were acknowledged.

Harm to participants does not necessarily need to be physical harm; it may also be stress, career or self-esteem (Bryman and Bell, 2011). It is the researcher's responsibility that the respondents are not harmed, or at least minimized. The researcher should ensure anonymity and confidentiality where possible and if the identity of the respondent must be revealed, an approval must be made from the respondent. It is impossible to identify all cases where harm is present and it is a major issue in qualitative research. Interviews were conducted at different levels at EPS and respondents were allowed anonymity where applicable in order to receive honest and truthful answers without jeopardizing the respondent's career. The answers were collected, stored and used exclusively by the researches.

Lack of informed consent is closely related to the previous ethical issue (Bryman and Bell, 2011). Each respondent must be provided enough information to be able to make an informed decision if they would like to participate or not. It is extremely hard to provide all information and often this is an issue when covert observations are conducted or when the identity of the researcher is hidden. In some cases, researchers' can benefit from conducting covert observations, as the studied objects will not change behavior. A researcher should not intrude on the privacy of a respondent, which address the ethical issue of invasion of privacy. This is linked to lack of informed consent as the respondent may consider the researcher is invading their privacy if they knew the researcher was conducting observations. Covert observations generate a high level of invasion of privacy. No covert observation took place during this research and the ethical issue of lack of informed consent was addressed by provide sufficient information prior to any activity involving respondents. When conducting observations, the participants were informed of the purpose and usage of the obtained observations. However, there is always a risk of participants' alternating their behavior during observations.

This risk was acknowledged and aimed to be mitigated through open and transparent communication of the observation's purpose as well as conducting several observations of the same type. Furthermore, before the interviews began all interviewees were provided with a transcript of the aim of the interview and the background to the thesis in order to secure all participants were given the same information. During interviews the respondents were given the opportunity to deny replying to questions as well as reviewing their answers before submissions for analysis to mitigate the risks of lack of consent and invasion of privacy.

Lastly, deception is raised as an ethical issue any researcher must be aware of (Bryman and Bell, 2011). This issue refers to the researcher state the research is something it is not. This research was conducted with full transparency, ensuring all respondents were given a true picture of the reason behind the research. From first point of contact with participants in the study the reason, purpose and intended outcome of the study were explained to the best extent possible. This was to ensure the participants could make an active choice whether they wanted to participate and to grasp how the material would be used.

3 Theory

In the theory chapter the theoretical framework consisting of Matrix organizational design, Lean leadership and Value Stream Management (VSM) is presented to provide the reader with valuable insight.

3.1 Matrix Organization

This subchapter aims to address the subject of matrix organizations, its origin and key factors.

3.1.1 Organization Design and Structure

Designing an organization is the process of building an optimal framework which purpose is to create value for a set of objectives (Cichocki and Irwin, 2014). Organizational design therefore includes more factors than the organizational structure, which is often visualized through an organizational chart (Galbraith, 2009). In designing an organization, the choices should match the complexity of the challenges needed to be managed. The design needs to be aligned with the organization's goals and objectives, and should facilitate effective strategy deployment (Kesler and Kates, 2011). However, the choice of an organizational design also includes accepting the inherited trade-offs. Organizations need to compete in increasingly complex business environments, therefore they seek designs that can match the complexity. An organizational design, which is organized to manage complexity where two or more objectives can be executed simultaneously, is the matrix organization (Galbraith, 2009; Gottlieb, 2007; Hall, 2013; Martin, 2005).

Tkalcevich (2016, Chapter 3, para. 3) describes organization structure as "*a framework that shows others the lines of authority, dictates formal communication channels, and allocates duties and rights to individuals"*. The matrix organizational structure represents two or more dimensions for example products, geographically and functions. It can be visualized as a grid-like structure with multiple perpendicular chains of command (see figure 3.1), which result in employees often report to two or more managers (Galbraith, 2009). These dual management relations are often referred to as solid or dotted lines. The meaning of solid and dotted lines are many, one example is the solid line is drawn to the functional manager who is responsible for the employee's salary and the dotted line is drawn to the project manager who is responsible for day-to-day activities. In the matrix structure, authority can both flow vertically within functions and horizontally across functional boundaries. The functional manager determines how tasks will be carried out and the horizontal manager determines what tasks and when they will be carried out.

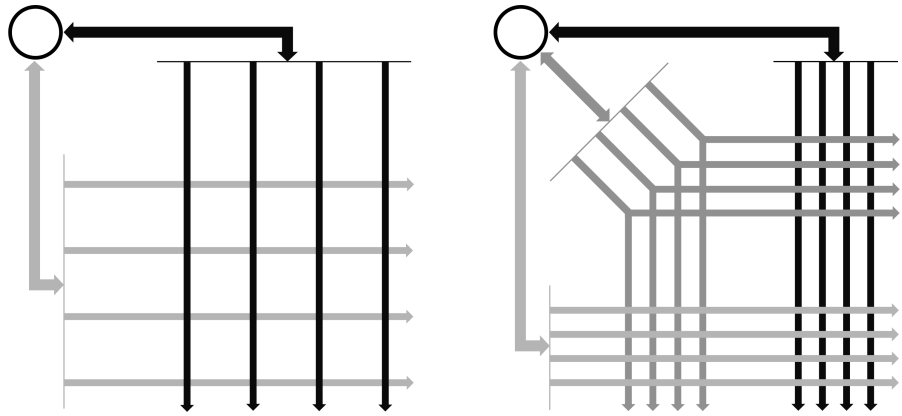

Figure 3.1. Illustration of grid-like matrix structures based on Galbraith (2009) definition.

3.1.1.1 The Continuum of Organizational Design

Galbraith (1971) presents a continuum of organizational designs, ranging from pure functional organization to pure product organization where the matrix organization is positioned in the middle (see figure 3.2). On the one side of the continuum is the functional design, which historically has been the most commonly adapted organizational design. The structure is often hierarchical and vertical structured where activities, tasks or process grouped together are carried out in separate functions. Organizations with strong functional focus often rely heavily on building specialized skills or advanced technology (Galbraith, 2009; Willcock, 2013). Common issues with functional organizations have been acknowledged as a rigid structure and can lack cross-functional integration. Interdependencies are present and may create problems in case one function is not performing as expected and deliveries are on a tight schedule (Galbraith, 1971). On the other side of the continuum is the product oriented organization design and it focuses on project execution where agility, delivery and budget targets are important objectives. In an organization with great diversity between product lines as well as a great change rate in products, this organizational design is appropriate. Even so, the design reduces focus on functional development and parallel projects can lead to problems such as resource utilization. In between these two organizational designs is the matrix organization.

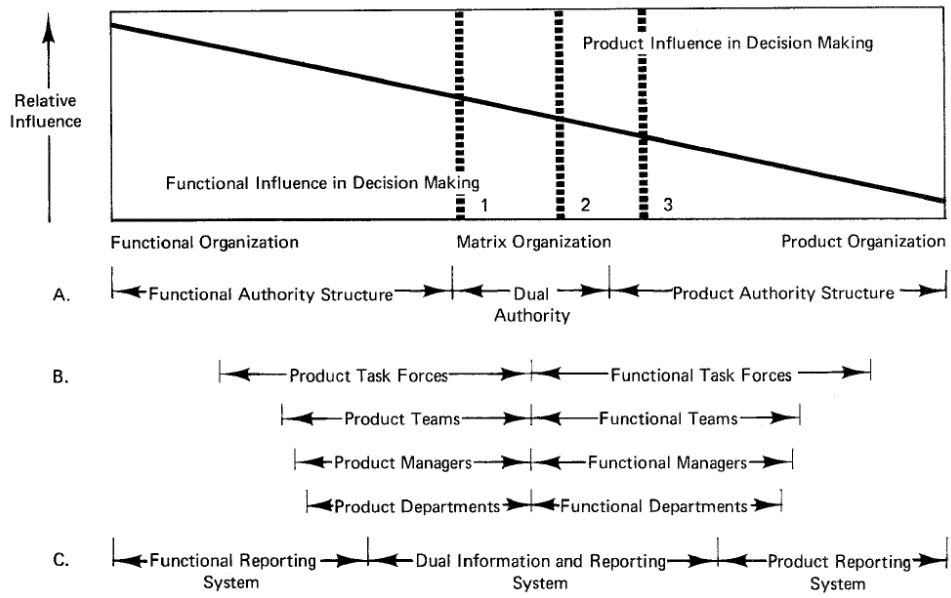

Figure 3.2. Range of organizational designs on a continuum (Galbraith, 1971).

3.1.1.2 Star Model

Organization design can be defined by using Galbraith's (2009) Star Model, which consists of five categories; strategy, structure, processes, rewards and people (see figure 3.3), all categories should be equally emphasized and interact harmoniously. If one of these five categories are misaligned, the whole organization will be affected. Star Model allows an organization to emphasize not only the structure of a matrix organization but also other key parameters to create an aligned organizational design. The purpose of conducting a Star Model is to generate an effective organizational design, translating the strategy and expectations to all employees within the organization. The five categories are described below:

The strategy provides a sense of direction through establishing goals, values and vision for the organization and here is where the competitive advantage can be found. (Galbraith, 2009) Two questions to ask when determining the strategy are *what is the formula for success* and *how do we differentiate us from competition* (Galbraith and Kate, 2007).

The structure dictates placement of power distribution and authority and can be considered the physical body of an organization (Galbraith, 2009). It entails decisions in terms of number of job specialties needed, span of control, whether power decisions should be centralized or decentralized and the form of the organization; standard dimensions or matrix structure. Questions to ask here are *how are decisions made, who has power and authority in the organization* and *what are the identified key roles* (Galbraith and Kate, 2007).

Processes displays both vertical information flow, including business planning and budget processes such as allocation of resources and funds, and horizontal information flow, such as new product development projects which are based on the workflow of the organization (Galbraith, 2009).

The processes allow the organization to function by ensure cooperation between departments are in place. *How are decisions made in the organization, how is collaboration enabled* and *how does work flow between different roles* are questions raised here (Galbraith and Kate, 2007).

Reward systems provide incentives and motivation to the employee simultaneously as it aligns the organization's goal with the employee (Galbraith, 2009). Monetary rewards such as salary increase, bonuses and promotions are not the only way to reward employees; recognition and challenging tasks are other ways to show someone has done a good job. Team bonuses are a good way to facilitate teamwork and are becoming increasingly common. Questions to determine rewards are *how is behaviour shaped by the goals* and *how can progress be determined* (Galbraith and Kate, 2007).

People create the skills and mind-sets to operate effectively in an organization in line with the direction (Galbraith, 2009). If an organization wants to be flexible, there is a need to have flexible employees and where cross-functional teams are required, people are needed which can collaborate. An organization which chooses to work in a matrix structure must recruit people who can influence without authority. When all these components are aligned it drives the overall behavior of an organization and results in organizational performance and culture. To identify the right skills and people, the following questions should be asked *what skills does the organization require* and *how can talent be developed* (Galbraith and Kate, 2007).

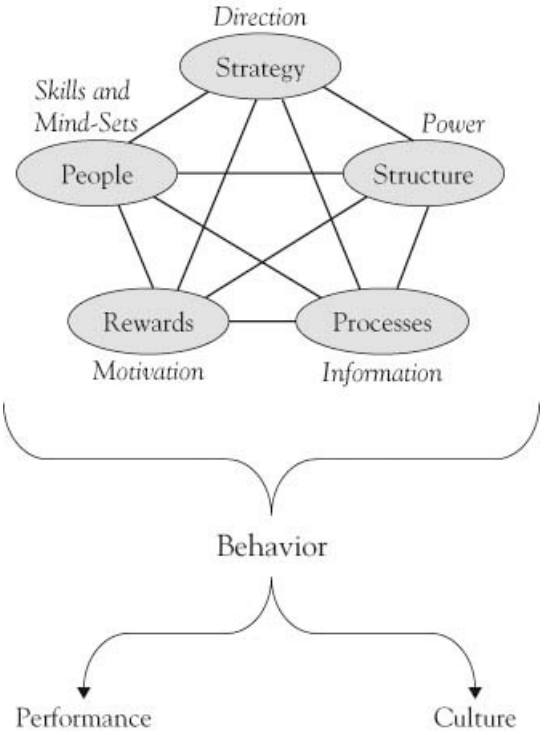

Figure 3.3. Star Model (Galbraith, 2009).

3.1.2 History of Matrix Organization

The origin of a matrix structure is debatable when reviewing theory. Galbraith (2009) argues similar structures dates back as early as the 1900s in the era of Scientific Management where Frederick Taylor proposed multiple bosses. Gottlieb (2007) goes even further back in history to the Roman legions. Galbraith (2009) advocates the modern matrix structure gain leverage from the competitive environment of the aerospace industry during the 1960's. When Russia launched Sputnik in 1957 it created high pressure on the US Aerospace industry. However, the Vietnamese war and expansion of the commercial aircraft market left the American Aerospace industry with limited resources and scarce budgets. Cost-efficiency and project delivery became top priorities, and in order to handle the both these strategies a shift in the organizational structure was needed. Many organizations adopted a matrix structure due to its dual strategy characteristics with a functional manager for developing technical excellence and a project manager for keeping track of project scheduling and costs (Galbraith, 2009; Gottlieb, 2007). The matrix structure was proven successful and gained leverage in other industries as well during the following decades. Benefits acknowledge by top management were lateral cross-sectional interaction which helped solve every day firefighting, freeing up time for leaders to focus on strategic issues (Gottlieb, 2007). However, like many other management concept the matrix organizational structure experienced a rise and fall. Galbraith (2009) claims reasons for the failures did not lie with the structure itself but that it was not correctly adopted, installed and implemented by organizations. Since the 1990s matrix organization has been formally accepted as a natural alternative for organizational design for organizations with complex business objectives.

3.1.3 Dimensions of a Matrix Organization

The need to manage increasingly complex business environments and organizational objectives has led to the expansion of organizational dimensions in the matrix. A matrix organization can be structured in two or more dimensions, ranging from simple to increased complexity (see figure 3.1 for simplified versions of a two- and three-dimensional matrix structure). In the following sections different types of matrix dimensions are presented.

3.1.3.1 Two-Dimensional Matrix Organizations

Galbraith (2009) presents several alternatives to two-dimensional matrix design. Firstly, the simple matrix design is also referred to as *line-and-staff model* where functions interact with business units. The relationships are often defined as solid or dotted and describe reporting relationships employees have with their dual managers. The second two-dimensional matrix design is the so-called *two-hat model* refers to when one manager is responsible for both a function and a product. The third variant is the *baton pass model*, which is often applied to products with long development- and life-cycles. The model refers to an exchange of managers depending on where the product is in the life cycle, for example, a R&D manager is responsible for the product during the development phase and after the phases is completed, the responsibility is passed on to the product manager in marketing. Depending on where the product is in the life cycle, the responsibility is passed back and forth between the managers.

A fourth two-dimensional design is a *"matrix within a matrix"- model*, which is described as one position is replicated at several levels in the organizational structure. In a two-dimensional design, it is important to have an articulated power balance. Leaders should be agile to the power situation in order to continuously balance the scale.

3.1.3.2 Three and Multiple Dimensional Matrix Organizations

Galbraith (2009) advocates the complexity of the two-dimensional matrix organization that arose during its popularity in the 1960's has today become manageable for most competent organizations. However, an increasingly complex business environment has resulted in companies who have mastered the two-dimensional structure ads more dimensions in order to become more competitive and deliver higher value to their customers.

Today's globalization has led to organizations need to manage their operations across borders and therefore an additional geographical dimension is often added in order to facilitate international expansion. Though it is the most common reason to expand from a two-dimensional to a three-dimensional matrix organization, other three-dimensional constellations still occur. Galbraith (2009) explains that organizations can also add a customer dimension as a third or fourth dimensions. The *front-back hybrid model* is a four-dimensional matrix model where the objective is to have strong customer focus while achieving global-scale economies. Its hybrid name refers to that equal focus lies on both ends, the front-end focuses on customer requirements and the back-end has a product focus. Furthermore, companies such as IBM have shown there is no limit to implementing additional dimensions with its six dimensions. However, the expansion of dimensions in matrix organization further complicates managing and execution all different objectives.

3.1.4 Implementing a Matrix Organization

One of the key reasons for deciding to work in a matrix organizational design is to execute several strategies simultaneously. Implementing a matrix organization often means shifting focus from vertical to horizontal processes (Hall, 2013). In matrix transformations organizations often struggle to dismantle vertical silos and managers find it challenging to lose autonomous control and authority. Hall (2013, Chapter 1, Section 5, para. 5) further elaborates "*A hierarchical and control-based individual or corporate culture will really struggle to make a matrix work.*". In order to be successful, the role of the vertical process leaders has to be reevaluated. The new role includes supporting the horizontal processes through supplying the right people, technology or tools (Martin, 2005).

Besides considering the five categories in the Star Model presented by Galbraith (2009) when designing an organization, Hall (2013) proposes for matrix organizations to work it needs to be aligned with the organization's strategy, structure, system and skills. Hall (2013) further elaborates the last key factor, skills, is often neglected therefore employees often blame the structure and propose reorganizations when in reality employees do not have the proper skills to operate in a matrix.

Implementing a matrix structure can be a huge cultural change for an organization and the need to guide employees in the transition should not be overlooked, organizations should provide communication and support to accept and settle in to the new structure (Gottlieb, 2007). When implementing a new matrix all levels of the organization should be involved and educated for a successful transformation (Martin, 2005). Top management needs to have an understanding of the matrix concept to be able to create an operational platform and create horizontal channels while reevaluating the vertical structures. The company vision also needs to be shared with clarity and consistency throughout the organization (Bartlett and Ghoshal, 1990; Johnson and Geal, 2016). Middle managers need to put emphasis on building teams, understanding how to operate in the matrix while redefine their own role as managers. Martin (2005) elaborates project management and collaborative skills also should be taught in order for employees to have the right skills to operate in a matrix. Individuals need to evaluate what shifts they need to do to be able to work in matrix organization (Martin, 2005).

Though reorganizations is needed to shift focus, it is important not to get caught up in the structure or dotted versus solid line relationships when operating in a matrix (Galbraith, 2009; Gottlieb, 2007; Hall, 2013). Structural changes in matrix organizations can often be ineffective where organizations get caught in series of reorganizations, which leads to loosing operating time while constantly having to settle into new constellations. Kesler and Kates (2011) call structure "a powerful but blunt instrument" as structure alone is not enough to dictate how an organization should function. It can be more effective to challenge the corporate culture and to establish teams, networks and communities that can effectively execute the matrix objectives (Hall, 2013). Gottlieb (2007) further elaborates reorganizations are needed since matrix organizations should be flexible by nature. By constantly provide a structure which is able to adapt to changing business environment can promote competitive advantages. Giving time to settle in the matrix, Johnson and Geal (2016, pp. 28) present that "*the challenge is not so much to build a matrix structure, as it is to create a matrix in the minds of the employees"*. Successful companies understand developing and investing in human capital and promoting the right behavior are more important than finding an ideal matrix structure (Bartlett and Ghoshal, 1990).

3.1.5 Key Characteristics in Executing Matrix Organizations

Galbraith (2009) advocates organizations that make matrix organizations work implement management processes aligning the different dimensions with the organization's goals and objectives. Hall (2013, Chapter 1, Section 6, para. 4) presents "*A poorly managed matrix, however, can create matrix victims who feel disempowered in the face of competing goals, lower levels of clarity, multiple bosses, and a more complex working environment*.". Leaders with a right attitude and mind-sets are, therefore, crucial in getting a matrix to work. To utilize the potential of matrix designs and their dimensions, organizations have to handle the issues and ambiguity inherited in the matrix design. Organizations and their leaders have to acknowledge key matrix characteristics to overcome potential pitfalls such as lack of accountability, increased uncertainty and unclear goals (Hall, 2013). Key matrix characteristics will be addressed and elaborated on below to assist in how to operate and manage matrix organizations.

3.1.5.1 Create a Cross-functional Team Culture

Shifting in power structure from vertical to horizontal is a complicated situation experienced by many organization implementing a matrix organization faces (Hall, 2013). Therefore, it is important to hire the right people who can excel in a matrix setting. Galbraith (2009, Chapter 12, Section 2, para. 1) states: "*usually these are people who can influence without authority, who are naturally collaborative, who like to be part of something important, and who are capable of building high-trust relationships and interpersonal network*". Besides investing in human capital, training and continuously developing existing human capital in skills and abilities to operate in a complex structure is a critical factor (Galbraith, 2009; Johnson and Geal, 2016; Sy and Côté, 2004). Though training is important, some things need to be taught through practical experience. Johnson and Geal (2016, pp. 31) propose that "*By moving selected managers across functions, businesses, and geographic units, a company encourages cross-fertilization of ideas as well as the flexibility and breadth of experience that enable managers to grapple with complexity and come out on top.*".

Managers in a matrix organization have be able to manage cross-functional teams, which means managers must be able to understand and support employees coming from diverse academic, professional and cultural backgrounds and that maybe located across dimensional and geographical borders (Kinor and Francis, 2016). Team members may not be used to work with each other nor the manager, which can result in a lack of reporting accountability and respect for the teamwork as well as for the manager. Hall (2013, Chapter 1, Section 10, para. 8) presents that "*Matrix managers need the skills to develop competent and confident people across barriers of distance, culture, time zones, and technology* ". As a manager for a cross-functional team it is also necessary to agree with other managers regarding the common resources (Kinor and Francis, 2016).

As a leader or manager, it is important to build trust among employees and between leaders and employees. In cross-functional teams' leaders have to make each employee see the big picture, how their role is connected to it, how they contribute to the team and the organization at large. Taking the time to establish clear role description and objectives and by demonstrating the leader has the employee's best interest in mind, trust and engagement can be established. In new group constellations team-building sessions can create a forum for leaders and team members to initiate relationships as well as get an understanding of how each member will contribute to the group and to the common goals (Tkalcevich, 2016). Leaders have to engage employees from the start by demonstrating a willingness to support and lead them both as a team and as individuals (Kinor and Francis, 2016).

Leaders can also demonstrate trust by decentralizing control, and empowering employees to take ownership and responsibilities of decisions (Hall, 2013). To create a unified team, it is critical to explain the individual's part in the team from the beginning and set common goals and clear objectives. Regular one-on-one meetings with employees can facilitate in making sure the objectives are understood and executed (Kinor and Francis, 2016). Interpersonal skills should be leaders' ability to communicate and make contact and sustain relationships (Johnson and Geal, 2016).

Providing standardized methods and processes can facilitate in operating in new cross-functional teams, as well as reduce the risk of employees acting according to conflicting habits (Martin, 2005).

3.1.5.2 Balancing Power

A common issue in a matrix organization is the power struggle (Galbraith, 2009; Gottlieb, 2007). Generally, sharing power and decisions is not something most leaders are used to (Sy and Côté, 2004). In functional structured organizations, the power lies in the functions, however in a matrix organization, when two objectives are prioritized simultaneously, power has to consciously be balanced between different sides. If ambiguity of power distribution is present it can result in unnecessary tension and conflicts leading to delayed decisions which lack in quality (Sy and Côté, 2004). Though the power can be equally distributed between the dimensions, usually it is shifted to one side (Galbraith, 2009). The power balance should be aligned with the organization's strategy. Furthermore, the decision authority together with the responsibilities has to be clear and reflect the balance. The power balance does not have to mean all decisions are shared (Kesler and Kates, 2011). Different parts of the organization can have different decision rights, and the formal structure should support this in order to avoid unnecessary conflicts. To rearrange the power distribution different levers can be utilized through changing the hierarchical structure or changing staff and role descriptions (Galbraith, 2009).

3.1.5.3 Establish Roles and Responsibilities

To reduce the level of complexity in a matrix organization and to balance power, roles and responsibilities should be clearly defined (Galbraith, 2009). Lack of roles and responsibilities have been acknowledged as confusion of who is the responsible manager, who to contact, lack of accountability and frustration (Sy and Côté, 2004). Clarity in these areas can therefore facilitate in resolving conflicts, reach consensus, create ownership and accountability (Gottlieb, 2007; Sy and Côté, 2004). One tool to facilitate in creating clarity is the RACI responsibility chart where decisions and roles are mapped and agreed upon by employees involved (see figure 3.4). RACI is an acronym for Responsible, Accountable, Consult and Inform. Vertical columns represent roles and horizontal rows represent decision areas. In each cell in the responsibility chart a letter indicating responsibilities is marked (X means no formal role) (Galbraith, 2009).

Roles / Decisions	Sales	Segment marketing	Insurance	Mutual funds	Marketing council	CEO	Finance	Human resources	Regional team
Product price									
Package design									
Package price									
Forecast	A	R	C	C	C	I	I	X	X
Product design									

Figure 3.4. An example of a RACI chart (Galbraith, 2009).

Galbraith (2009) advocates establishing a responsibility chart can be more effective than getting caught in discussions about solid or dotted line relationship which does not provide the same level of clarity of who is responsible for what. The chart itself is a living process and should continuously be updated and revised to reflect a dynamic business environment (Gottlieb, 2007). Though the RACI model can help in increasing clarity for employees, Hall (2013) presents there is also a risk of being too rigid in the descriptions and thereby influencing mind-sets of employees. Matrix organizations need people who can be agile in order to deal with the matrix ambiguity. Furthermore, employees should have a clear understanding for the accountability without relying on authority (Martin, 2005).

3.1.5.4 Communication

The need for effective communication within and between different dimensions is crucial in order to have a successful matrix organization (Galbraith, 2009). Additional dimensions further increase the interdependence between dimensions leading to a greater need for communication and coordination. A downside to implementing a matrix structure has been acknowledged as increased bureaucracy where dual reporting lines can lead to an escalated need for communication and coordination which in turn leads to an increasing number of meetings (Hall, 2013). It is the leader's responsibility to facilitate and promote communication within its own team and between different teams (Tkalcevich, 2016). For effective communication leaders should have abilities such as problem solving, able to negotiate and have interpersonal skills to communicate with individuals in various parts and levels in the organization (Johnson and Geal, 2016; Sy and Côté, 2004).

Galbraith (2009) advocates both informal and formal communication is essential to tear down barriers to facilitate relationships and trust, which are two important factors in a matrix organization. Formal communication channels can work as a link between different sides of the matrix. It can be carried out through joint decision and performance evaluation activities between managers with shared resources where managers are obligated to collaborate and together identify priorities. Linking different sides of the matrix by a formally stated communication channel help to prevent conflicts, resistance to change and power struggle.

However, all communication channels cannot be presented in an organizational structure or through meetings calendars. Informal communication, which is natural and voluntarily, has to be supported and encouraged by management in order to for cross-functional relationships to be build.

Managers also have to balance a variety of having direct and non-direct reporting relationships (Kinor and Francis, 2016). Different reporting relationships between a managers and subordinates can lead to conflicts and confusions. Managers can find themselves in situations where subordinates have several different projects parallel. Therefore, it is important the manager encourage the subordinates to share their deliverables with all managers involved to avoid conflicts in schedules or unnecessary conflicts

3.1.5.5 Establish Goals and Goal Alignment

As previously mentioned, one of the matrix organization's strengths is the ability to succeed on two or more objectives simultaneously. However, with two or more dimensions a great challenge is to align conflicting and competing goals (Sy and Côté, 2004), which is one of the most common reasons for why conflicts arise in matrices (Kesler and Kates, 2011). This leads to friction, which can create rivalry within the matrix (Sy and Côté, 2004). Aligning goals from the different sides of the matrix can facilitate communication, highlight expectations, identify risks and build relationships (Galbraith, 2009). By establishing common goals, employees will know what to focus on instead of receiving different priorities from two different directions.

The process of aligning goals between the sides of a matrix is dependent on a common planning process (Galbraith, 2009). As stated earlier, formal communication channels can link the matrix's sides in goal alignment activities. For these activities to be effective all dimensions need to use the same information, hence one well-functioning information system is important. Additional, one risk of not using the same information besides misaligned goals is different sides of the organization can start to develop their own systems or languages which can lead to increased gaps between dimensions.

3.1.5.6 Embracing and Solving Conflicts

As advocated by Galbraith (2009) the complexity of multidimensional matrix often lead to a lot of conflicts when two or more dimensions' interconnect. Conflicts are inevitable in any complex business environments and are inherited consequences of a matrix organization. Middle managers are often the ones caught in conflict of how to execute company strategy due to competing goals and conflicting views (see figure 3.5) (Hall, 2013).

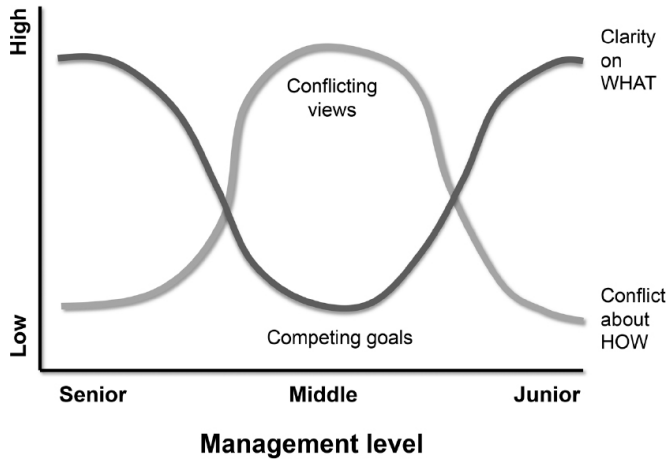

Figure 3.5. Middle managers conflict of competing goals and conflicting views (Hall, 2013).

Kesler and Kates (2011) illuminate conflicts and tension in a matrix organization can open up to trade-off discussions where diverse objectives and point of views are highlighted in order to consider ideas from different parts of the organization. On the other hand, absence of conflicts can mean the matrix is not working since conflicts might be buried or acted on in unhealthy ways (Galbraith, 2009). Kesler and Kates (2016, pp. 13) present "*healthy tension is how you exploit the many assets of a big company*". Effective problem solving in a matrix organization is based on the presumption a conflict between two managers, referred to as healthy tension, will result in a third alternative fulfilling both objectives (Galbraith, 2009). Leaders in a matrix organization therefore have to be good at balancing power through understanding and using power levers, set norms as well as lead by example when solving conflicts at their own level.

Since matrix organizations are flexible and a team based organizational design all employees, especially managers, should be trained in problem solving and conflict handling (Galbraith, 2009). If managers have experiences from different sides of the matrix it can help in problem solving, both because since they are able to solve problems easier and have a holistic perspective of the organization and its important interfaces. Managers who cannot solve certain conflicts are left with two choices; escalating to a higher level or risk making poor judgment calls (Hall, 2013). Top managers should engage in an open but direct discussion with everyone involved and avoid solving conflicts through one-on-one meetings with the lower level managers since there is a risk of misinterpretations of the solution to the conflict (Galbraith, 2009). Problem-solving discussion should not only include manager, but also the scale of the organization and all affected dimensions should be present when solving a problem. All involved stakeholders should be brought together in one forum in order to find a solution and reach consensus.

3.1.5.7 Influence without Authority and Emotional Intelligence

One of the matrix leader's key features is the ability to influence without authority (Galbraith, 2009). Hall (2013) highlights leaders can feel uncomfortable with losing authority since they have to rely on others for their success. The anxiety can then lead to the risk of managers trying to increase control by institutionalize centralization of decisions through new reporting structures and engaging themselves in decisions outside their responsibility. Since matrix organizations should be based on high levels of decentralized decision making, this behavior of control should be avoided. Leaders have to let go of the traditional view that authority is power in order to lead in a matrix organization Leadership is something greater than exploiting authority in order to get results, fear can rather limit a group's abilities to reach their goals (Tkalcevich, 2016). Hall (2013, Chapter 1, Section 10, para. 9) states: "*When managers are concerned about their ability to deliver accountability without control and influence without authority, we need to give them tools and skills to be effective in an environment where this is completely normal*".

Sy and Côté (2004) present the concept emotional intelligence (EI) to be a key success factor in effectively operating in a matrix organization since utilizing EI can have an impact on work relations and leadership. EI can be defined as the ability to use, guide, understand own and other emotions and can be divided into four areas; perceiving, using, understanding and managing emotions (Metcalfe, 2014). Emotionally intelligent employees can utilize their strengths to balance social settings in a matrix organization, this can be especially important for managers who need to influence without having formal authority (Human Resource Management International Digest, 2014). To influence without authority, leaders need to utilize EI to find proper channels to empower employees to take ownership and responsibilities. It can for example be done through establishing trust, respect, listening to the individual needs and providing goals (Galbraith, 2009; Tkalcevich, 2016).

3.2 Lean Leadership

To be successful, organizations require strong leadership, which is no exception when following Lean philosophy (Petersson et al. 2012), hence the purpose of this chapter is to present the concept of Lean leadership.

3.2.1 Fundamentals of Lean Philosophy

Many industries have realized the benefit of applying Lean in their organizations to increase efficiency and effectiveness hence apply it differently to fit their organization (Ruffa, 2010). Here, Lean is referred to as Lean philosophy and the fundamentals and core concepts of Lean are presented. Oppenheim (2011) defines Lean as a process which is customer-driven, dynamic and with the purpose of reducing waste whilst increasing customer value. Ruffa (2010) compare Lean to an organizational effort of reducing excessive fat, referred to as waste, and Bergman and Klefsjö (2010) state the basic idea is to deal with all forms of waste to generate value for customer. As identified above, two central concepts in Lean is customer value and focus on minimize waste (Dombrowski and Mielke, 2013).

The concept of value is anything the customer is willing to pay for, or the movement of refinement of the product through operations (Tapping and Shuker, 2003). Value is not a uniform agreement between stakeholders, making the focus on customer value not only a key process but also a difficult task (Oppenheim, 2011). Waste is the opposite; activities of non-value activities and usage of resources the customer is not willing to pay for (Bryman and Bell, 2010; Oppenheim, 2011). Apart from value adding and non-value adding activities, there are also 'non-value adding but necessary activities', such as machine setup times (Oppenheim, 2011). These 'non-value adding but necessary activities' should be minimized, whereas non-value adding activities are aimed to be eliminated. Another key concept in Lean is value stream (VS), defined by Tapper and Shuker (2003), as all necessary transformational activities from raw material or information, both value and non-value adding, to the final product or service which the customer is willing to pay for. When Oppenheim (2011) introduce the fundamentals of Lean, the below principles are raised:

- Specify customer value
- Map the VS to plan the program whilst minimizing waste
- Make the products and information flow without stopping
- Let customer pull value and demand
- All processes should be aimed at perfection
- Respect people through mutual respect and trust, and to always blame the system, not the employees, in case of issues

Bergman and Klefsjö (2010) support the idea of letting the work flow based on the argument that flow will assist in eliminating non-value adding activities. Furthermore, continuous improvement is introduced as a cornerstone when working with Lean. To assist in focus on increasing value whilst reducing waste and monitor the flow, 5S and visual management is used (Delisle, 2015). The purpose of 5S is to provide a visual control and eliminate waste by ensuring the workplace is tidy based on 5S; sort, store, shine, standardize and sustain. Visual management assists in communication without the need of verbal exchange.

3.2.2 Impact of Culture and Values on Lean Leadership

Organizational culture can be seen as the norm of how employees think of "how things are done" in the organization (Mann, 2009). The culture of an organization is closely related to the values and should be linked to each individual through continuous discussions and exemplifications with all employees (Petersson et al., 2012). Starbird (2017) concludes the importance of values in Lean philosophy is often overshadowed by the core theme; elimination of seven wastes[2], hence Starbird (2017) proposes an eighth waste; failure of gaining Lean culture through employee engagement. This is previously mentioned by Liker and Meier (2006) in their handbook on how Toyota is working with Lean.

[2] Liker and Meier (2006) present the seven wastes of Lean as: Overproduction, Waiting, Transportation, Overprocessing, Excess inventory, Unnecessary movement and Defects.

A leader in a Lean organization must ensure values and principles are aligned on all levels of the organization (Petersson et al., 2012). The purpose of aligning values and principles is to increase the VS thinking across all departments and create a common goal. Liker and Convis (2012) state the ultimate goal in Lean according to Toyota is referred to as True North. When Lean leadership is properly executed, the alignment between employees and leaders towards the ultimate goal can be realized (Dombrowski and Mielke, 2013). The True North does not change from year to year and is a goal of perfection, unreachable but should always be aimed towards and provides a path forward (Liker and Convis, 2012).

One example of how to spread values throughout the organization is how Toyota created "Toyota Way", a compendium translated into several languages, outlining core values of Toyota (Modig and Åhlström, 2015). These five core values are divided in two categories; continuous improvement and respect for people. Liker and Convis (2012) state these five core values are used to guide a Lean organization towards True North. Below each value is described.

3.2.2.1 Challenge

When True North is set as a long-term vision, people are encouraged to meet challenges bravely and with creativity (Modig and Åhlström, 2015). This value provides energy to leaders in order to drive their team towards perfections (Liker and Convis, 2012). The greater the challenge is, the greater chance for development.

3.2.2.2 Kaizen Mind

Translated from Japanese, Kaizen means improvement and is exactly what this value stands for (Modig and Åhlström, 2015). With the mind-set of people in the organization to look for potential improvements continuously, an organization can proceed to be innovative. Even though an organization seem to be perfect, the environment is constantly changing allowing room for competitors to catch up, environmental changes to take place or new technology to emerge, hence aim to always improve is necessary to stay competitive (Liker and Convis, 2012).

3.2.2.3 Go and See

At Toyota it is expected by all leaders to have first-hand information in case of a problem emerges as it will assist in making decisions based on facts (Liker and Convis, 2012). This value requires leaders to go to the source to get an understanding of the issue at hand in order to draw accurate conclusions and conduct corrective actions (Modig and Åhlström, 2015).

3.2.2.4 Teamwork

In Lean, the group performance is more important than individual performance and teamwork is a cornerstone (Liker and Convis, 2012). Teamwork must be reflected in the incentive system and at Toyota teamwork is a part of the promotion process, but the incentive system should also foster an environment for individual development (Modig and Åhlström, 2015).

3.2.2.5 Respect

Respect should not only be shown to co-workers but also to environment, community and customers (Liker and Convis, 2012). Each individual has the responsibility to ensure they understand others and to create trust (Modig and Åhlström, 2015).

3.2.3 The Leader's Role in Lean

No matter how much an organization focus on reducing waste or focus on customer needs, Lean will never be fully operational unless the leaders of the organization embrace the methodology and live by its principles (Camp, 2015). Leadership is not solely limited to managers and Petersson et al. (2012) distinguish between a manager and a leader based on how they are selected. Often customers view support functions, such as leadership, as an activity, which does not directly add value to the product produced, but without good leadership the organization will not be able to continuously improve. It is the role of the leader to train and develop the skills of their staff to ensure processes are done more efficiently. Lean leadership can be considered as the link between continuous improvement of the organization and the Lean tools applied.

In Lean the leader's' most important task is to train and empower the employees to support them in performing their tasks better and allow them to continuously improve (Halling and Renström, 2014; Liker and Convis, 2012; Poksinska et al., 2013). As Lean is heavily team-oriented it is important the leader encourage both individuals as well as their team to raise improvement suggestions, ideas and facilitate continuous learning (Poksinska et al. 2013). This ability of motivating and encouraging employees is important due to the fact that leaders does not directly add value to the final product or service, hence it is the individuals or the team who can work with improving the final offering and reduce waste to increase the value (Liker and Convis, 2012). At Toyota, the leader is considered as a coach whose main task is to enable value-added work. In organizations where Lean is not implemented, the role of the leader is often to monitor and control processes from a distance, however in a Lean organization, a slightly different approach is applied (Poksinska et al. 2013). Leaders are present on sight as well as during coffee breaks and focus shifts from the leader being a controller to becoming a facilitator or coach. Poksinska et al. (2013) suggest visual control, standardized daily meetings, two-way communication and systematic continuous improvement culture to allow empowerment of employees.

Halling and Renström (2014) state the role of a manager in an organization is to challenge but also support employees to allow for self-development. Leaders exist on all levels in an organization and no matter what level a leader operates in, it is necessary to keep focus on the two key concepts of Lean; respect for people and continuous improvement. Mann (2009) states there is often a gap between Lean tools application and Lean thinking of an organization, and the link between these two is the senior management. At the same time Halling and Renström (2014) postulate senior management are more often than not ignoring the concept of respect for people in Lean philosophy.

Furthermore, Poksinska et al. (2013) emphasize the fact that communicating Lean is a leader's role in an organization and Lean leadership is a prerequisite in order to sustain any Lean implementation.

Petersson et al. (2012) propose six qualities of which a Lean leader should possess in order to lead their team. The first quality *is the leader should be comfortable with Lean philosophy* by having a substantial understanding of the methodology as well as experience in working with Lean. The True North values must be understood just as much as the application of Lean tools. Secondly, *a Lean leader must be engaged and involved in Lean work*. It is important for a leader to show their engagement through question and challenge the current way of working, show a genuine interest in the organization, even through tough times. Both large and small gestures are key to show engagement. A third quality needed from a Lean leader is to *work according to established standard way of working and facts*. Even though it may seem like a natural way of operating, often leaders tend to follow a hunch. Mann (2010) considers this leadership quality as a key element in how to create a Lean culture and state standard work is the engine of which drives the organization. Clear priorities, often trade-offs between safety, quality, delivery and finance, are included to enable employees to make clear decisions (Petersson et al., 2012). Constantly *question with purpose to challenge ways of working to improve an organization requires a strong* drive which is the fourth quality. An important aspect of Lean when challenging existing ways of working is to emphasize the job which is performed, not the individuals conducting the tasks. When trying new ways of conducting tasks, Lean allows for mistakes to be made which will enable the employee making the mistake to learn. It is the fifth quality of a leader to *allow themselves to make mistakes* hence show it is acceptable, as long as the employee is working with improvements. This quality reflects prestige less and can also be shown by the leader recognizing employees' efforts rather than the leader herself. Lastly, a leader *must provide safety to the employees by ensuring the appropriate information from other management levels are passed on*. This quality also requires the leader to question top-level decisions in order to respond to employee's potential objections.

3.2.4 Lean Leadership Development

For a leader to apply Lean leadership, there are several parameters which needs to be considered. Below are four pillars presented on how to work with Lean leadership development.

3.2.4.1 Self-development

At Toyota, leaders are expected to be curious and have both a desire as well as drive for self-development (Liker and Convis, 2012). The behavior is lured out from employees through constantly being challenged and coached in self-development by their coach. Once these traits are identified in the behavior of a leader, or potential leader, the person can move onto the next level of leadership in the organization. The part of self-development is crucial for all leaders in a Lean organization as it will allow for leaders to reflect upon their own work and identify improvement areas in the way they work (Dombrowski and Mielke, 2014).

According to Lean everything can be improved continuously, and leadership abilities is not an exception (Dombrowski and Mielke, 2013). Self-development is one way of ensuring not only products and processes are continuously improved, but also leaders. To assist in self-development, Toyota uses continuous learning cycles which they refer to as *Shu Ha Ri,* describing different stages of the individual's learning process (Liker and Convis, 2012). The first stage, *Shu,* is where the person learning is closely studying the coach to learn key activities of conducting a task, thereafter repeatedly perform the activities. The coach is closely supervising the employee to ensure proper execution is in place. Second stage, *Ha*, allows the employee to perform activities without supervision, but according to standard procedures. The stage of *Ri* is where the employee knows the activities and applies creativity in order to improve existing procedures. An employee reaching *R*i is an indication of the readiness of moving to the next leadership level. Through continuous learning cycles, individuals are able to align themselves with the True North values and ensure they incorporate the values into their every day's work (Dombrowski and Mielke, 2014). Toyota has been using the *Shu Ha Ri* cycle since the mid 50's and it is today one key leadership skill as Liker and Convis (2012, p. 61) state "*…the ability to observe and analyze the actual situation in depth and without preconceived ideas. This is one of Toyota's central values and a critical aspect of Toyota leadership.".*

3.2.4.2 Coach and Develop Others

Once a leader has mastered the full learning circle of self-development, they are invited to coach others to do the same (Liker and Convis, 2012). Dombrowski and Mielke (2013) refer to this stage as a qualification role of the leader and is distinguished by the leaders continuous challenging of employees. The challenges should not only be given by the leaders, the employees involvement in identify areas of improvement is key (Dombrowski and Mielke, 2014). The role of the leader is to guide and nurture the potential leader to equip them with the tools needed to meet challenges (Liker and Convis, 2012). This is a long-term commitment and a continuous process, which creates a firm basis of experience and training hence, it is not cheap. Toyota dedicates both funds and time in terms of decades, to develop their leaders as they believe leadership is worth investing in to become a leading organization. Dombrowski and Mielke (2014) emphasize the importance of individual coaching and adjust development to the level of the employee, not simply develop top performers. Even so, Liker and Convis (2012) state the importance of work effectively in a team. The individual is responsible of self-development and the results of the tasks conducted, however the team is achieving the end-results. By developing leaders through coaching, Lean can be established in an organization and the chance of Lean being "just another fad" is significantly reduced as employees can incorporate corporate values and culture into their personal values. When a leader is coaching an employee, faith in that person is essential and without it, there will be no room for self-development of the employee. By coaching and developing employees, leaders are able to train the mind-set and infuse continuous improvement thinking into the minds of their future successors (Dombrowski and Mielke, 2014).

3.2.4.3 Daily Kaizen

The leader's role of developing subordinates is just a small part of the responsibility of a leader at Toyota (Liker and Convis, 2012). Kaizen, meaning continuous improvement, is a daily key activity with two meanings; maintenance and improvement. Maintenance Kaizen include quick reactions to unplanned events such as mistakes, breakdowns or other variations part of daily activities. The reactions deal with these events according to standards to meet set requirements in terms of for instance quality, safety or productivity. As Toyota's system is structured to stop in case of issues affecting standards, it is vital for maintenance Kaizen to be urgent. Improvement Kaizen is different as it does not fix problems, rather it works in the way of increase performance based on the True North values. Dombrowski and Mielke (2013) define this step in development of leadership as having an improvement culture, which should be considered in all actions in a Lean organization. No matter how the different authors' have described the concept of improvement, they agree the aim of daily Kaizen, or improvement culture, is to go for perfection with zero defects and zero waste (Dombrowski and Mielke, 2013; Liker and Convis, 2012). However, Dombrowski and Mielke (2013) speak of improvement culture in general where Liker and Convis (2012) break up the improvement culture into daily routines. Toyota believes understanding of daily Kaizen can not be taught through certification, rather it is developed by leaders as they coach and support their subordinates as well as exercise self-development (Liker and Convis, 2012).

3.2.4.4 Hoshin Kanri

Toyota builds their organization from the bottom-up, however the True North vision is set top-down (Liker and Convis, 2012). Hoshin Kanri, which in Japanese means "direction" and "management", or "control" (Bergman and Klefsjö, 2010), is the fourth step of leadership development and aims to align the vision and goals across functions and management levels as well as guide how plans for continuous improvement should be laid out.

3.3 Value Stream Management

The purpose of this subchapter is to give insight to the theory of Value Stream Management (VSM) by defining concept, characteristics and prerequisites combined with potential issues and leadership skills needed.

3.3.1 Defining the Concept Value Stream and Value Stream Mapping

A value stream (VS) is a process including all activities needed to transform input to output and make it available to the customer, including all the organizations supportive functions (Kuhlang et al., 2003). Examples of VS activities are operational processes, flow of material and information, and controlling of activities. Within a VS a predetermined set of products are included, but there is no standard way in determining which products to include and each organization often adapt it to their own operations. A product matrix can assist in deciding how to group VSs as it displays similarities between products and thereafter they are grouped together based on these similarities (Dolcemascolo, 2006; Nash and Poling, 2008;).

Another option is to identify which processes different products go through, thereafter group the products with similar paths. In production, Tapper and Shuker (2003) state VS are often divided into product families.

In an organization divided into VS, VS mapping is a common tool used in many organizations to find the activities in production generating value for customer (Rother and Shook, 2003). It is used to map the steps in production from supplier to customer and is used to identify sources of Lean seven wastes with the purpose of reducing lead time (Bryman and Bell, 2010; Rother and Shook, 2003). VS mapping is considered to be a useful tool as it creates visualization for current state, but it also assists in identifying gaps between current state and ideal state, where the ideal state often represents the Lean True North values (Kuhlang, et al. 2013). Even so, several issues have been identified when applying the VS mapping tool such as lack of understanding of culture, poor Lean understanding and lack of strategic link to company objectives and vision (Hines et al., 1998).

3.3.2 Value Stream Management Definition and Application

For an organization, which has a strategic focus on driving their operations forward and is structured in VS whilst applying Lean management principles, the term Value Stream Management (VSM) is used (Tapping and Shuker, 2003). The reason why companies' focus on managing their VS is simply as it is where the money is being made (Maskell et al., 2012). By incorporating a strategic approach, including not only VS mapping but also the designing of the organization's' VS, the concept of VSM remedies the issues mentioned in relation to VS mapping above (Oberhausen and Plapper, 2015). Well-conducted VSM is supposed to simplify performance reporting, organizational structure and infrastructure processes (Maskell et al., 2012).

Gathering and analyzing data links VSM and Lean initiatives both strategically and operationally, to all planning and implementation of change in core business processes (Hines et al., 1998; Tapping and Shuker, 2003). When following VSM, involvement of people throughout the organization is key to retain focus on improving the VS (Tapper and Shuker, 2003). It is the people in the organization that learn the Lean tools and incorporate them in their daily work. Baggaley and Maskell (2003) state the more developed an organization is in applying Lean, the more important it is to manage the VS. Through VSM, it is possible to ensure the improvements through all levels are strategically linked (Tapper and Shuker, 2003). Organizations following Lean are likely to have made the conclusion what customer considers value is what should be emphasized in the organization.

When looking at the organization, the customer is often not interested in how good the interaction is with the suppliers nor how the product development processes is conducted, rather the customer is only willing to pay for the process of refining the end-product (Hines et al., 1998). This force Lean organizations to shift focus from functionally driven to become process-oriented where VSM is one way to visualize the process of bringing the product to customer.

VSM can be explained as a systematic strategic process aiming to assist in transforming an organization to mature in Lean, linking tools, people and reporting requirements (Tapping and Shuker, 2003).

In VSM, aligning the vision with all management levels and between departments is necessary to keep the focus on the process rather than the functions. A common tool used in Lean to break down the vision into goals can be done through policy deployment (Hines et al., 1998). Policy deployment is referred to as *Hoshin Kanri* (Bergman and Klefsjö, 2010), also mentioned above in chapter 3.2.4.4. In Lean it is believed if the people within a process is part of formulating the goals it will be easier to retrieve an aligned vision. The strategy and vision is determined by top management, a top-down approach, but since the people in the process are responsible for determining how to achieve the vision, it is simultaneously a bottom-up approach. Apart from applying any of the Lean tools, soft drivers are required to successfully run VSM such as ensure proper education is provided, empowerment and involvement of people (Hines et al., 1998; Tapping and Shuker, 2003). It is the cross-functional team cooperation within a VS that secures the success of a well-run VS (Baggaley and Maskell, 2003).

3.3.3 Prerequisites for Value Stream Management

In a functionally structured organization the flow of value is not possible to follow, but through moving to a VS approach visualization is enabled and it is possible to manage the process (Baggaley and Maskell, 2003), hence a proper understanding of the current state VS is needed (Tapper and Shuker, 2003). Prior to moving to VSM, top management must make a commitment to the VS by provide the appropriate resources, performance measurements supporting the VS focus and encouragement through the process (Tapper and Shuker, 2003). This is linked to the relentless focus of Lean; the customers. Customers are not only the external customer paying for the end-product but also the internal customer, also referred to as the employees. In VSM, it is necessary to be aware of both these groups' requirements.

Each VS should be driven as a small detached organization within the organization, responsible for their own success (Baggaley and Maskell, 2003). A VS will contain both value adding and non-value adding activities, and it is up to each VS to improve their own organization (Tapping and Shuker, 2003). Baggaley and Maskell (2003) outline three maturity levels of which a Lean organization can undergo towards becoming VS driven. *Level one* includes identifying the VS, VS mapping and start with improvements in the flow of the VS. In the first level, there is no need to restructure the organizational chart in the short-term. *Level two* allows the organization to start moving towards VSM by introducing VS managers, VS performance evaluations and improvement teams assigned to one VS. Here it is also necessary to assign key roles to belong to one VS rather than a function. *Level three* is depicted by restructuring the organization around the VS, allow for cooperation between VS yet ensure they are all driven as small organizations within the organization. In this last step, the whole organization should place the priority on the VS.

However, no matter what level of VSM maturity the organization has reached, which functions or which management level the employees operate in, communication is key (Tapper and Shuker, 2003). It is through communication trust is built, and it is necessary to be clear on why an organization decides to focus on flow and VSs.

3.3.4 Issues in Value Stream Management

When structuring an organization according to VSs, there are a few reoccurring issues which are important to consider. Suggestions in how to overcome these issues are provided based on the previously mentioned VSM maturity. In the early stages, short-term solutions can be adapted but the movement towards a mature VSM may demand the organization to adopt long-term solutions.

3.3.4.1 Assign Resources to One Value Stream

Human resources are needed from not only manufacturing in VS, but also supporting functions such as purchasing, procurement, QA, sales and marketing, maintenance and manufacturing engineering (Baggaley and Maskell, 2003). It may be hard to relocated functionally oriented people, either physically or reporting relations. Firstly, there may not be enough people employed within a function to be allocated in one VS each, for example, there may be three manufacturing engineers and four VS. Secondly, an issue in assigning one person to one VS is the employee may possess a certain skill which is required by all VS however no one else can perform this skill. If this is the case, issues with prioritizations may occur. Short-term solution to this problem is to share resources across VS, however to overcome the root cause of the problem, cross-training of employees should be considered as a long-term goal.

It may also be impractical to have all functions assigned to VS even though the perfect VS includes all people who have an impact on bringing value to the customer (Maskell et al., 2012). Another common issue is the sales and marketing people are often divided into markets or geographical areas rather than in VS, hence liaison and integrating mechanisms need to be implemented. Apart from these hard factors, soft factors must also be considered such as cultural changes when a function is broken up. If a function is not broken up however, the function efficiency performance may hinder a successful focus on VS (Baggaley and Maskell, 2003). Face-to-face communication, sit closely and team building can assist in remedying the soft issues.

Characteristics of physical resources, such as large machines, are often that they are expensive to invest in, provide large batch sizes and long lead times (Maskell et al., 2012). These characteristics all go against the idea of make production flow. When an organization is transforming into a value driven structure, these machines are often shared across VS, meaning one VS does not have the full ownership of the resource.

A short-term remedy to this issue is to work around the physical resources, where in the long run these should be aimed at being replaced in order to perform cell manufacturing[3].

3.3.4.2 Poorly Defined Value Streams

Baggaley and Maskell (2003) argue that each VS should be seen as an organization within an organization therefore it should be of substantial size. Their recommendation is to have between three and four VSs, with one extra including operations which does not quite fit in the other VSs, such as processes. Too many VS can dilute the concept of consider each VS to be their own organization. Furthermore, size in terms of employees per each VS is of importance and should be between 25 and 150 people as a basic rule (Maskell et al., 2012). This is due to the fact that a VS with less than 25 people will fail to have enough people in running an effective operation and if more than 150 people are employed, there will be a lack of focused team effort.

As the products are divided into VSs based on similar operations and characteristics, the likelihood of similarities between different VSs is very small hence the VSs should not be compared to each other (Maskell et al., 2012). Each VS has different bottlenecks, problems and result so it is important for top management to not create competing measurements between the VS. Even so, it is recommended to have friendly competition between the VSs as it generates a healthy tension.

3.3.5 The Role of the Value Stream Manager

The objective of a VS manager is to ensure successful VSM is conducted (Keyte and Locher, 2004), to drive future state improvements (Rother and Shook, 2003) and ensure customer orders are delivered according to customer needs (Maskell, 2015). Many organizations fail to assign a VS manager which leads to a lack of focus on the flow (Rother and Shook, 2003). Growth, profitability and loss should be separated between VSs hence VS managers require full authority and accountability for the financials for their product family (Maskell et al., 2012; Maskell, 2015). Due to the financial responsibility, it is necessary the VS manager ensure the VS they manage is correctly defined to optimize it (O'Neill, 2015). The complete success or failure of the performance of the VS lies at the feet of the VS manager so ultimately the VS manager is judged on how successful they are in generating higher value by looking at performance measures determined by the organization.

[3] Cell manufacturing refers to a cellular design, which links similar operations together thus creating a cell. The design is utilized in order to promote a continuous one-piece flow of a manufacturing process (Liker and Meier, 2006).

It is up to the VS manager to clearly define the team working in their VS and therefore it is extremely important the VS manager have access to people which can support and improve the VS (Maskell, 2015). The team should complement the knowledge possessed by the VS manager. Once the team has been established, key success factors to build the team and develop soft skills by strong leadership through empowerment, respect of people and cultural transformation are required (Burton and Boeder, 2003; Maskell, 2015). A second pillar of building a strong team is to ensure there is a constant challenge to make improvements and keep the employees focused by protecting them from any interference from higher up in the organization (Maskell, 2015). The manager must have deep knowledge and understanding of the VS as well as educate employees working with daily improvement initiatives related to VS (Rother and Shook, 2003).

Coaching and facilitating skills is a must as well as the expectation of the manager to work hands-on with problem solving (Keyte and Locher, 2004; Rother and Shook, 2003). Continuously building knowledge for the team members in the VS is necessary and can be done by mentoring whilst walking around in the production, certifications and formal trainings (Maskell, 2015). To further build the team, cross-training of employees is key. This way employees can help each other and it creates flexibility within the team.

Further responsibility of the VS manager includes ownership of performance measures related to quality, cost and delivery, and as several functions are included besides manufacturing in realizing these target measures, the manager must lead across functions (Keyte and Locher, 2004; Rother and Shook, 2003). As processes, people and information must be integrated with each other and through the use of Lean tools, a Lean coach can be of value to any VS manager (Rother and Shook, 2003). However, it is important the Lean coach does not perform any improvements on their own, rather only support and train the VS manager in the Lean tools and philosophy.

4 Empirical Findings

The empirical findings chapter presents findings obtained through interviews, observations and internal documents from the case study.

4.1 GKN Company Background and Organizational Design

GKN Group is a global engineering organization with 58'000 employees in over 30 countries (GKN Group, 2017). Founded over 250 years ago, GKN has a strong engineering history of designing, manufacturing and providing services to world leading manufacturers of aircrafts, automotive and machinery. GKN Group is a global matrix organization and is divided into four main divisions: GKN Aerospace, GKN Driveline, GKN Metallurgy and GKN Land Systems (see figure 4.1).

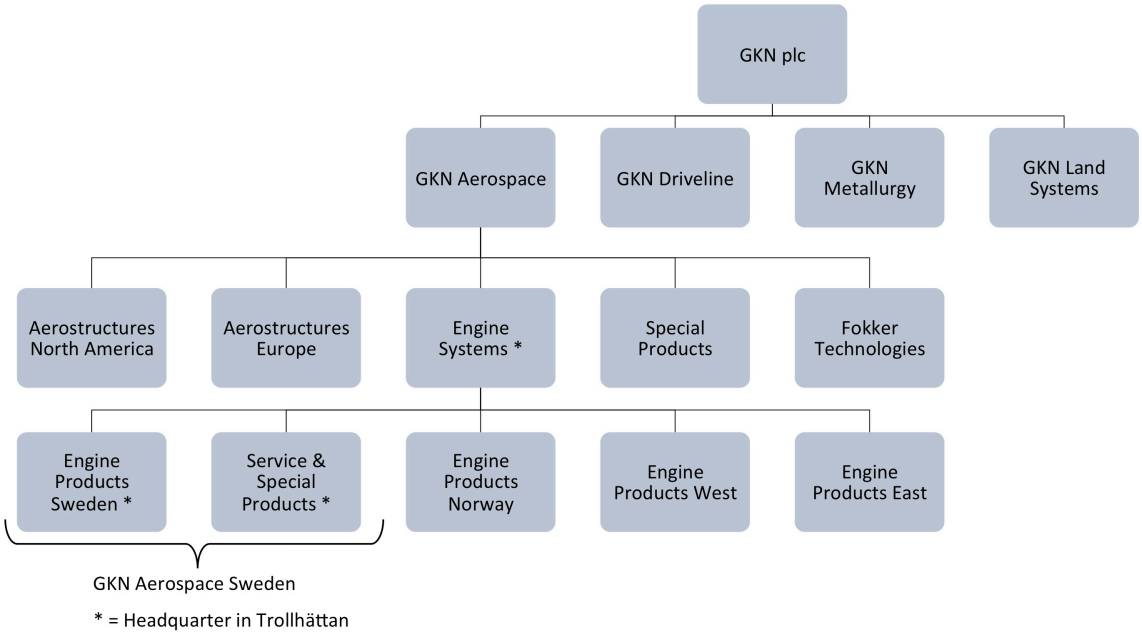

Figure 4.1. Simplified organizational chart of GKN Group hierarchy.

GKN Aerospace is a world leading first tier supplier of airframe structures, engine structures, electrical wiring and niched products to civil, military and space aircrafts. GKN Aerospace has approximately 18,000 employees in 14 countries (GKN Group, 2017). The Aerospace is further divided into five areas: Aerostructures North America, Aerostructures Europe, Engine Systems, Special Products and Fokker Technologies.

GKN Aerospace Engine Systems is divided into five business units; Engine Products Sweden (EPS), Service and Special Products (SSP), Engine Products Norway, Engine Products West and Engine Products East (GKN Group, 2015). EPS and SSP together constitute GKN Aerospace Sweden (GAS). The two manufacturing facilities are located in Trollhättan, Sweden where they share headquarter with the Engine System Division, in total approximately 2,000 employees operate at the Trollhättan site.

EPS designs and manufactures components for commercial aircraft and gas turbines. SSP provides services such as spare part and maintenance to world leading producers and manufacture engine parts for space rockets and Swedish military. Although EPS and SSP are two separate business units some processes and resources are shared.

4.2 Dimensions in the Matrix Organization at EPS

EPS is currently working in a complex global matrix organization with three dimensions; Programs, Operations and Functions (see figure 4.2 and 4.3). Programs and Operations are considered core business where Functions are supportive. By dividing EPS into these three dimensions, more than one strategic focus can be kept to stay competitive in the current market. Previously in EPS history a lot of emphasis has been on the functions, however, this has changed towards a customer focus in Programs, and operational excellence in the Operations.

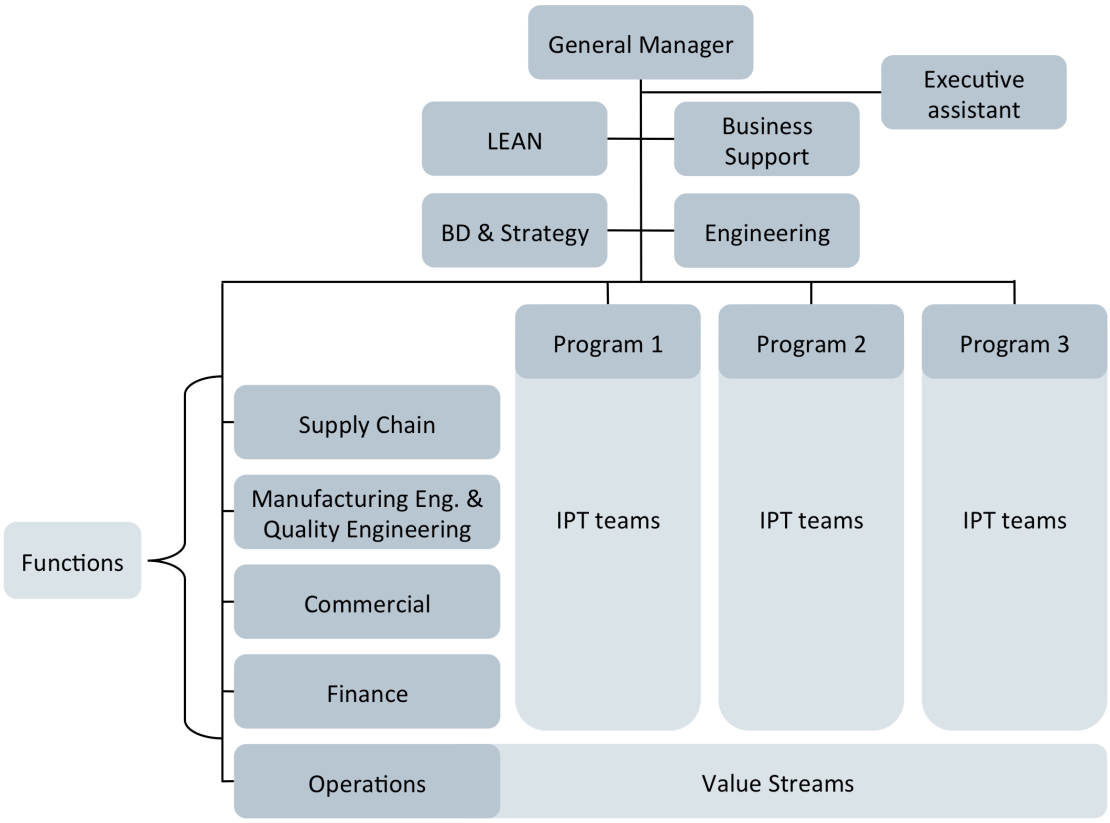

Figure 4.2. EPS organizational chart.

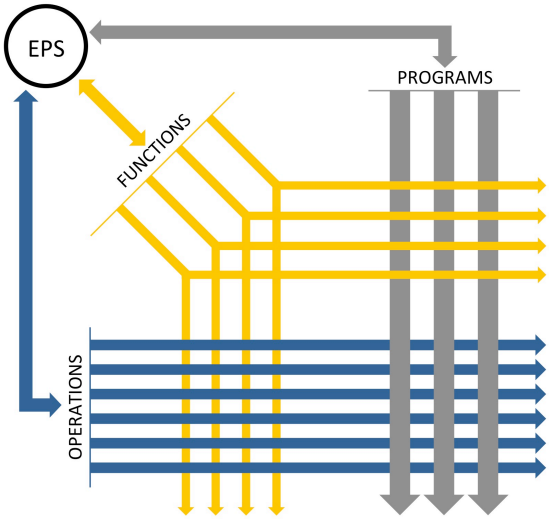

Figure 4.3. EPS organizational chart visualized in a grid-like structure.

The Programs dimension is divided in three different programs, each including one main customer and a few smaller customers. Program's responsibilities are financials, sales, profit and cash, as well as the satisfaction level from the customers within their program. Both finance and customer satisfaction must be balanced as success with one of these does not guarantee success with the other. Furthermore, Programs is responsible for the customers' perception of EPS as a first-tier supplier to the Aerospace industry.

Operations dimension span six value streams (VS), each considered as individual factories, which is the main part of Operations. Operations has no responsibility for sales, rather they are responsible for all the manufacturing and delivering of goods. The VSs must ensure they produce products to the right cost, at the right time, to the right place and at the right quantity, from raw material to finished product. Even though Programs are responsible for building the relationship with the customers, it is Operations task is to ensure the customers are satisfied with the products they are receiving. The focus of Operations is the flow of material. Approximately 700 out of EPS's 2,000 employees work in the Operational dimension.

Lastly, the Functions dimension includes the departments: Supply Chain, Manufacturing Engineering and Quality Engineering (MEQE), Commercial and Finance. The functions responsibilities are to support core business with resources, expertise as well as process development. The focus of driving competence and development functionally of both people and processes will ensure aligned standardized ways of working across the organization. The functions are shared across Programs and Operations.

4.3 Value Stream Characteristics and Purpose

As previously mentioned, EPS operates its manufacturing in six VS, managed by five value stream managers (VS managers). The term VS at EPS refers to the whole horizontal operational chain, from supplier to customer, often referred to as 'ring-to-ring' (see figure 4.4). In detail, GKN describes their VSs as the flow of all activities, both value adding and non-value adding, required to produce a product from raw material to the customer.

At GKN, the VSs are divided based on product families, one VS includes products with 80% similar process steps and with maximum 30% difference in work content. The VSs are divided into six streams of core products with similar key features, one VS usually serves different customers in two of the three Programs. The reason for working with structuring production in VSs is to steer focus on flow efficiency. VSs in the Aerospace industry are characterized by having low volume high value production.

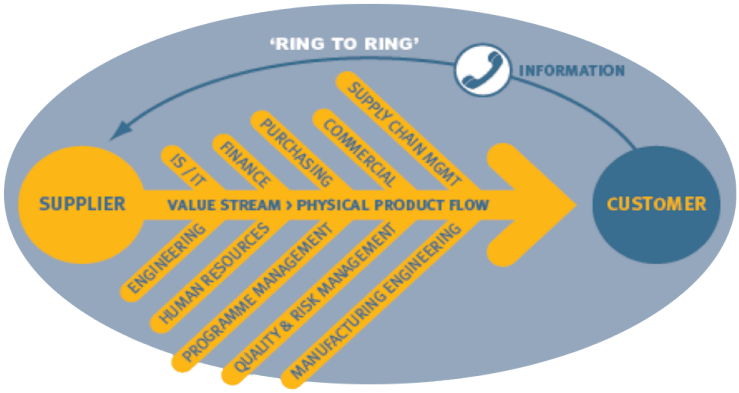

Figure 4.4. Ring-to-ring, value stream flow from supplier to customer.

All VSs are hierarchically equal and managed under a common manager, Head of Operations. One statement uttered several times by top and middle management during observations and interviews is "*each VS can be seen as an autonomous factory that could have been placed anywhere in the world*". This statement is a well-suited allegory for how the VSs should be perceived by everyone, from managers and employees to suppliers and customers. In practice, this implies each VS would be equivalent to a small to medium sized Swedish organization. The statement creates a sense of urgency for ownership and accountability for all involved stakeholders, especially the VS managers. *How would they manage a factory that is equivalent to their own VS? What is needed by them as managers? What type of competencies and roles would they need? And how many?* These questions were constantly raised during the course of the research. The fact is these factories are located in Trollhättan, in the same plant, which allow them to utilize the advantage of collaborating and to some extent share common processes, suppliers, customers, resources and assist each other's in machine capacity. The core task of a VS is nevertheless the same; a VS is accountable for delivering the right product, to the right price, to the right place and at the right time. The responsibility to fulfill these task is the VS manager's which operates together with a VS team of line managers and operators as well as the support of functional roles. The role of the VS manager and the VS team will be explained in 4.4. Below is a simplified description of the six VSs.

4.3.1 Value Stream A and B

VS-A and VS-B are managed by the same VS manager due to their relatively small size. Both VSs are mainly autonomous with some processes in VS-F. Together, the VSs are operated by approximately 100 employees including three line managers.

Some resources are deployed to a specific VS whereas other resources are shared between the two. Collectively, the VSs manufacture a total of 20 end-products, and approximately 30 units are produced weekly; 15 in VS-A and 15 in VS-B. The processes are mainly cutting and milling and the most common raw material is forging. Though forging goods are more expensive than, for example, casting goods it has generally less quality issues. These preconditions have positioned VS-A and VS-B internally to have the least amount of quality issues out of all VSs. Currently the VSs are undergoing renovations to update the machine park in order to create more effective flow.

4.3.2 Value Stream C

VS-C has approximately 120 employees including three line managers. VS-C produces 40 end-products where two are high volume product with approximately eight units produced weekly. The rest of the products are produced at a rate of approximately zero to two products weekly. VS-C supplies two of the programs of which the high-volume products serve the largest customers in one of the programs. The products produced are rotating which implies the products have a higher level of specifications compared to structural products. VS-C is mainly autonomous with exception of some processes going through VS-F.

4.3.3 Value Stream D

VS-D has approximately 150 employees and four line managers. The line managers are in charge of one sub-stream each, where two of the line managers serve one of the high-volume products each. VS-D produces approximately 30 end-products in total at different rates, from one per year to 250 weekly. VS-D produces two high volume products, one is supplied in a ratio of nine sets (total 250 products) per week to VS-E, hence, VS-E is dependent on VS-D. The second high-volume product produce nine end-products per week. In addition, approximately three lower value products are supplied in ten per week each. This implies VS-D has a high level of incoming and outgoing material and as many of the other VSs are experiencing, the incoming material is one of the greatest challenges, making production takt and delivery difficult. The different products in VS-D has relatively different business challenges such as one product is exposed to great competition especially from low-wage countries and another end-product greatly suffers from supplier issues.

4.3.4 Value Stream E

VS-E has recently been merged with a previous VS, and has grown to approximately 190 employees and eight line managers. VS-E is the largest VS in terms of turnover and hours available. It produces four end-products to two of the programs at a rate of six to ten units weekly. One of VS-E characteristic is the end-products consist of a lot of inbound components which is manufactured together through manufacturing processes such as welding. One end-product can consist of up to 45 separate components, compared to other VSs who may manufactures their products from raw material to finished product by e.g. cutting. Two of the end-products are fairly new leading to problems in settling in the manufacturing processes, another problem is as with the majority of VS, incoming material.

4.3.5 Value Stream F

VS-F differentiates itself the most among all the VSs since its main customers are either internal customers such as other VSs and functions, or customers which is not included in the three programs. Furthermore, VS-F operates in both business units in GAS, EPS and SSP, and thereby has reporting lines to both organizations. The two business units differentiate a lot from each other, EPS has a strong focus on VS thinking whereas SSP is having a different focus of driving their business. VS-F develops and manufactures tooling and fixtures for both internal and external customers, and has shared processes such as wash and lacquer. VS-F also assists other VSs, mainly VS-D and VS-E, with manufacturing operations in case more capacity is needed to meet demand. Approximately 160 employees are working in VS-F, divided as 140 in EPS and 20 in SSP. VS-F has eight line managers, which are in charge of different processes or machining segments.

4.3.6 Similarities and Differences Between the Different Value Streams

There are similarities and differences with all six VS. All products are highly advances with world-class quality and they all serve civil or military aircrafts, however as can be seen in the VSs descriptions above all VSs has their set of differences. These are due to variables, ranging from different types of products (e.g. rotating or static), processes (e.g. milling or welding) to raw material (e.g. forging or casting goods). Additionally, products can be in different stages in their life cycle, which in turn create new and different manufacturing and quality problems in the operational chain. One way of visualizing the differences between size of VS in terms of delivered end-products, turnover and producing hours/VS is visualized in figure 4.5. The size of the bubble represents the VSs annual turnover 2016, x-axis represent the share of total end-products delivered per VS and the y-axis outline the actual labour hours per VS. Due to confidentiality all factors are based on percentage of their combined sum. The purpose of figure 4.5 is to display how the VSs can be viewed differently in size depending on which measurement is used.

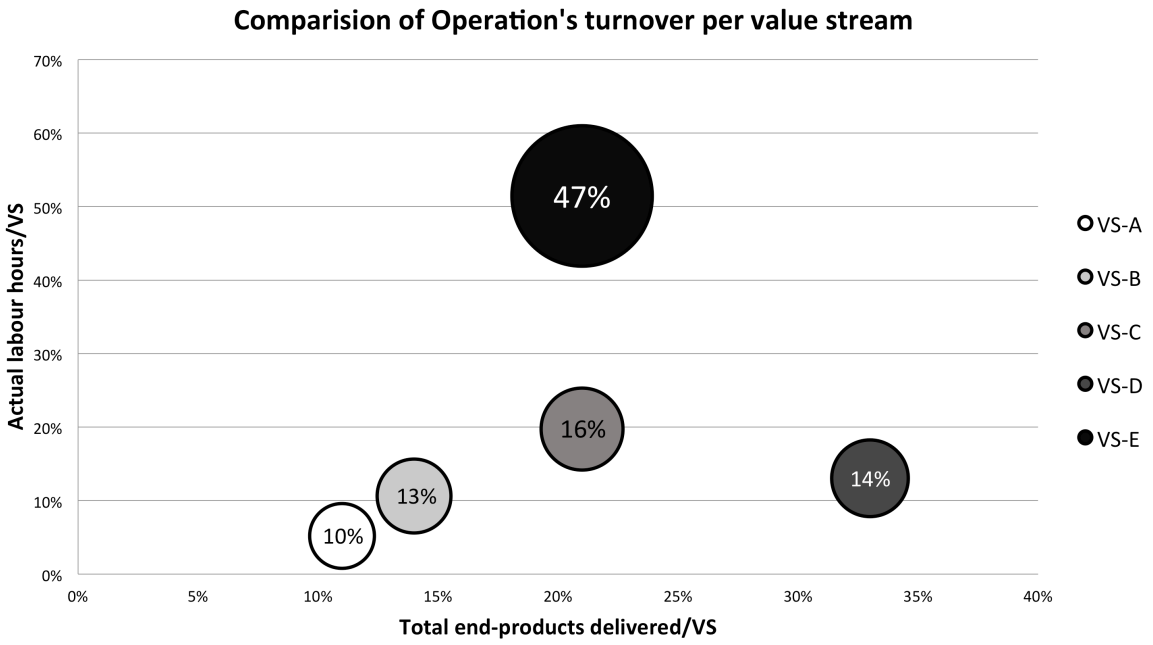

Figure 4.5. Bubble diagram displaying different value streams size.

4.3.6.1 Products and Processes

The VSs different products characteristics and manufacturing processes have led to the VSs are experiencing different problems in fulfilling the responsibility of meeting previously mentioned requirements of delivering the right product, to the right price, to the right place and at the right time. Some VSs have very mature end-products which results in fewer quality issues due to internal handling, other VSs are implementing new end-products which have led to a great deal of new challenges. One VS is currently implementing a new end-product due to a contract with a new customer. This has led to an increased allocation of resources towards the implementation project as well as increased communication and collaboration between the VS manager and the customer.

The number of produced end-products also varies between VSs. VS-E has only four different types of end-products to be produced however their manufacturing process is very complex with up to 120 operating steps to combine up to 45 components. The parts are usually fabricated through welding where narrow tolerances and manual work leads to a lot of different parameters that can potentially cause problems. VS-C, on the other hand, has 40 end-products, which greatly variates in takt time[4].

[4] Takt time refers to the required production pace to satisfy customer demand and is expressed in time per piece. To have a takt production the cycle time (time it takes to produce one piece) have to be equal or less than the takt time (Liker and Meier, 2006).

4.3.6.2 Differences Between Value Stream Managers Responsibilities

VS-F manager operates in both EPS and SSP, which mean the manager also has two reporting lines and obtains goals from two directions. In VS-C, the manager is fairly new to the VS and VS-E manager has a changed responsibility area of two newly combined VSs. The level of maturity of both the VS manager and of the VS impacts how a VS operates. When a VS manager is new to the role or is assigned to run a new VS the primary objective for the VS manager is to create a well-functioning team, advocates VS-C manager.

4.4 The Role of Value Stream Manager

From interviews and organizational documents the following description of the VS manager's role and responsibilities has been outlined.

4.4.1 Creating a Competitive Value Stream

The VS manager is responsible for managing the VS with the primary objective of the delivery of products. According to Head of Operations, the VSs are responsible for delivering two things, KPI (Key Performance Indicators) Gold (further elaborated below) and A4 strategy. A4 strategy is a simplified strategic plan on how to increase a VS competitiveness, which includes a VS abilities, capabilities, and costs. The VS manager is accountable to fulfill the A4 strategy plan as well as the VS's deliverables. When these objectives are fulfilled a VS is often referred to at EPS as "a strong VS". It is the VS manager's responsibility to create a competitive VS which is efficient and effective while continuously working to improve the flow to reduce the hourly cost. Historically EPS customer agreements have been based on risk and revenue sharing partnership (RRSP), where the supplier acts as a shareholder and shares a product’s development cost with the customer to a certain percentage and in return earn the same percentage of the product’s revenues. However, EPS wants to obtain a more balanced agreement portfolio by attracting another type of agreements, so called long-term agreements (LTA). These agreements allow EPS to compete on an open market, hence, the revenue is based on its own cost levels. When moving from RRSP agreements to LTA, EPS has to focus on being competitive through reducing their hourly costs.

4.4.2 Delivery of KPI Gold

VS managers are measured on a range of KPI’s in a measurement system referred to KPI Gold. The name, KPI Gold, comes from to what level these KPI’s are achieved, where Gold is the ultimate goal that always should be strived towards. The measurement system span KPI’s such as safety, quality, delivery precision, inventory, cost, and productive hours. These KPI’s are determined, controlled and deployed from the top of the organization and it is the role of the VS manager to break them down further in their VS as well as to report results upwards in the hierarchy (see figure 4.6).

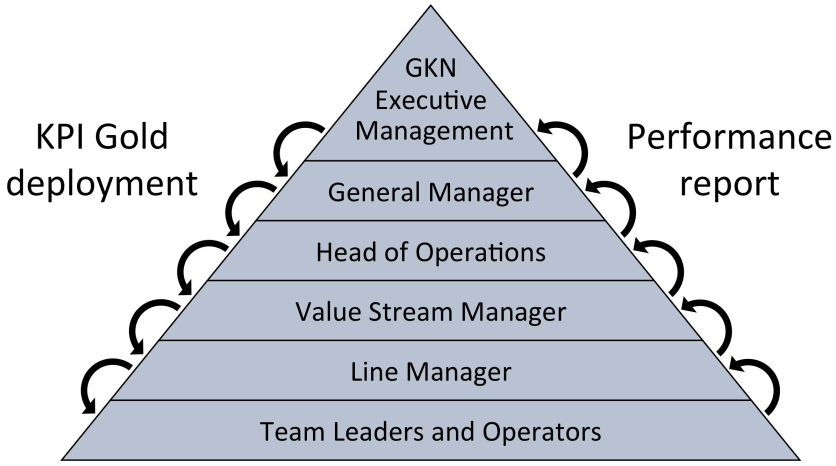

Figure 4.6. Visualization of KPI deployment and performance reporting.

4.4.3 Performance Development Planning Process

All VS managers are responsible for conducting Performance Development Process (PDP) process with all employees with a solid relationship. The process focus on developing the performance of individuals to support the delivery of the business goals and include objectives such as

- Set individual objectives to deliver a set continuous improvement plan
- Review past performance, acknowledge achievements and identify areas for improvement
- Develop career goals
- Set development objectives that improve performance in current role and prepare for future roles

The process is divided into three phases and requires the direct manager[5], the matrix manager[6] (if applicable) and the employee to participate. Phase one sets a plan for the coming year in terms of performance objectives, career goals and personal development and is set by a collaboration between the direct and matrix manager. The direct manager is also responsible of anchoring the objectives of the employee with their own direct and matrix manager to ensure alignment throughout the organization. The employee is responsible of organizing the meeting and coming prepared with a draft of performance objectives. Phase two entails a mid-year review where the progress in accordance to plan is evaluated and can be a formal meeting or a part of daily operations. In phase three the progress is compared to the plan and the performance is rated.

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[5] EPS definition of a direct manager refers to Galbraith's (2009) definition of a functional manager, which is the manager responsible for the employee's salary.

[6] EPS definition of a matrix manager refers to Galbraith's (2009) definition of a project manager, which is the manager responsible for the employees' day-to-day activities.

In all phases, an e-mail is sent out to the employee informing there is time for PDP follow-up and thereafter it is up to the employee to book in appointments with the direct and matrix managers, arrange place as well as time for the meeting.

4.4.4 The Role Description

The VS managers all have the same role definition but the differences of the characteristics of each VS leads to they become unique to manage. This puts different pressure on the VS manager whose personal profiles in turn also create differences in what way the VSs are managed. During the primary interviews, all VS managers were asked about what they considered being their role. Both the level of maturity of the VS and how long the manager had been assigned to the role as VS manager impacted the response. For example, one manager has only had the position for a couple of months, in that case the VS manager saw that a main part of the role was to build the organization and settling in the role as VS manager. All VS managers stated their role is to dispatch finished end-products and to deliver the KPI's which are provided. A VS manager clearly emphasized the VS focus when stated *"I am responsible for the extended value stream - from supplier to customer"*. Another mentioned sales, profit and cash as the key deliverables as in the end any organization's focus is to make money. Many consider their role to build a well-functioning team and communicate the objectives through clear goals broken down from KPI Gold. One VS manager said *"My role is to provide support and build prerequisites for my team to be able to do their job"* and another said *"My role is to build leaders"*. There is a clear focus on the soft factors of putting together the right team to deliver what is expected by the VS and all managers emphasized the importance of explaining the goals and why business is conducted as it is to gain buy-in. Depending on the personality of the VS manager, they see their roles slightly different, however it was not raised as an issue due to the complex and different characteristics of the VS. *"I consider myself as both a VS manager, but also as a functional manager which is responsible for employee development and continuous improvement of ways of working in my VS"* was a statement made of one of the VS managers. No other VS managers mentioned this perception.

In GKN's Operational Management System (OMS) the role of the VS manager (role named Value Stream Responsible) is described as: "*To be responsible of coordinating the planning process, follow budget, and compile resource requirements"*. Furthermore, the VS managers are required to participate in the following activities:

- Create and approve manufacturing programs.
- Identify/analyze resource requirements
- Analyze and propose solutions for remaining resource gaps
- Decide on freeze resource plan

The described role does not fully correlate what the VS manager themselves have presented as their role. However, as described above a key task of VS managers are to request human resources from functions where they do not have the mandate, such as from the MEQE function.

The VS managers' base their requirement on the planned amount of work needed to be done for the next coming year. In theory, the VSs should receive as many resources as they want since the function will debit the VSs for the resource, however in practice this is not always the case. During interviews, it was said the functional manager could sometimes deal with the VS manager to see if the requested amount is really necessary. After a few negotiations, the VS manager is assigned human resources, which may not be equal to what was requested from the beginning.

4.5 Value Stream Manager's Team

To support the VS managers in their responsibilities of delivering end-products the VS managers operate together with a cross-functional team which consist of a variety of solid and dotted relationships (see figure 4.7). There are two types of teams; VS team which includes all employees who impact the VS as well as the VS management team which consists of various leaders in the VS. At EPS a solid line is drawn between an employee and the direct manager who is responsible for the employees personal development and wage development. A dotted line is drawn between an employee and the matrix manager who is responsible for everyday activities or it can also refer to an important reporting relationship. An employee can be physically located either with the direct or matrix manger.

The VS manager is in control of its own budget and all costs related to building a VS team, the amount of resources needed to fulfill these objectives is therefore recorded on the VS budget. The VS management team however is liable to take ownership of the VS financials through budgeting, forecasting and monitor actual value, conducting risk management through following the cycle of plan-do-check-act. Additionally, the VS management team is responsible for managing the physical flow through controlling safety, quality and delivery, as well as engaging the team. Lastly, the leaders in the VS management team are responsible for taking short- and long-term decisions to act on these objectives.

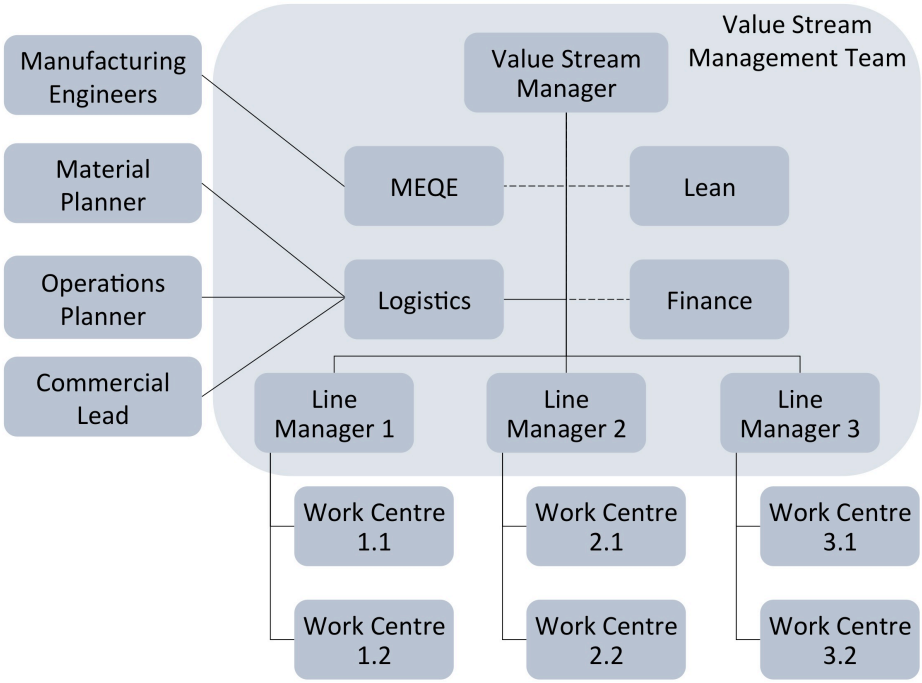

Figure 4.7. Value Stream Team.

On a higher hierarchy level, Head of Operations and his management team also support the VS managers. The Operations management team consist of a maintenance and tool support function, Lean, Human Resource (HR), Logistic, Project management and Finance. HR and Finance have a dotted line relationship to the Operations dimensions and solid line relationship to their own functions (see figure 4.8).

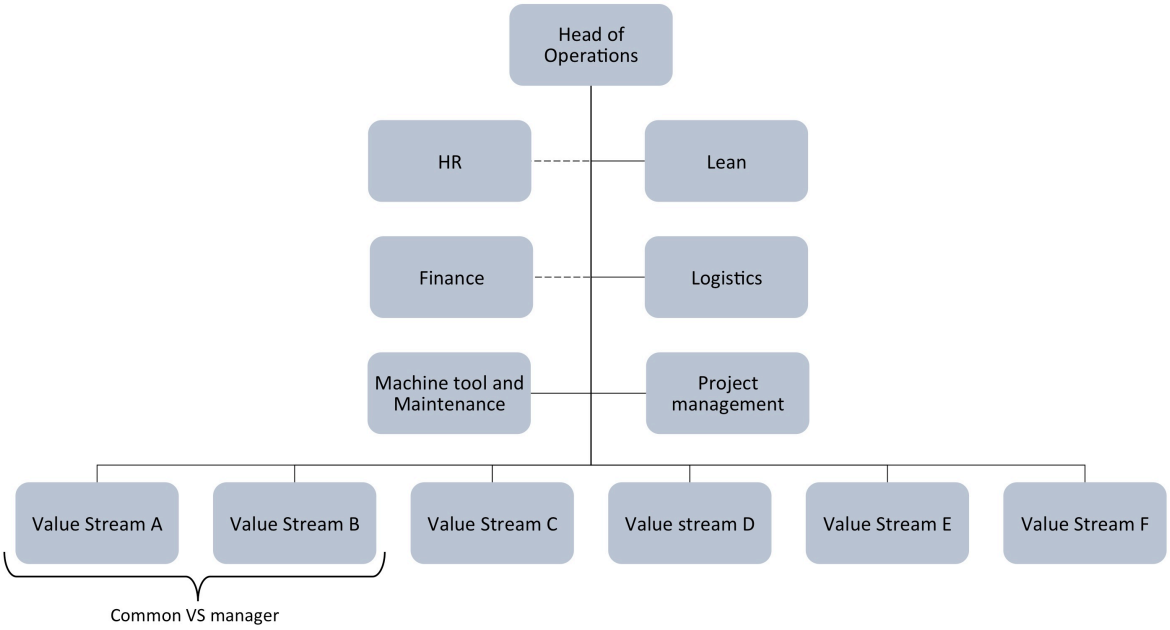

Figure 4.8. Organizational chart of Operations management team.

4.5.1 Solid Line Relationships

A solid line relationship at EPS means the direct manager is responsible for the competence development, long-term career development and employee rewards. In the management team put together by the VS manager the solid relationships identified are the line managers and the logistic manager.

4.5.1.1 Line Managers

A VS is divided into departments which are managed by line managers. In general, line manager's' responsibility is meeting the daily production plan for their department and budget, and they report directly to VS managers. The departments usually consist of different work centers, which are run by teams of operators working in shift. Each shift consists of a team of approximately six to ten operators with dedicated team leaders (TL). Besides TL, who is in responsible for planning and continuous improvements, there are two additional roles in each team that have responsibilities of safety respectively quality. The three roles are one way for the line managers to create a sense of ownership as well as accountability of safety and quality in each team and shift. Furthermore, the role of TL is to always have someone responsible for the site since all teams work in shift whilst line managers work Mondays to Fridays. Line managers are in charge of meeting the requirements of the KPI, which the VS manager has delegated to them. The VS managers can also have implemented additional performance indicators in order to raise awareness of important sub-targets or areas of interest in running the daily operations, which is excluded in the KPI Gold standard. For example, one VS manager has created an additional performance indicator to monitor the waiting time for a measurement process as they believe this measurement will assist the team to create a competitive VS. Line managers are responsible for planning and developing their department including resources and competence development, process development and continuous improvements while following budget. Just as the VS managers encourage their line managers to take ownership of their department, the line managers in turn encourage the TLs and operators to have the same sense of ownership of their duties and deliverables. It has been articulated that solving a problem should be done as close to the source as possible, it is therefore very important everyone feels responsible for the delivery of goods and meeting the overall goals.

4.5.1.2 Logistic Manager

The logistics manager is a new role which has been established during the course of this research. The logistic manager's role allows one person to obtain a holistic view of the supply chain, from supplier to customer. As this role is new to EPS, not much information has been obtained, however the purpose is for the VS manager to only have one person to turn to with all supply chain related questions. In order to get a holistic perspective two previously functionally deployed roles, material handler and commercial lead, have been incorporated and moved to be located in the VS. Together with operations planner, which already was located in the VS, the three roles have the responsibility of the supply chain and report to the logistic manager.

Material handler is in charge of inbound material from supplier to VS, the operations planner is responsible for capacity and material planning in production and customer lead is the VS's interface with the customers supply chain and the delivery from EPS to customers. Material handlers have previously been located in the Supply Chain function where they operated in supplier-based teams with Supplier Quality Assurance (SQA) and Commodity. Commercial lead was previously located in the Commercial function where one commercial lead served several VSs. By having all the three supply chain roles operating under a shared manager they too get a holistic view of the supply chain and an insight to how their own role and duties affect the other supply chain roles in the VS. One of the primary incentives of moving the supply chain roles to the VS was to structurally align them to operate in a way that is most effective from a VS perspective and not a functional perspective.

4.5.2 Dotted Line Relationships

The dotted line relationships at EPS mean the employee should deliver some form of result or assist the matrix manager when required. The intensity of the relationship can depend on physical location and previous relationships. Dotted relationships are identified between VS manager and the MEQE manager, Lean and Finance.

4.5.2.1 Manufacturing Engineer and Quality Engineer Manager

As the name proposes, the role includes responsibility of the manufacturing and quality in the VS. A high level of quality in the products and processes is extremely important in the Aerospace industry due to safety standards and legislations. Product quality and the ability of deliver end-products on time to the programs goes hand in hand, therefore the role of Manufacturing Engineer and Quality Engineer (MEQE) manager is critical for the VSs. The VS's MEQE manager is responsible for the everyday manufacturing related activities and long-term improvement projects to make the VS's production more efficient and robust. They also serve as a link between product development and production.

The MEQE manager has a dotted reporting line to the VS manager and a solid reporting line to the functional manager of manufacturing engineering and quality engineering. This means the VS manager is responsible for the daily activities and what to focus on while the functional manager has responsibilities of the personal development of the MEQE manager and developing manufacturing related methods and processes which should be used in all VSs. The role as a MEQE manager includes helping the VS manager in requesting resources and budgeting for how many manufacturing engineers (ME), Computer Aided Manufacturing (CAM) programmers and methods engineers is needed for a year ahead. Budgeting also includes resource requests for shorter periods of time for example introduction of a new product. ME, CAM programmers and method engineers are deployed from the manufacturing engineering function and work in a team under the MEQE manager but have different reporting lines. The MEQE is ME's direct managers whilst CAM programmers and method engineers have their direct manager in the MEQE function. A MEQE manager obtains KPI from both the VS manager and their functional manager.

4.5.2.2 Lean

The Operations Lean function consists of a Lean manager and three Lean coaches and serves the Operations dimension in Lean related activists such as continuous improvement processes. The Lean manager and one of the Lean coaches operate as second level Lean coaches and share responsibilities of supporting the VS managers in strategy, conducting PD matrices, degrading KPI's, and VS mapping. The second level Lean coaches are in charge of supporting half of all VSs each. The other two Lean coaches support line managers and TL with Lean tools in more practical issues. They are arranged just as the second level Lean coaches in supporting half of all VSs each. The Lean function is located as a part of the Operations dimension and only reports to Head of Operations. However, the VS managers see the two second level Lean coaches as part of their team and are often visualized as a dotted line to the VS's organizational charts. By being shared between different VSs the Lean managers get an overview of how the different VSs operate.

4.5.2.3 Finance

There are two employees who have the financial supporting role, also referred to as Controller. As the Lean coaches, the controllers are also shared and serves half of the VSs each. The financial role includes controlling and supporting the VS in financial statements, analyzing overhead costs, supporting in budget processes and calculation and investment models. The controllers have a dotted line relationship to VSs and a solid line to their function, Finance. In addition to supporting the VSs the two controllers have additional functional responsibilities where one monitors products with quality issues put in quarantine awaiting release and the second controller is in charge of the financials of inventory.

4.5.3 Additional Roles Affecting a Value Stream

Besides the VS managers' team, other cross-functional roles and stakeholders have interaction with the VSs at different times or due to different issues. During interviews and observations the primary non-reporting relations has been highlighted as Human Resources (HR), Supplier Quality Assurance (SQA), Delivery Supplier Quality Responsible (DSQR), Chief Manufacturing Engineering (CME) and IT (see figure 4.9).

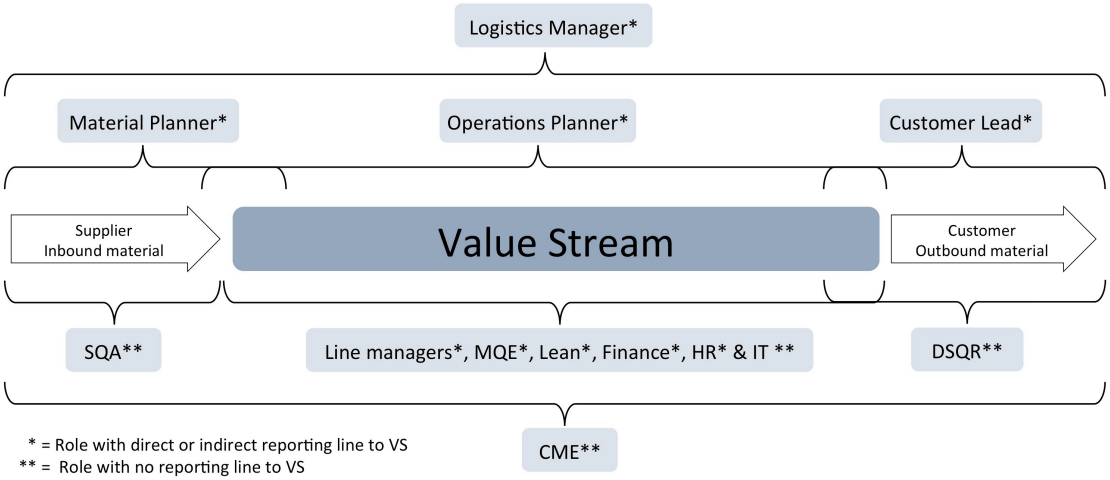

Figure 4.9. Visualization of all roles affecting a value stream.

4.5.3.1 Human Resources

As stated above is HR one of the functions operating in a Head of Operations management team. The Operation's HR role is also known as HR business partner with the primary objective to support Head of Operations and VS managers in areas of human resource related areas such as recruitments, rehabilitations and salary revisions. In total, HR business partner supports approximately 45 middle and top managers in Operations, Programs and some of the functions. However, focus is on the Operations dimension where daily or weekly contact with all managers is included which is more seldom with Programs and functional managers. In addition to supporting managers, the role entails centralized HR work duties. A dotted relationship is identified to Head of Operations the VS manager and a solid relationship to the function.

4.5.3.2 Supplier Quality Assurance

As mentioned earlier, the SQA has previously been operated in teams with the material handler and commodity. The role of the SQA includes responsibilities of controlling and monitoring quality of inbound material and components as well as conducting deviation investigations and reports. SQA is also included in supplier audits and the process of developing quality requirement of production material. SQA operates in close collaboration with suppliers and their processes, and has the foremost responsibility of controlling quality matters beyond EPS's organizational upstream-boundaries.

4.5.3.3 Delivery Supplier Quality Responsible

DSQR is the customer's representative for controlling outbound end-products. Instead of having an employee controlling the quality and specifications of inbound products at the customer's site the DSQR controls and verifies the end-products have the right specifications before leaving EPS. The DSQRs are educated and certified by a customer and each customer has one or a few employees only controlling their products. Therefore, since several VSs serve the same customers they sometimes have to share one DSQR.

4.5.3.4 Chief Manufacturing Engineer

A CME is the technical leader of Manufacturing Engineering and is responsible for manufacturing definition and manufacturing engineering related activities throughout VS operational chain and the whole lifecycle of a specific end-product. CME represents the ME function in the cross-functional teams in the Program dimension where internal and external customer, and supplier audits is one of their responsibilities. Furthermore, they have the responsibility to ensure the manufacturing process meets customers and authority regulations, robustness and ensures compliance of manufacturing processes and standards. The CME role has a dotted line relationship to the Program dimension and supports the VSs through the MEQE role.

4.5.3.5 Information Technology

IT is a shared resource for the whole organization, located in the Sweden Business Support function. IT supports the VSs in developing IT related activities such as visualization of processes and machines. Additionally, they support the VSs in adapting the Enterprise Resource Planning (ERP) system after the VS needs and requirements. Digitalization and visualization are important aspects in moving a production into industry 4.0 etc.

4.5.4 Similarities and Differences Between Value Stream Management Teams

The VS management teams looks more or less the same (see figure 4.7 for the VS management team), currently there is only one manager who has not yet decided to implement the role of a logistic manager into the team and therefore still operates with only one operations planner located in the VS. One MEQE manager also operates as a CME, which has been articulated as a great asset due to the CME's in-depth knowledge of the product's characteristics.

However, how the VS managers have chosen to arrange their line managers is very individual. One VS manager has chosen to structure one line manager in the beginning of the VS flow, one in the middle and one handling the processes in the end of the VS. This VS manager has chosen to let their TL take part in the capacity planning instead of line managers, an initiative to create a sense of ownership and responsibility of the TLs. Another VS manager wants the line managers to feel responsible of the products the VS delivers and has therefore divided the line managers to be in charge of the manufacturing process of one main end-product each. A third VS manager has chosen to arrange the line managers based on the product characteristics. In the VSs which share a VS manager, one line manager operates in both VSs while the other two operate in one VS each. Similarly to the VS manager, the line managers also have the freedom to run their department as they wish. These two VSs have started an initiative to create ownership of TL by involving them as part of a process control project. For another VS, one line manager is in charge of a large continuous improvement initiative where operators are involved to improve their operations. VS-C

4.6 Operating in a Value Steam in EPS

For the VSs to operate both as separate factories and as a collective, it is the VS manager's job to balance how to run the VS as they best see fit while simultaneously following standardized activities. As previously mentioned, the VS managers have the primary responsibility to fulfill the VS's objectives. This implies that the VS managers have the authority to operate and distribute the available resources within the VS to achieve these objectives as they best see fit. A common leadership practice at EPS is to decentralize decisions to as close to the affected area as possible. All leaders interviewed during the research advocated, in one way or another, that they try to distribute accountability to subordinates in order to create a sense of ownership of tasks.

4.6.1 Value Stream Objectives

As mentioned earlier, the VS managers are measured on a predetermined set of KPIs such as safety, quality, delivery precision, inventory, cost and productive hours. The VS managers and the VS management team are responsible to take the necessary decisions and actions on a daily, weekly and monthly basis based on the performance of the KPIs. On a daily basis safety, quality and delivery (SQD) are measured together with what is referred to as 4Ms, which is an abbreviation of man, machine, material and method. 4Ms can be viewed as the prerequisites needed to meet the VS's production plan to fulfill the SQD targets. To be agile and quickly respond to any threats towards the progress of these objectives, the VSs operate in a bottom-up manner to elevate all relevant information. This allows them to quickly identify unpredicted disturbance or other short-term risks towards the SQD targets. It further allows to utilize problem solving at the source and to only elevate problems which require attention to higher management levels. It is done through a standardized morning meeting structure in order to obtain a collective current state of all VS at the same time and where both SQD and 4Ms are reviewed.

4.6.2 Standard Morning Meeting Structure

The morning structure is a standardized way of delivering results and conditions for the VSs ability to produce according to plan, and is conducted during three different levels; line managers' team, VS manager's team and Head of Operation's team. During these meetings information and problems are escalated of what has happened during the last 24 hours and expected outcome of the next 24 hours as well as other important variables which will affect the VS in a near future. The purpose of the standard meetings is to ensure a stable workflow and to obtain a high pace in problem solving and conducting continuous improvement activities. The aim is to identify and act on potential risk before they can affect safety, quality or delivery.

The agenda looks similar for all three management levels and besides SQD and 4Ms, status on corrective actions are reviewed as well as issues that needs to be addressed to next level of management. The progresses in these areas are visualized on large whiteboards, which are displayed in the production area and meeting rooms.

Visualization is a way for all stakeholders, from operator to top management, to obtain an overview of how a VS is performing. All employees should be able to see if their VS is performing according to target or not. The morning structure begins with all line manager meet with all their night shifts TL and the MEQE manager meets with the deployed ME. Areas which affects the VS's ability to perform according to target is elevated during the next level meeting with the VS managers and the VS management team. The last management level meeting is with Head of Operations and his management team. The same areas are covered and visualized according to Operations criteria's. During the Operations morning meeting all VS managers obtain an overview for how their fellow VS managers are performing.

4.6.3 Value Stream Lean Activities

Every Wednesday the VS manager's management team focuses on Lean initiatives which are run in Operations. Straight after the standard morning meeting a Lean Steering Committee meeting is held where different Lean initiatives, such as VS mapping activities, are presented. The Lean manager and Head of Operations hold the meeting and the purpose is to share experiences across VSs. Employees who are conducting improvements in Operations are invited to present their progress each week. In the afternoon, Head of Operations have a standard "go and see" activity referred to as "Think Lean" where all VS managers are invited. The agenda includes a detailed tour of an improvement initiative at one of the VSs. The purpose is to share experiences, new ways to conduct improvements, but also involve employees from different levels in the organization. Participation is only mandatory for the VS manager which VS is in focus, for all other VS managers the activity is voluntary. However, from observations it was noted that there was a relatively low participation from VS managers whose VS was not in focus. Even so, from observations VS managers showed a "go and see" attitude themselves as they are often seen present in the production area daily engaging with employees.

4.6.4 Policy Deployment Matrix

Another way of acting on strategic measurements is through utilizing a policy deployment matrix (PD matrix). GKN uses the PD matrix as a standard way of aligning goals down the organization through converting strategic priorities into actions by using the process of Hoshin Kanri (see figure 4.10). EPS has chosen to review the PD matrix quarterly in order to be agile to changes through incorporate them into strategic performances. Each VS manager is responsible of breaking down the strategic priorities for their VS to have goals to work towards. The purpose of the PD matrix is to ensure everyone's focus is kept on the customer and to move in the same direction. It is based on data to identify strategic gaps as well as create mutual understanding. By breaking down the strategic parameters and directing people in what they should do, aligned goals and objectives are expected results. It is based on the vision of GKN which is disintegrated to strategic goals followed by outlining the annual objectives, the continuous improvement plan, targets and ownership. A part of the PD matrix is the RACI model (responsible, accountable, consult and inform), which is a method to create clear ownership and to dictate who acts on what.

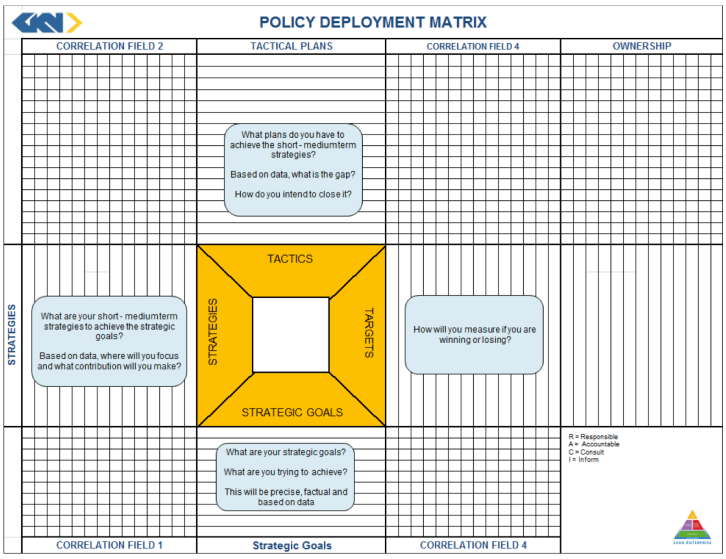

Figure 4.10. GKN's Policy Deployment matrix.

4.6.5 Cross-functional Collaboration

EPS operates in a matrix organization where the different dimensions constantly interact on both a daily basis in VSs and through different directed initiatives and improvement activities. Since the Functional dimension is in charge of developing methods and competences it affects how a VS operates. Methods developed in the MEQE function, for example, are later carried out through the MEQE managers' daily activities. Another example of how the Functional and Operational dimensional interacts is a robustness improvement initiative to reduce recurring quality issues in high volume products. The initiatives are led by the end-product's CMEs but carried out through resources from the functional departments and VSs. Though the VS is seen to be run as its own factory it has to utilize the human resources available within the functional departments to fulfill the delivery of end-products. The VS therefore supplies employees with task to fulfill the VS objectives while the functional department serves a key role in maintaining and developing individual co-worker competence and technical excellence. Whether or not a specific competence or functional role should be based as a part of the VS team or not is a question that often arose during interviews.

4.7 Lean Leadership at EPS

EPS is a Lean organization and a description of how they work with Lean is presented below.

4.7.1 Vision, Culture and Core Values

"We aim to create long term and sustainable shareholder value in the form of steadily growing earnings and dividends through the delivery of growth in sales and profits, and a strong return on invested capital." is the stated strategy of GKN spanning all divisions of the global company. For GKN Aerospace of which EPS is a sub-business units, the strategy focuses on widen the product range of core structures, engine systems and niche technology markets. The way forward focus on design and manufacture integrated systems and grow into new markets, close to existing markets.

The culture of GKN can be traced back 250 years. It is referred to as the DNA of GKN and consists of five principles considered to be present in everything they do, every day.

- Seize and adapt to all opportunities presented
- Offer market leading precision technology
- Make an effort in excel and improve in all areas of business
- Take care of one another and the customers
- Always do what is right

Furthermore, GKN has developed a set of values consisting of six promises given to the employees from the organization. In return, there are the same amount of values expected by the employees to promise GKN. These values are referred to as "Living the Values of the GKN way" see table 4.1.

Table 4.1. GKN promises to employees and employees promises to GKN.

GKN promises to employees	Employees promises to GKN
GKN will invest in your development so we can together create a successful organization by providing the best service to the customers	I will be engaged in my work to contribute in building a successful customer oriented organization
GKN will assist in development to your highest potential and will not accept any form of discrimination	I will always respect my colleagues
GKN will ensure a secure and safe work environment	I will not put my colleagues at risk and I promise to inform anyone who is not working in a safe way
GKN will do anything in their power to minimize the effect the organization has on the environment	I believe in honesty in all situations
GKN will contribute to the society of which everyone is a part of	I am aware I have the right to report work which is performed incorrectly and I am willing to do so
GKN will listen in confidence in case of problem	I will do everything I can to contribute to a better environment and support the community where I work and live

4.7.2 Lean Enterprise

GKN is an organization, like many, which has adapted Lean philosophy into their way of working and has named their system "Lean Enterprise". Lean Enterprise support five objectives GKN strive towards; lead in chosen markets, leveraging the global footprint, technology driving margin, operational excellence and sustain above market growth. Lean Enterprise consists of four modules (figure 4.11); GKN Lean Vision, Production Excellence, Business Process Excellence and People Excellence, all addressing key Lean initiatives and tools to use when striving towards the above-mentioned objectives.

GKN Lean Vision states "*Our vision for Lean is to create a culture of continuous improvement in all we do, by having a common approach to improving our Business and Production processes"* and aims at building a continuous improvement culture totally relying on leadership. Production excellence is defined as *"an approach to create flow of value to our customers and sustaining improvement in our production processes"* and focuses on how to work with Value Stream Management (VSM) and Lean tools in production. This module is studied by VS managers as it aims at developing the physical flow. Business Process Excellence is described as *"an approach to creating flow of information and sustaining improvement in our office and supporting process"* and is a module studied by functional managers as it is aimed at developing support processes. Lastly, People Excellence is *"a commitment to unlock the talents of our people and create a culture of CI which support the GKN way"* and is studied by everyone as it is the basis for leadership. The modules affecting the VSs are the Production Excellence Module and the People Excellence Modules, described below.

Figure 4.11. GKN's Lean Enterprise.

4.7.2.1 Production Excellence Module

In the module of Production Excellence important terms needed to understand both Lean as well as VS mapping is defined. Value is defined as what the customer is willing to pay for; value adding activities and processing. Preventing value from being created is described as waste; variation, no standards or visual management. Waste is further elaborated as everything customer is not willing to pay for and is divided into eight categories; defects, overproduction, waiting, transport, inventory, motion, excess-processing and no employee involvement. To reduce waste, GKN presents the foundation of several Lean tools such as 5S (Sort, Store, Shine, Standardize and Sustain), VS mapping, Kaizen, visual management and problem-solving. Problem-solving activities are encouraged to be conducted where the problem occur, hence it is the leader's role to support and enable problem-solving, not actually solve the problem.

In the Lean Enterprise booklet VS is described as the flow of activities, both value adding and non-value adding, required to bring a product from raw material to the customer. As previously mentioned in chapter 4.3, at GKN the VS are divided based on product families and one VS includes products with 80% similar process steps and with maximum 30 % difference in work content. To improve flow of value Lean Enterprise states management supporting activities in terms of teaching, coaching and recognizing good continuous improvement efforts is key. When GKN speak of improving the flow of value, they refer to *ring-to-ring*, meaning an extended VS focus with a holistic view from customer to supplier (see figure 4.4). VSM for GKN is to ensure the VS focus on delivering the 4 R's; right product, right price, right place and right time. One of the five objectives supported by Lean Enterprise is Operational Excellence and includes eight principles:

- Create Lean VS
- Make Lean VS flow
- Make Lean VS flow visually
- Create standard work for management of Lean VS flow
- Make problems/disruptions within the VS flow visual
- Create standard work to have routine response to VS flow problems
- Teach employees problem-solving to maintain and improve the flow to customers through employee involvement
- Free leaders time to work on growing and improving the business

These eight principles are GKN's way to ensure the business is structured around the VS. In this chapter on how to run the VS efficient and effective, how to deal with the issue of resources which are shared across VS is outlined. A four-step model is presented with four questions to answer in order to determine how to prioritize; what is going to run, what is it capable of doing, how am I going to connect it and how am I going to schedule it. These steps include creating a flow path of the products which share resources, analyze capability in regards to machine loading, takt time and interval analysis. Furthermore, FIFO lines are suggested in order to control the work in process and to know which product to process next. Multiple FIFO lanes can be used to create more flexibility when scheduling.

4.7.2.2 People Excellence Module

The People Excellence module focus on employee involvement and leadership. All continuous improvement efforts require strong leadership and at GKN there is a standard for how to work with leadership called Leadership Standard Work. The purpose is to make leadership of processes and people focused, visible, systematic and repeatable and is considered as key to success as it is driving cultural change through changing the behavior of employees. Leadership Standard Work (see figure 4.12) consists of the foundation and core of continuous improvement culture, building onto standards, supported by visual management, process, system and verifications. By working with Leadership Standard Work leaders moves from reactive to proactive actions with the purpose of push this way of thinking down the hierarchy of the organization.

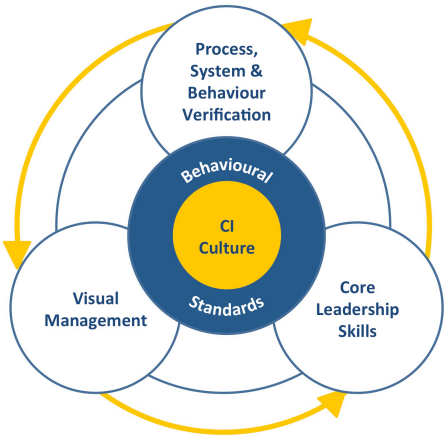

Figure 4.12. GKN's Leadership standard work model.

There are several leadership models presented to assist leaders to drive a culture of continuous improvement at GKN and the one mentioned mainly during the interviews was the Cathedral model. The Cathedral model is built on the values presented in table 4.1 as a basis with a daily accountability process where the leaders are supposed to evaluate whether what is performed during the day meet the expectations set. There are three core skills all leaders must apply which are a part of the Cathedral model; recognizing, coaching and provide constructive feedback. Guidelines of how to use these skills in the role as a leader is provided and what the impact of using these will have on the employees. Lastly, a big part of this module is how a leader can establish employee involvement, which phases a team goes through from firefighting to excelling in involving employees. It is the role of the leader to ensure to develop and sustain a way of working facilitating moving from firefighting to integrated employee involvement in the standard way of working. During an interview with the Lean manager for Operations, the Cathedral model was mentioned as good guidelines of Lean leadership.

4.8 Semi-structured Interviews with Value Stream Managers

After the primary unstructured interviews, secondary follow-up semi-structured interviews were conducted where the VS managers got the chance to reply to a set of questions (see appendix 1). Below their responses are presented, divided into areas of strong VSs, team and leadership.

4.8.1 Strong Value Streams

The first question was asked in order to identify whether the VS managers had consensus regarding what a strong VS is. The foundation of the responses was very similar with a focus on independence to solve problems without interference from other parties. One VS manager advocated a VS is strong when it can solve 90% of its own problems and to accomplish this requires appropriate competence in the VS. One prerequisite to have appropriate competence is to be able to take full ownership of the VS and its' resources. Two of the VS managers expressed the importance of simultaneously use the strengths in being a large organization.

One of these two managers stated there is a lack of viewing EPS holistically as one organization, where prioritizations are always on high volume value products, making the products which have lower volume value suffer. Another common theme between VS managers regarding what defines a strong VS was delivery; two emphasized end-products, but three managers included both end-products and targets. It was clear many VS managers understand the importance of explaining why something is done to employees, hence they said it was key to involve team members in decisions to create strong VSs. Words mentioned in relation to involvement was openness, belonging and aligned goals. One VS manager stated a strong VS is equal to be a strong factory where the foundation is to have a good leader. Another VS manager said a strong VS is where a continuous improvement culture is well implemented and established to drive the VS towards the goals set. Some problems were identified during the interviews in regards to creating strong VSs such as misaligned goals, lack of holistic view across all VSs and lack of solving root-causes to issues where they occur.

Secondly, a question was asked what is considered to be the VS's strengths. All VS managers mentioned their team in relation to their strengths, however slightly different. Four VSs managers mention well-functioning cooperation within their management team and two VSs managers state they have diversity which complements the management team. Employee involvement as well as clear goals, both short- and long-term, were common themes expressed by several managers during the interviews. "*I have competent staff with the appropriate and diverse background in my team which strengthens my VS. We work together to set goals and set boundaries*" was stated by one VS manager. Two VS managers considered their strength as a VS to be able to produce complex products which makes them competitive, of which one of them said this is their VS number one strength. As two VS are nearly autonomous, interdependence on others was mentioned as a strength as it makes it easier to control their flow. From here the responses differed slightly depending on the experience and personality of the VS manager, but also depending on how the question was interpreted. Expressions used to explain the strengths were courage, produce many products simultaneously, flexible and strong production unit, knowledge of competition, good delivery of end-products with high quality, stick to budget, good structure and visualization.

When the third question was asked in regard to what the challenges each VS face, there was a wide range in replies. The only consistent answer for all VS managers, except one, was inherited quality defects in inbound material. This was the first to be mentioned and was experienced as a huge challenge today. The impact this challenge has on the VSs depended on the number of inbound materials used to produce end-product but also what type of raw material is used. There are not many suppliers able to supply the raw material in this industry hence EPS becomes dependent on the relationship with the suppliers. The VS managers do not sense they can impact the relationship with the supplier on VS level. Additionally, the VS managers expressed the SQA role, in charge of solving supplier quality related issues, is organized in a structure which benefits the function rather than the VSs. Two VS managers further instigated quality in terms of robustness is a challenge, both on existing products but also when new products are introduced.

It was expressed from one interviewee that very seldom focus is on identifying the root-causes to increase robustness, rather the focus is on the symptoms and the VS manager request a good way of working with robustness. One VS manager stated "*If the quality is not in place, it will be very hard to reach the goal of reduced hourly rate to stay competitive".* Overall, the impression was the greatest challenge experienced was to be able to deliver KPI Gold without being able to control and take full ownership of all activities and resources in the VS. The soft challenges were identified as create a team spirit and see the employees affecting the VS as one team, across different roles and between white- and blue collars. To emphasize that solid and dotted lines has no importance was also mentioned as a challenge as employees tend to hold on to these quite hard. One VS manager expressed different challenges than the others, and stated the greatest challenge is to maintain high efficiency during renovation of machinery and to develop more effective methods. Additionally, the VS manager stated there is an increase in demand for the products and one challenge is to ramp up production in an appropriate pace. Another VS manager said their VS has the capacity and competence to take on new assignments, but the challenge is to make the contract signing effortless. Today, this process take a lot of time and cost a lot of money when new contracts are signed and in order to make it easier, a more effective process is needed. A challenge for the VS which belongs to two separate business units at GKN Engine Systems, is that there are up to three different strategies to be aimed towards which may not always be aligned and there is a lack of understanding between the business units regarding prioritizations. Other challenges mentioned were sharing of resources across VS, lack of DSQR employees, keep competence within one VS when the VS manager cannot offer a career development plan, take on the responsibility of managing the extended VS from supplier to customer and when new orders come in from old contracts where machines that used to perform the processing have been phased out.

The VS managers were asked what they considered to be the competitiveness of their VS today and four replied that it is done through focusing on reducing the hourly cost. The VS managers presented two ways of reducing cost of which the first was through gaining new contracts to fill up unutilized production capacity. The other way was making their processes more efficient to free capacity which will allow for more business to be brought in. One VS manager said knowledge of capacity and capability makes their VS competitive. Two of the interviewees clearly stated that having a well-functioning continuous improvement culture is key to enhance the VS's competitiveness. To include everyone, both white- and blue collars in the future state of the VS is very important and it is everyone's own responsibility to know what the goals are and to work with improvements to strengthen competitiveness. One VS manager expressed the importance of pushing down decision making to line managers which are responsible of increase the competitiveness of the VS's departments as it should not be the VS manager's role. The role of the VS manager is to free time for line managers so they can work with competitiveness, but today there are a lot of administrative processes which hinders line managers to do so. Additionally, two VS managers stated their competitiveness is their knowledge of competitors through benchmarking of prices and to know who you are competing against, although not all products can be benchmarked since EPS may be the only producer.

One VS manager replied a strategic plan of the future state makes them competitive and by having the latest machines through either development of machines or investment in new automated machines will increase their long-term competitiveness. Additionally, it was mentioned to keep key employees motivated they should be invited to suppliers visits which can then be seen as a competitive factor for recruiting competence. One VS manager stated they could not compete very well on hourly cost, however their competitiveness lies in the ability of fixing problems with the end-product.

4.8.2 Team

The first team related question asked VS managers to define what a strong team is. The first response of almost all VS managers was that a strong team is the same as a strong VS. All VS managers replied employee involvement although with different expressions; participation, build commitment through challenging tasks, involvement from employees through exciting tasks, create a "win and lose together" attitude, commitment by ensure all employees are aware of the goals and the purpose of the goals. Three VS managers lifted the importance of diversity of gender, age and competence to create a heterogeneous team which challenge each other as well as the current ways of working. A holistic view and aligned vision of where the organization is going characterize a strong team for four VS managers. Ownership of tasks is necessary in a strong team emphasized by two VS managers, and one of them stated "*A leader does not necessarily have to have the title manager"* reflecting on how a strong team must lead themselves, but also others. Other characteristics raised were self-development, continuous improvement thinking, know their value, clear scope of tasks with clear boundaries, supportive and to have fun together.

Since employee involvement was mentioned by all VS managers, a follow-up question regarding how to create involvement and commitment was asked to three of them. An agreement was identified as by providing information, clear goals and reach alignment through emphasizing on why the team should do what they do, involvement is created. In addition, teamwork through supportive leadership and to allow the team members to take ownership of tasks were raised as key to create employee involvement. Other ways to create involvement were mentioned to be participation, led by example, have fun together, use images to create understanding and a prerequisite is the team members must like to work in a group.

The second team-related question was based on matrix structure and asked whether it mattered if employees had a solid or dotted line to the VS manager. All VS managers agreed it should not matter and it does not matter to them. However, they all agree on how the individual's personality plays an important role in how lines are perceived. One VS manager experiences the significance of lines to increase when an employee feel stressed and insecure in their role, but with clear priorities, involved employees, maturity and security within their role the lines have no significance. At the same time, several VS managers express the desire to pull some resources, such as SQA, CME and ME, closer by create a solid line relationship in order to control and motivate them.

There are some disagreement regard what resources the VS managers want to have closer, and one even state it is not necessary as the focus should be on communication between the roles. One VS manager expressed potential risk of losing depth in competence if all functional roles are pulled into the VS. By changing between a dotted, or no line, to a solid line, sends a message regarding the scope of the role.

The lines have importance when it comes to deliver result according to one VS manager "*If you have a solid line to a functional manager, who pays your salary, and a dotted line to a VS manager - who do you listen to when goals are misaligned?"*. It can be hard to affect a dotted line relationship. One VS manager stated the lines does not matter per se, however it has a symbolic value of what is important and can be used to emphasize prioritizations needed.

In relation to the previous question on what a strong team is, the VS managers were asked how they can work to strengthen their team. Involve employees and inspire by leading by example were mentioned by three VS managers. To strengthen the team through involvement, the VS manager must show commitment and trust in their VS and communicate. One VS manager said it is not only enough to tell the team what to do and involve them through different activities, it is key to listen and be responsive. Clear expectations and know the direction of the VS is required by the VS manager in order to ensure the team knows where they are going. Furthermore, the VS manager can strengthen their team by create room for their team to take ownership of tasks. To have a strong management team with competent line managers is key to build a strong team according to two VS managers. Other success factors are mentioned to be diversity and job rotation.

The next question asked was how VS managers motivate their team and create commitment. All managers thought it to be important to show small appreciations, anything from a comment to chocolate or cake. Even if everyone agreed on the importance of recognizing employees when they have made an accomplishment, three VS managers said it is easily forgotten and there is often insufficient time and room for recognition. To take the time to show appreciation is crucial to motivate the team. Three VS managers also stated the importance of celebrating success, both small and large victories. Reward systems should be in place, one VS manager state the process of having a weekly recognition on Friday morning meetings where the management team lift one person who had performed well during the week. Another VS manager had no standard reward system, but kept a storage of chocolate which is handed out when an employee has done something well. A third VS manager was requesting a standard reward system, apart from the one GKN has in place. People are different and need different type of recognition; some prefer one-on-one meetings whereas others prefer to be recognized in a group, hence it is important to know how to trigger each team member. Even though all VS managers emphasized the soft factors of motivation, one VS manager also said it is important to push employees by being clear on the expectations which will drive employees to perform. One employee might be motivated by money whereas another employee is motivated by achieving goals. Some employees get motivated by structure where others get motivated by the freedom of creating something of their own.

4.8.3 Leadership

The first question in relation to leadership was to gain an understanding on the knowledge of Lean leadership amongst the VS managers. As it is a quite broad question, no answer was the same. The first VS manager defined Lean leadership as flexible and efficient leadership, working with continuous improvements. Another VS manager stated Lean leadership is present everywhere and comes down to the goal of having a problem free everyday life.

The VS manager further elaborates, many standards of how to operate within EPS exists, however there is an opportunity to update, develop and create new ones. The second VS manager state Lean leadership progress every day and key is visualization providing a clear objective. The interviewee agrees with the first VS manager regarding a lot of standard exists, in relation to visualization, and say it is a lot of freedom within the standards. The perception from this VS manager is no more standards are needed, it should be up to the VS manager what to visualize to help the team reach the goals and to force more KPI's on a team rather lead to confusion than success. A third VS manager focus on Lean when referring to Lean leadership and state "*Lean is to create a self-improving organization which is quick and flexible in order to continuously improve"*. The Lean tools which are often mentioned, such as 5S, Kaizen and VS mapping, comes down to continuously improve and the leader's role is to drive the tools to improve the organization. More standards were requested by this manager. The fourth VS manager said Lean leadership have had different meaning over time and the concept has also matured due to increased understanding. The Lean tools are not sufficient and Lean leadership is about self-development, lead as you preach whilst focusing on change through a continuous improvement culture. To work with Lean leadership visualization, standards and persistence is needed to guide the way forward. The fifth and last VS manager said Lean leadership is interesting from a waste perspective. What is waste in leadership? One example could be difference in opinions between leaders regarding career development and misaligned resource planning. Furthermore, the VS manager believes there are enough standards as it is today and if more standards were to be implemented, there is a risk of sub-optimization. Cross-training of employees and create a culture where employees learn from each other is Lean leadership.

The second question asked what the VS managers considered as key characteristics of a leader leading a cross-functional team. Four of the VS managers expressed the importance of understanding the holistic organization by possessing knowledge from several different positions in order to create authority and respect. A good sense of business management and being strategical by thinking ahead is necessary according to four of the VS managers. Goal oriented whilst communicative is important. Other characteristics mentioned were brave, analytical, coaching, democratic, choose the right team, detailed oriented at the same time trust employees to take responsibility, unafraid and enjoy the role as a leader. One VS manager stated "*The important characteristics of a good leader depends on where the organization, or VS, is. In a mature VS it is important to be a visionary whereas in an immature VS it may be more important to be structured and methodological*".

The last question asked was what three parameters the VS managers would consider key in order to facilitate a good cross-functional work environment at EPS. The question raised some confusion and only one VS manager was able to come up with three parameters on their own. This interviewee emphasized cross-train employees by allow different roles to try something new, a ME should get the option to try logistics for example. This would lead to better understanding of the different roles in the team. Second parameter was named to be geography in terms of closeness to the cross-functional team. Closeness will always be more important than any solid or dotted line as it creates a personal relationship between the team. Thirdly, objectives should be explained and developed through involvement, everyone's part of the cross-functional team should be included in the process of developing the strategies. The other interviewees had suggestions but often got stuck after one or two parameters. By the researcher facilitating example of closeness to the VS managers, the VS managers were able to relate to the purpose of the question. Everyone agreed closeness is the absolutely most important parameter to build a cross-functional team, but it is not always easy to achieve. One example was given by one of the VS managers to move all resources working for one VS to one location. As some resources are shared across VS this is however not possible. Limited office space was also a parameter affecting the ability to have additional roles move closer to the VS. Another interviewee said it is important to understand customer requirements and for all employees to see the same thing. If there is a universal agreement of focus on customer, team spirit is likely to increase. To evaluate the current cross-functional work today, Positive Climate Index, a process where selected employees in a month get to share opinions on the work environment, can be used was recommended by one VS manager.

According to another interviewee there is a lack of cross-functionality in Operations management team where important VS roles such as ME or representatives from the Supply Chain function are not represented. By integrating cross-functionality from the top it will easier spread down the organization. Furthermore, it was also mentioned that a lack of team building between VS managers exists. To ensure good collaboration between VS, a request was raised to enhance the teamwork on this level. Additionally, meetings between Operations and functions usually only occur on top management level. To create understanding between the dimensions and enhance cross-functionality at EPS, the VS manager found a need to more regularly meet with functional middle managers. Other factors mentioned was a need for stronger information sharing system and career development to facilitate good cross-functionality.

4.9 Semi-structured Interviews with Roles Affecting the Value Stream

During this research, a couple of unstructured interviews was conducted with top management representatives. They were asked about the background of the current organizational form and the view on strong VS. Other supportive roles were interviewed using semi-structured interviews where the questions addressed the relationship they have with the VSs. In appendix 2 the top management support questions are presented and in appendix 2 the semi-structured questions are outlined. Below are vital points brought up during these interviews presented.

4.9.1 Matrix Organization Structure from Top Management Perspective

When asked about why EPS are working in a matrix organization the General Manager (GM) said, it is because it is believed to be the best way of leading an organization. During the Volvo Aero time, they tried different organizational forms although all had a strong focus on the functions. GM presents working in a matrix organization is nothing new in Trollhättan, they are used to work in different dimensions with different focus. The difference now is EPS is more distinctive in the organizational form and its multidimensional reporting structures. When the GM was asked how the great change from being functionally structured towards VS and Programs as core business is affecting the business, the reply was no big change is happening. Despite the GM's reply, many employees have advocated EPS is in an extensive change process and expressed challenges that rise with this change. From interviews, it is clear tension raises in parallel with uncertainty regarding what will happen to different roles which may either change dramatically or disappear. The greatest effect will be seen by the Supply Chain function as the manager's role will go from being operational to be more of a consulting role. Furthermore, material handler has already been moved to the VS and discussions are ongoing whether other roles in the Supply Chain function also should be moved. When the researchers explained what was seen from previous interviews with employees in the organization, the following statement was made from the GM "*if it is perceived to be a big change [structured in VS] it means the cross-functional way of working the last 15 years has not been properly accepted. Then, it is just a bunch of leaders at the top that think that everyone has understood the vision. If everyone thinks it is a big change, no wonder why it did not work out before*".

4.9.2 Top Management's View on Value Streams

As mentioned by the GM and Head of Operation, it is through the VSs EPS can compete as an organization. Head of Operations further elaborates on the importance of not losing focus on functional expertise but everyone needs to understand how their job affects the VSs and their ability to compete. The VSs should have the ability to act fast and efficient, but also have the ability to understand and act on what the business environment demands to be competitive. Head of Operations said the VSs have to be competitive in the short-term through delivering the annual targets and in the long-term through creating a VS that will be competitive five or ten years from now. To be able to accomplish competitiveness it is of high importance for the VS managers to have an understanding for the economic aspects of running an organization of this size.

The reason for why VS managers should be responsible for the whole chain from supplier to customer is, according to the GM, to have one person accountable and no one should be able to blame their shortcomings on someone else. With great power comes great responsibility. GM further elaborates mandate and authority goes hand in hand; if a VS manager is responsible for the deliverables of the VS, the manager needs to have the authority to make it work. Since functional managers will not be affected by a poorly run VS, they should not be able to affect a VS's deliverables.

When questioned regarding how independent a VS is allowed to be the GM replied it is up to the VS manager to decide in what activities, or supportive roles, they want centralized to their VS. According to the GM, the first step towards becoming a strong VS is to realize that as a leader one need to be greater than oneself, meaning you need a strong management team with the right set of competences. A VS leader, therefore, need the right mind-set to understand what competences they need in their team to be able to operate a VS equivalent to a small or medium sized organization.

Everyone agrees on this, the GM state, but it has been proven much harder to implement as when it is time to implement, no one is expecting the change to affect their function or work. Head of Operations sees a great progress in the VS manager taking responsibility and ownership from only the last year. Now it is important to align the whole organization to support the VSs.

Another challenge in creating strong VS is acquiring the right amount of competences from the supportive functions as there is a shortage of some important roles. Head of Operations presents this as an example where the whole organization do not work in accordance to creating strong VSs and is instead driven by resource optimization and functional budget goals. However, from the VSs point of view, the investment of one employee might pay its salary 50 times by being able to deliver more products and it is not a cost burdening the functions as the VS will pay for any human resource they add in their VS. The VS managers have, or should have, the mandate to own and develop their VS as they best see fit.

4.9.3 Value Streams from Supply Chain Function Perspective

An interview was conducted with a middle manager in the Supply Chain function where questions regarding the current situation between the function and the VSs were asked. It was mentioned the function has a tendency to follow up operational targets and there is not enough time to work strategically. Proactive actions to prevent future potential strategic issues are seldom conducted, instead current efforts are put on reacting to operational issues and identify potential sources of why a problem occurred. When the root cause has been identified, the middle manager said there is a lack of time to invest in preventing it to happen again. The problem is experienced due to top management request detailed information on deliveries and supplier performance, which is further delegated to the global function, and therefore little space is left for providing responsibility and provide room for ownership down the organization. If top management started to request strategic plans instead, it would be easier to work proactively and trust employees to take ownership of the operational targets.

Many supplier's delivery performance have been deficient and the Supply Chain middle manager state there is a need to do something in order to make a change and to focus on strong VSs can be one way. How can the Supply Chain function work together with the VSs to ensure inbound material arrives in time? It will be important to discuss how new ways of working should be outlined. When the interviewed Supply Chain middle manager was asked how these two dimensions could best work together, no answer was found.

However, close collaboration as well as meetings between managers to work more strategically was mentioned as success factor. The SQA manager agree and believe by assigning one SQA to a VS, focus can be kept on quality and flow simultaneously, however by allowing the SQA's to still sit together and not in the VSs can assist in sharing knowledge. Today there is a diverse range of competence in the SQA function and the employees make a lot of use of sitting together and sharing experiences. It takes long time to learn how to work with supplier quality and new issues appear continuously, which require a conjoint effort to solve. The SQA manager stated however there is a great need of creating a connection between SQA and the VSs by drawing a map of who is responsible for what and by meeting in person.

As it is today, the VS managers does not know exactly which SQA deals with their supplier quality issues and to let either the VS managers or MEs meet SQA on a regular basis can make a lot of use. It should be clear that SQA's are part of the VS teams even though they do not necessarily have to sit in the VS. The SQA manager further stated in some cases, more than one SQA might be needed for one VS and there is not enough resources in the SQA function to cover the demand as it is today.

Before the organizational change of moving material handlers to the VSs was confirmed, an interview with a material handler was conducted. The same issue, as for SQA, of losing competence was raised when moving towards a VS focus rather than a functional focus. Today, the material handlers are all seniors and would highly likely not have problems with being assigned to a VS, but the problem would occur if a new person were to be employed for the position. The training of this person would take longer time and may not get a holistic view for material handling as a function. Another challenge mentioned by material handler was how the important teamwork between material handlers should be kept. In the role as a material handler, travel several times a year is included hence someone else needs to cover the daily tasks and if the material handlers are divided into VS, the knowledge of each other's areas will decrease. The SQA is an important role for material handlers as they work closely together, exchanging information regarding deviating material and communication between these roles is vital to do a good job.

Even so, it is important to not lose holistic focus and create sub-optimizations according to the Supply Chain middle manager. One challenge to consider is how to create forums and ways of collaboration for roles in the commodity teams which currently have a close contact with the suppliers and each other to share information. Furthermore, one of the strengths of the commodity teams is the united front towards the supplier as one supplier often serves more than one VS, hence the suppliers have one contact person into EPS. When the team is divided based on VS, the suppliers will have more than one contact person which might create confusion at suppliers site but also internal disputes regarding prioritizations. This statement was supported by the SQA manager, which emphasized the importance of ensuring mixed messages are not sent to suppliers from different employees located in different VSs. Mixed messages can lead to many discussions and even deviations in either documentation or the material. Communication and clarity is key when several employees contact one supplier.

The SQA manager elaborated best practice development can assist in transitioning to this type of structure and how ways of working is conducted today should always be questioned.

4.9.4 Value Stream from MEQE and Commercial Functions Perspective

To focus on strong VSs, Commercial function has moved one customer lead representative into the VS as they are believed to do their job better the closer they are to the VS according to an interviewed Commercial manager. Same issue as for Supply Chain function applies to Commercial, but towards customer instead. One customer may be served by several VS hence will communicate with more than one employee from EPS. It may create confusion for the customer, but it will allow the customer lead to focus on their job task. The Lean managers pointed out that the VS mapping processes has been an example where gap between the VS and Supply Chain has been explicit. The lack of Supply Chain representatives in the VS's management team resulted in incoming material was excluded from the mapping process. But by moving both material handlers and customer lead to the VSs a more correct mapping of the VS can be conducted, which can facilitate in utilization planning.

Previously the MEQE function had a solid line relationship to the VS, but has changed to a dotted line which results in competence and method development is supplied to the VS through the MEQE function. One of the interviewed MEQE managers was very positive to operate in a matrix organization. The MEQE manager stated this way of operating feel professional and sees the operational gain from obtaining KPI from two different managers as long as they are compatible. Further elaboration on the topic is there are currently no forum to develop methods and way of working in the VS, therefore it is positive to conduct those activities in the function where the MEQE manager's role is to link MEQE function to VSs.

4.9.5 Value Streams from Other Related Functions Perspective

The Lean manager, just as the Supply Chain manager and the SQA manager, advocated the risk of losing deep functional competence if moving functional roles into the VSs. Additionally, HR business partner also presents an issue if functional roles are deployed into the VSs and new resources are recruited. The result is doubling the amount of functional resources hence costs will increase. In creating strong and independent VSs it is important not to lose the holistic view and sub-optimize each VS. HR business partner says Head of Operations is currently doing a very good job in getting the VS to collaborate and helping each other for joint success but highlights it is important to withhold. However, it is highlighted the VSs will never become completely independent since resources and process will have to be shared. There is therefore a need to balance between centralized and decentralized functions. HR business partner stated some activities will have to stay centralized, for example the salary system and internal education.

Lack of role description and limitations of responsibilities were mentioned during interviews. For example, the Controllers found the description of their roles and responsibilities vague as it is sometimes difficult to know what financial activities falls under their responsibilities in their role as VS support versus their functional role.

What is included in their role varies due to differences in what kind of support and participation the different VS manager's request. However, they both said they try to support the VSs as much as they can and the current way of working is fairly new and will hopefully become clearer. Furthermore, since the Controllers are shared between VSs and not physically located in either it affects how they can support the VSs. Previously the Controllers met with some of the VS managers only once a month to update about the VS financials. Now they meet more frequent, at least once a week, which has facilitated agility and enabled proactive work since the Controllers are more up to date with the VS's activities. The HR business partner highlights the need for clarity of solid and dotted line reporting and what is included in terms of authority and responsibilities. It can facilitate in reducing conflicts and anxiety and help employees in knowing how to prioritize and who to contact in certain situation for example sick leave. HR business partner further elaborates the importance of both managers have to sit down and lay out a common ground together with the employee.

Many interviews presented challenges or gap between the functions and the VS. One challenge is the functions are not arranged according to the VS. In the HR function, for example, the HR business partner is responsible for different segments hence the VS's HR responsible is not the same as for MEQE or Supply Chain functions. The same has been seen in the Supply Chain as well, where the commodity teams are not arranged in accordance to the VSs.

4.9.6 Lean Leadership

As mentioned, GKN, and thereby EPS, follows Lean principles and way of working. The Operations Lean manager presented their personal view on Lean leadership as a coaching leadership style, and for leaders who follow Lean leadership, continuous improvements and problem solving comes natural. However, the Lean manager states there is currently some shortcomings in how Lean leadership is addressed, and they can become much better in emphasizing the importance of the soft factors such as affiliation, involvement, communication, and closeness. When discussing different Lean leadership models, the Lean manager highlights not everyone understands the meaning of using them, and instead of actually living as a Lean leader in everything they do it is only "a check in the box" for some managers. There are still improvements to be made to create a Lean leadership mind-set for leaders within Operations. The Lean manager continues, to focus on these values and to create a continuous improvement culture it starts with the request and encouragement from the entire organization, starting from the top of the organization.

4.10 Challenges

Several challenges were identified through observations and interviews conducted at EPS. Below are these summarized and presented.

4.10.1 Quality

Being a first-tier supplier to the Aerospace industry put a lot of pressure on quality allowing narrow tolerances, both for the raw material as well as the end-product produced. The result of poor quality can cause devastating accidents hence it needs to be closely controlled and monitored. Raw materials used for aerospace are often sourced from a few suppliers due to its complex characteristics, such as heat resistance and coarseness. As a result of the high demand put on the raw material, very few types can be used from a handful of suppliers and the prices are set accordingly. When raw material regularly does not meet the quality requirements, such as casting due to being too coarse, it highly affects the VSs operations as due to the high price of raw material, it is not possible to have enough stock to cover up any quality flaws. Material with poor quality must be sent back to the supplier leaving the VSs without any raw material to process.

At EPS this is a great problem causing a lot of frustration in all VS, with one exception since this VS does not use casting as raw material. As mentioned earlier, a reorganization was recently conducted where material handlers were physically moved from the functional organization to sit in the VS. The purposes of the change are to make the material handler chase and push the supplier to deliver on time with high quality material as expected, and to make the material handler feel more committed to the VS than to the supplier. It was mentioned several times during interviews that *"We want the material handler to win or lose with the VS"*. During the interview with a material handler a concern was raised regarding the ownership of accounts resulting from this change. Previously, the material handler has been responsible for a couple of suppliers without VS focus whereas now, several material handlers will have contact with one and the same supplier, shifting focus towards VS. The material handler stated this way of working will make it confusing for the supplier and the relationship with the supplier can become weaker. On the contrary, during other interviews it was raised that EPS should not have a supplier focus, they should have a focus on what creates value for the customer that is all operations in the VSs.

Even though this change has been implemented to strengthen VS focus, there is still one challenge in relation to raw material quality raised from both material handlers as well as the VS managers; the SQA responsible for supplier quality is still physically sitting together in their function. Previously, the material handler and the SQA have been working closely together in unison towards the suppliers, however the physical bond has now been broken. One material handler raised this issue during an interview and stated it will be extremely hard to do a good job without SQA close as they will now lose the chance of overhearing which has previously assisted in their work. Some VS managers have also expressed the request to pull SQA into the VS to further put emphasis on VSs and to create collaboration between ME and SQA which are both working with the quality of the product.

The risk when moving all functional roles to the VS is to lose competence and depth. According to one VS manager, there is currently no relationship with no standard meetings or communication channels between VS manager and SQA.

As mentioned above, it is not only quality in raw material which are necessary to monitor and control, but also the quality of the produced product. Many VSs also have a problem with quality internally due to material is being processed incorrectly, damaging the goods. When material has been processed incorrectly, ME must examine the goods to investigate whether it can still be used or not. To prevent mistakes in processing from happening, CME are working with robustness of processes, however they are neither solid nor dotted to the VS, which makes it hard for the VS managers to affect this resource.

Lastly, DSQR who is the customer representative and confirms the goods have the quality expected by the customer, is responsible of transfer the goods to finished goods inventory. Several VS managers have expressed the lack of resources in this department meaning even if the finished goods meet the quality expectations and the goods are finished on time, unless DSQR confirms it, the VS cannot deliver in time.

One VS manager expressed DSQR is more important than SQA for them and since there is not enough tasks for one DSQR to do in one VS full time, the resource is shared and the issue is that high volume products will always be prioritized. The challenge when this resource is lacking is to deliver on time.

4.10.2 Matrix Structure

During interviews a challenge regarding misaligned goals were repeatedly lifted. The three dimensions have similar KPI's however how they are measured differentiates. One example raised was how KPI's for inventory are measured. In the Program dimension inventory is measured by number of units available for a Programs or customer, whereas in Operations dimension inventory is measured in total units in finished goods. Let's say the VS goal is to have ten units of one product in finished goods, they do not care to which program these units are allocated to, as long as they have ten units they fulfill their KPI. However, one of the programs may have a KPI of ten units in the same VS, but the ten units that are in finished goods may be divided between three programs, then the Programs dimension with a target of ten units does not fulfill their KPI. Similarly, VSs are for example measured on if they are producing according to a time schedule. The Supply Chain function is measured on service level to the VS, meaning ensuring material arrives to the VS in time. However, Supply Chain is only measured on high volume value products for the service level, low value and volume products are excluded. This means the Supply Chain function can fulfill their KPI's, but due to a small detail not arriving on time for production, the VS miss their KPI (see table 4.2).

Table 4.2. Misaligned goals.

	Programs	Operations	Function (SC)
Inventory	*Not OK:* need ten units, but only five are allocated to this program	*OK:* ten units in finished goods	-
Service level	-	*Not OK:* missing small details	*OK*: key material arrived on time

Another contradicting goal is to measure VSs performance on hours produced at the same time as the VSs are expected to think of flow. It was mentioned during interviews EPS wants to create so called healthy tension in order to create discussions between dimensions which hopefully lead to a more beneficial result than if only one dimension get to decide. Even so, the healthy tension was experienced to create a lot of frustration between dimensions and a common theme was the interviewees often referred to the other dimension's lack of understanding for their situation.

Furthermore, due to the matrix structure the challenge of reporting relationship in terms of solid and dotted lines were raised. The VS managers were asked whether they thought these lines had any meaning, both for themselves and for their employees.

All VS managers were agreeing on this question and their consistent answers were similar to "*The lines have no meaning what so ever to me, but I believe it has a great meaning for people in the organization"*. One VS manager said to believe the more stress and insecurities were present, the greater role the lines tend to play for employees. Even if the VS managers stated the lines did not have a meaning to them, several expressed the request of changing the line relationship between themselves and functions around them. When the GM of EPS was asked about the importance of solid and dotted lines he stated that it should not have any meaning, and if it does it highly likely depends on something else. The GM reflects managers often says it does not have a meaning as long as it does not affect them and their employees. Both the GM as well as the Head of Operations question why lines have importance in an organization when they tend to have no meaning when people are working in projects.

Resources with dotted relationships to the VSs must be requested based on a resource plan, and there is no guarantee the same person doing the role today will be operating in the same VS a year from now. This was raised as an issue by one of the VS managers who said that even if the VS receives the requested amount of resources, there is no guarantee the VS will receive the person they want. This VS manager took the role of ME as an example, where they obtain in-depth knowledge for one product in one VS, then this person becomes valuable for the VS, but next year the VS might receive another person.

Since the recent change in organization and the functions role has changed to even more supportive than before, the role of functional managers has also changed. Now, the functional managers should not drive any operational measures rather only drive improvement projects in terms of ways of working and competence development of staff within their function. One challenge here is GKN's executive management demands operational measures to be reported upwards in the organizational chain, which complicates the structure at EPS today. The reason why operational measures are requested higher up in the organization is to evaluate for instance suppliers over time globally, hence no real-time data is really needed. The GM suggested that the functional managers could still take part of the operational information however later in time. One interviewee said it was important for functional managers to let go of the operational measures and another interviewee lifted the importance of GKN's executive management in this question. If top management turn to the functions in case of issues with operational measures, the functions will continue to drive these questions. One example brought forward was if one supplier is not delivering as promised, who do top management turn to - the Supply Chain manager or the VS manager? In this new structure, it should be the VS manager, however it is hard to change old habits and this was lifted as a challenge.

4.10.3 Value Stream Management

The Aerospace industry is heavily controlled by large and expensive machines hence there has always been a focus on maintaining a high resource utilization rate. This is contradicting to the theory of Lean where focus is on customer demand, pull system and one-piece flow. An interviewee raised this as a challenge due to the fact employees often cannot think flow when focus is on optimizing the resources.

The same interviewee said there is a need to find the balance between flow and utilization of machines and some VS at EPS have a greater risk to focus too much on resources than flow due to high investments in machines. One VS manager uttered, "*In practice, it will never work with flow"*. Furthermore, due to the size of the machines it is hard to in all situations create a layout that supports continuous flow, and to allocate only one resource to one VS.

These are physical challenges in regard to VSM, but there are also other softer challenges. Due to the history of the organization as being very functional oriented, a new challenge has risen based on the reorganization of moving functional roles closer to the VS; cross-training of employees. One VS manager expressed the importance of everyone within the logistics team to know enough about each other's roles to keep it running in case of someone is away. This becomes even more important under the new constellation as it is now, the functional role of for example material handler can rely on the other material handlers to deal with their tasks. In the new structure, this option will no longer be possible hence it is key to cross-train between the different logistics roles. Another key relationship where cross-training could be facilitated was raised by another VS manager and is between the two roles SQA and ME. Both these roles deal with quality and should be aware of how their work impacts the other role.

Lean and VSM drives value while reducing waste, all activities the customer is not willing to pay for. Leadership can be considered waste in case it is not used to facilitate development of value adding activities. At EPS, a lot of meetings have been identified and VS managers have raised this as a challenge. It hinders them from conducting strategic activities, which are setting directions for how to become more competitive, and instead, they must attend meetings. Even though it is considered to be too many meetings today, there might be important links missing still. Many VS managers request a closer contact with SQA and a wish has been expressed to bring them closer to the VS and place them in the VS, similar to the material handler. However, during one interview it was raised that SQA and VS manager has no standard meetings where they exchange information today. The challenge is hence to identify how meetings at EPS can be run and organized more effective and efficient. One VS manager has started to analyze how a new meeting structure can fulfill this.

Three VSs are almost autonomous in its production processes whereas three are interconnected. Since the interconnected VS are run by separate managers, it can be hard for one manager to fully understand how another VS operates. Due to the fact that some managers want as much as possible to be standardized and some to have full authority to develop their own VS it can be challenging for two managers with two separate views of standardization to share processes when they want to operate them differently. This challenge of standardization is only related to the VS dependent on each other.

4.10.4 People, Roles and Responsibilities

The issues of solid and dotted relationships have already been raised above, but these also create insecurities for employees. Functional employees located in the VS tend to be confused regarding whom they should report their vacations and sick leaves to. One VS manager clearly stated the importance of reporting leave to the manager where the employee is sitting. If this is not done, there might be a gap in human resources affecting the productivity.

At the same time it was said if the functional manager take on their new responsibility of acting more of a support function with employee responsibility, they should be the ones to inform regarding leave of their staff. This challenge is linked to the matrix structure but also to reporting relationships and responsibilities. Unless it clearly states what employees should report to which manager, it is hard for the employees to know and can get easily confused.

Three challenges which goes hand in hand is understanding of each other, resistance to change and learning from each other. During interviews, there has been several times where the interviewees state, *"The others do not understand how it works here"*. For instance, in some functions it is said that VS managers do not understand how it works and how it is impossible to focus on flow through VSs whereas the VS managers want to move some functions closer to them to increase focus on VSs. This lack of understanding has led to resistance when transforming into a new structure where some roles are pulled closer to the VSs. Another interviewee raised a potential problem of exposing people to a change they may not approve of or agree with which can generate a negative effect through the organization.

There is an especially great risk when a change is introduced to employees who do not agree, but are expected to lead the change. It may lead to confusion amongst the employees and the challenge is how to communicate; both to the manager against the change, but also for this manager down the organization.

It is key to work together towards the same goal; however, this can be a true challenge in case the above mentioned soft factors are present. There is a lack of clarity of relationship between some roles in at EPS according to one interviewee. If no visual relationship, such as lines, is present, it was questioned what type of message this is sending. In order to work together towards a mutual goal, it is also necessary to learn from each other and share experiences, something which can be done better today. Furthermore, as mentioned previously, the role of functional managers has changed, but the responsibility of method development to ensure standard ways of working are established and employee development, working with future career paths, are still up to the functional manager. When the functional employees no longer sit closely to the functional manager, this can be a challenge for the future. One VS manager also expressed the request to be able to provide career paths to functional employees within their VS, however it is hindered by the functional managers. A collaboration challenge in terms of employee development between functional manager and VS manager has been identified. The functional manager do not want to lose the human resource to another function and the VS manager do not want to lose the human resource to another VS.

5 Analysis

The analysis chapter presented is based on the research questions and combines theoretical data obtained from literature study with empirical data retrieved from the case study.

5.1 First Research Question

The first subchapter of the analysis aims to analyze the theory and empirical data in terms of the first research question; How can an organization be structured in a multidimensional matrix organization and work with Value Stream Management in parallel?

5.1.1 Value Stream Management in a Matrix Organization

To answer the first research question of this research, it is important to first evaluate whether the two theories are compatible to identify the plausible relationship between them. It is also necessary to answer the question of why one should work according to both theories simultaneously and an example of this is provided through the case study. A reason for operating in a matrix organization is to execute two or more strategic objectives simultaneously, which EPS chose to do by introducing three dimensions. The Aerospace industry is pressured to deliver extremely high quality products with tight tolerances, use the latest and best materials, have customer in focus and yet deliver on time while continuously aim to reduce costs. As mentioned previously, it creates the need for dual strategies; reducing costs by increasing efficiency in manufacturing processes simultaneously as continuously ensure high quality and being leading in research and technology. EPS has previously been heavily functional oriented to develop internal capabilities and expertise, but due to an increased demand to lower production cost to attract new cost-based customer contracts focus has shifted towards creating efficient VS. To simultaneously keep focus on disruptive technologies, a matrix structure organization is used. The focus on VSM in Operations dimension, in cooperation with Lean, address manufacturing of high quality products at a low-cost by improving the manufacturing processes through operational excellence. Six VSs are present at EPS and as per Kuhlang et al (2003) definition of VS is all activities needed to create a product and to make it available for the customer, including the supportive functions. Programs dimension is financially responsible for the customer contracts and that the customers are satisfied with EPS as a supplier. The Functional dimensions' responsibility is to develop skills and processes to support the other two dimensions and continuously drive EPS forward in terms of technological development to stay competitive.

According to the GM, EPS is operating through VSs as it is considered to be the best way of maintaining competitiveness, now and in the future. By decentralizing the authority to the VS managers and by giving them mandate to run their VS as an independent factory they can take the responsibility to create competitive VS. By providing the VS managers with operational freedom they can run the business as they see fit and be accountable for their own business.

5.1.1.1 The Continuum

When comparing VSM to the characteristics of the continuum of organizational designs displayed in figure 3.2, VSM might be considered shifted towards the product organization side rather than centered around the matrix organization. The focus for product-oriented organizations is on agility, delivery and budget targets with a strong focus on the product. Furthermore, leaning towards this organizational design in the continuum is appropriate when there is a great diversity between product lines. As the case study at EPS suggest, one VS should contain 80% similar components and 30% similar process steps. These different VSs can be considered as one product line and due to how the VSs are divided, the different VSs will have very different characteristics with clear budget targets and strong focus on the product. It further supports VSM to lean towards product-oriented organization.

In an organization with mature VSM, each VS should be autonomous with no dependence on any other VS. Heavy and advanced resources should try to be eliminated or if it is not possible, each VS should be equipped with their own physical resources. These types of resources often demand specialized skills hence if an organization with these types of characteristics in their manufacturing, a matrix organization can be very suitable, theoretically, where these skills can be accessed from specialized functions. Exactly where on the continuum (figure 3.2) the organization should be located is organizational specific and should be evaluated. In the case study conducted at EPS, advanced physical resources cannot be removed from the manufacturing due to the complexity of the end-product. When comparing to the maturity model of VSM, EPS is moving towards a high maturity where the aim is to make each VS an individual factory.

5.1.1.2 Value Stream Management in Star Model

Shifting organizational focus from functions to VS often take form in structural changes. Even though structural changes are important to lay a foundation of daily operations and reporting lines, it is highlighted in matrix theory it is important to not solely use structure to drive the right operational performance since it can be “a powerful but blunt instrument”. As presented by the Star Model (Galbraith, 2009) there are four additional categories to be considered when designing an organization, namely; strategy, processes, rewards and, people and skills. These categories are just as important as the structure, but have not been discussed as much during interviews at EPS as structure in terms of dotted and solid lines. When asked about the importance of solid and dotted relationship the VS managers answered that it does not matter, the team is the important part regardless of reporting lines. However, several managers presented they wanted some additional lines drawn to them to enhance focus on flow but also to create a symbolic value of importance. The lines themselves may not matter, however the importance of having lines is considered important, the insecurity of not controlling resources without reporting line is difficult in some roles. Matrix theory stressed creating the right processes, reward systems and development of people play as much importance to drive the right performance. To further identify whether Star Model is applicable in VSM, the theory is compared to how EPS is working today.

As the VSs produce different products hence compete in different markets and on different terms, such as being a single supplier or on price, leads to the strategy of each VS looks slightly different. Competitiveness is based on the types of contracts planned to be attained in the future and the target hourly cost, which come down to what KPI Gold and A4 Strategy each VS have. Even if the measurements are the same, the numbers may differ. The strategy in VSM organization could here be connected to the True North values. To some extent the structure, in accordance to the Star Model, should differ between the VSs as it is based on what is required within an organization. For example, VS-A and VS-B share 100 employees where VS-E have 190 employees assigned to the VS and it put a different demand on the span of control.

Reward system should provide incentives and motivation in order to align the employee and the organization's goal as well as facilitate teamwork independently of the structure. During interviews it was raised a lack of reward system exists for middle managers and their teamwork, rather than helping each other it is much easier to focus on one's own VS. The Head of Operations has placed a KPI of requirement of helping each other, which is considered good by one of the VS managers, but not enough emphasized. By using the Star Model and really investigate the question *how is behavior shaped by the goals* maybe it would be possible to achieve a deeper collaboration between VS. To have a common reward system between VSs could also be beneficial and reduce potential frustration between employees, questioning why another VS receive other benefits and bonuses.

People and skills required should be in line with the goals of the organization and in a matrix structure, it is necessary to recruit employees that can influence without authority and thrive in a matrix setting. Hall (2013) advocates matrix-skills is often neglected therefore employees often blame the structure and propose reorganizations when they feel the matrix structure does not work, when in reality employees do not have the proper skills to operate in a matrix. At EPS, due to the rotations between VSs and roles, it is highly necessary for employees to be cross-trained to able to be flexible. The Functions are responsible for supplying the resources the VS require which have a dotted relationship. Furthermore, as the VSs produce different products different skills are needed, it is impossible to state a standard number of job specialties needed for all VS. However, even if the structure may not be standardized across the VS based on their different characteristics, it is certainly possible to standardize these areas within one VS.

The vertical processes in terms of business development will be divided between the VSs based on how they are competing. An example is VS-C recently attracted a new contract, which brought in a great new business affecting the complete VS, however it did not affect the other VSs goals of business development. Budget and resource allocation highly affects all VSs however and will have to be aligned between VS. Currently at EPS, this is done through the annual requesting of resources from functions. The processes have a great connection between VSs and should aim to be synchronized. Information processes should be standardized across VSs to ensure the right people get the right information and to allow flexibility in the structure of the organization.

Currently at EPS, there are many standard formal meetings, however to develop strong VS, invitations should be sent to roles affecting the VS, but does not have a reporting relationship.

5.1.2 Synergies

Next step in analyzing how the matrix and VSM can work together through hopefully creating synergies. When reviewing the theory several commonalities in both success factors and potential pitfalls are found and will be elaborated. However, although both theories are considering organizational aspects it is important to highlight the two theories are different. Matrix organizational theory refers to the entirety of organizational design through several strategic focuses simultaneously strategic. VSM theory refers to how to operate through linking Lean tools and strategy with focus on flow and customer orientation. Matrix theory is therefore more all embracing in its description how to operate as an organization whereas VSM theory focuses on how to operate where flow and customer are in focus. As they both refers to organizational theory it can therefore be difficult to fully work according to the both of them.

5.1.2.1 Function versus Flow

One of the common themes is both theories often requires organizations to transform from being functional oriented to horizontal oriented. Baggaley and Maskell (2003) highlights the challenge of focusing on flow of value in functionally structured orientation and how it can be helped through a VS focus. Even if a VSM organization is structured horizontally, there will still be functional elements in each VS. Matrix theory highlights the implementation of a matrix organizational design often includes shifting focus from vertical to horizontal processes (Hall, 2013). Shifting focus, either to VSM or matrix organization, require organizations to undergo organizational transformation, which can result in changes in roles, responsibilities and structure. When there is a lack of guiding an organization in the transformation several challenges can occur. EPS is currently settling in operating in a matrix organizational structure, which has historically been heavily focused on functions. At the same time as settling in the matrix structure EPS is restructuring the role of the three dimensions, where Operations and Programs are highlighted as core business and where functions should act as supportive to the two. This change has lead to the VSs have taken over operational responsibilities from the functions, which has been experienced as a power struggle.

The power balance should be explicit and clearly understood throughout the whole organization, since it is based on the overall organization's strategy according to Galbraith (2009). From interviews with VS managers and other VS related resources the strategy to create “strong” VSs is clear, which includes the VS manager should have the resources and authority to operate the VSs. This should be reflected in the power balance where the core business of VS and Programs should have mandate over functions. However, during interviews it has been identified this way of thinking of strong VS may not be as widespread and accepted by the rest of the organization.

Various interviews at EPS stated the way functional managers conduct operational measures, even though they should not, which create conflicts. In matrix theory this is referred to as a power struggle where a lack of formal structure supporting decision rights can generate unnecessary conflicts. Even if a formal structure is in place, managers and employees do not always accept it. Clarity in job roles and responsibilities can help to solve this issue, and at EPS a lack of and insufficient role descriptions have been identified. From a VSM perspective the functions impact on the VSs is when one resource cannot be located within one VS, which may hinder the success of the VS. Sometimes the functions performance is prioritized at EPS and VS managers may not receive the resources they need due to the functions are not willing to hire more staff even though there is a current demand from VS managers. The reason seems to be due to lack of agility in the matrix organization in terms of moving resources between VS. One VS manager may need one resource one year and then the next, the resource may be redundant in the VS which creates uncertainty for the functions in hiring new employees, leading to the functional managers deals with the VS managers.

5.1.2.2 People Involvement

In Galbraith's (2009) Star Model, people and skills play an important role of the organizations design and the matrix theory state employees should be involved in problem solving. For an organization working according to VSM, involvement of employees is necessary to be successful and maintain focus on VS according to Tapper and Shuker (2003). In Lean Enterprise, VS managers receive training in how to involve employees in improvement activities continuously. At EPS, the VS manager is responsible of inviting the employees who impact the result of the VS to meetings and includes members of their management team. Other roles, which are considered to contribute, are also invited, the question is if all employees who actually contributes, directly or indirectly participates. Standard meetings are held at EPS to facilitate cross-functional and cross-functional interaction such as capacity planning meetings and management team meetings. Furthermore, by having the PDP process allows employees to take responsibility of their own development hence involve them in continuously improve. A lot of effort is put on employee involvement in VS manager's management team, but a lack of team involvement from other team members outside the management team was identified. This will be further elaborated later in the analysis.

5.1.2.3 Alignment of Goals

According to Galbraith (2009), alignment of goals is especially important in a matrix organization due to the complexity of the structure. Competing goals from different dimensions are common hence it is key to ensure all goals within one organization is based on a well-functioning information system to allow everyone use the same information. VSM theory however does not mention the alignment of goals due to complexity, rather Tapping and Shuker (2003) state the goals should be aligned with the overall vision of the organization. Aligned goals are important to drive the right operational performance, and are especially important when undergoing a transformation since the transformation itself can create enough confusion and anxiety for employees. Lean and VSM theory suggest PD matrix to align goals based on a common vision or strategy and this tool is commonly used at EPS.

Every quarter of a year a new PD matrix is generated. All dimensions do this based on the same strategy, hence the information is the same, but how to reach these may be divided separately which can in the end still create conflicting goals as presented in the empirical data chapter.

In accordance to matrix theory, not all organizational goals have to be aligned since healthy tension can be a good way to achieve better results for all involved parties. Misaligned goals are one of the challenges presented during the case study where the different dimensions measure performance differently, which has created unnecessary tension between the dimensions. As matrix theory states, the middle managers are often the ones caught in conflicting views and competing goals. This has been found at EPS when activities are prioritized differently between dimensions confusion and anxiety have been identified for employees who are expected to report and follow two managers. One reason for confusion has been identified as both functional managers and VS managers follow up on operational measures, however slightly different and with different priorities. As the outcome of the operational objectives only affects the VS managers, the functional managers should not drive these objectives.

Both theories raise the importance of inviting employees to participate in setting goals according to the vision of which one-on-one meetings are important to ensure objectives are understood. At EPS, the goals are broken down by management, thereafter passed down for next management level to break down further. It allows managers to take ownership of the goals, but a lack of involvement from employees seems to be present. The employees are invited to set individual goals of their own performance through the PDP process.

5.1.2.4 Roles and Responsibilities

VSM does not distinctly state the importance of clear roles and responsibilities is key to be successful when working with VSM. Matrix theory however states clear roles and responsibilities are prerequisites in order to run a matrix organization successfully and to assist in providing clear priorities. Since VSM does not always indicate a complex structure, it may be considered as presumption to have defined roles and responsibilities. Based on the statement from matrix theory regarding how clear roles and responsibilities creates distinct priorities, an organization working with both matrix organization and VSM may still benefit from a this aspect. Comparing to EPS, clear roles and responsibilities are important in a large matrix organization using VSM as without it, confusion is raised.

As Galbraith (2009) state, there is a great chance of creating frustration unless the clarity of roles and responsibilities is present. Galbraith highlights that RACI can be a useful tool in creating clarity. Gottlieb (2007) and Sy and Côté (2004) state ownership and accountability is born out of clear roles. All VS managers replied their responsibility is to deliver results in accordance to KPI Gold which indicate the VS managers are capable of leading their VS as they best see fit for its characteristics. The VS managers also have a very clear direction and understand why they need to achieve the goals set, hence a relationship can be identified between understanding of clear goals and role description.

However, at EPS the VS managers took full ownership and accountability of their VS without having a clear description in the OMS.

During interviews it was mentioned employees who have dual reporting relationships to one direct manager and one matrix manager experience confusion in matters such as who to ask for a vacation or who to report sick leave to. Some employees when interviewed expressed a confusion in their role and what responsibilities they have to their managers, which also showed a confusion in understanding their goals and what prioritizations to make. Some VS managers are experiencing increased bureaucracy when a resource have dual reporting lines, another challenge raised in matrix theory. It has also been a lack of clarity in terms of relationships between different roles. Matrix theory state employees must understand why and how the organizational design of a matrix is chosen in order to make it work. The RACI tool is already being used in EPS through the execution of their PD matrices. EPS is therefore used to the process, and can be further used to create clarity in the functions and VS roles and responsibility, and to create consensus. From observations and interviews there seem to be a lack of knowing how to work in a matrix organization. When comparing to VSM theory, the why and how of working with Lean and flow is widespread and there is a Lean department that can offer support when needed at EPS. To explain how to operate in a matrix is the leader's role and will be elaborated further on in the analysis.

5.1.2.5 Challenges

Though EPS has proven matrix and VSM theory can work together, it is also highlighted that it can create confusion and ambiguity in how to operate which is presented in the empirical subchapter Challenges. Both matrix and VSM theory addresses several factor, prerequisites and issues to be considered when working according to either of the theories. Potentially it is the lack of addressing these factors causing challenges experienced at EPS, which in turn build barriers between dimensions instead of tearing them down. Some challenges have been addressed above and some case specific challenges will be further elaborated.

The greatest challenge experienced at EPS today is regarding quality, mainly from supplier, which falls under SQA's responsibilities. VS managers found it challenging with SQA not being arranged in accordance with VSs, not having designated SQA working with their VSs suppliers as well as not having any reporting relationship with the SQA function. It is also a challenge, as the SQA performance is not evaluated by the VS, but rather by the Supply Chain function. According to VSM theory the VS should be supplied with the resources required to achieve desired goals, but in matrix organization when other strategic objectives have to be obtain at the same time, organization are left with possibilities to make structural changes or find other tools and process to achieve results. One of the most important leadership ability according to matrix theory is to influence without authority. It can be carried out through utilizing emotional intelligence (EI) and empower employees to take ownership and responsibility. This should be done by trust, respect and listen to the employees and the first step is to open up communication channels. As the need for communication increase, organizational meetings tend to follow the same trend and steal valuable time.

The problem of too many meetings has also been identified at EPS, which hinder middle managers to work with strategic improvements. Even though VSM fail to mention influence without authority as key to succeed, the actions of building trust, respect and empowerment of employees will still be useful.

EPS production is characterized with large, expensive and advanced physical resources, which are in some cases shared across VSs. It creates a barrier for flow to work and limited space to reallocate physical machines to is also experienced. This is a common issue in VSM theory and occurs when one resource is not allocated to only one VS. It would not be financially feasible to make all the necessary investments needed to allow all VSs to have their own machine and be independent of other VSs hence EPS must balance investment in new equipment with shared resources and facilitate for co-production by implementing Lean tools such as setup time reduction.

In VSM theory, one potential issue is poorly defined VS which may result in incorrect amount of employees in one VS. If too few employees are allocated the VS will be short in staff but if there are too many employees there is a risk of losing team efforts. At EPS, both these seem to be present since some of the VS managers have expressed when they request resources from functions, they will not receive the amount they requested. Both VSM and matrix theory state a high need of employees being cross-trained and flexible. In a matrix it is important to reduce ambiguity and according to VSM theory, cross-training of staff is necessary to move towards a mature VSM organization. At EPS a lack of cross-training has been identified between some roles. With the complexity of matrix structure mixed into VSM, it is extremely important to ensure cross-training of employees to create a flexible workforce.

5.1.3 Summary of the First Research Question

The purpose of the first research question was to investigate whether the theories are compatible and if it would be beneficial to use both in parallel. The analysis present that it is possible to combine the theories as the one does not exclude the other and it is beneficial in an organization with multiple strategies of where focus on flow is one. A matrix organization working with VSM may shift towards the product-oriented focused organization on the continuum rather than a pure matrix design due to the focus budget, result and flow, which is neither positive nor negative, but could be beneficial to be aware of.

Star Model was adapted considering VSM and it was found that each VS have different strategies making them competitive, as well as different structures in terms of size even if focus should be on flow for all VS. Rewards, processes and, people and skills should be aligned between VS in an organization following VSM.

Several synergies were found between the theories by comparing to the case; focus on flow, aim to reduce heavily functional organizations and highlight the importance of involving employees.

Matrix theory stress importance of establishing a power balance and alignment of goals and these seem to assist also in a VSM environment, however the elements are not as critical.

Defining how and why to work in accordance to any theory is important to get all employees on board and commit. In the case, Lean seems well adopted but there is a lack of understanding of matrix organizational design.

Different challenges were presented according to the theories, which must be addressed by the organization. Cross-training of employees were mentioned as a challenge in both theories and VSM theory state incorrect number of employees as an issue. The case study shows poorly defined VS will affect the matrix organization in case there are supportive functions responsible for deploying resources to the VS. To be able to influence without authority is necessary for any leader in matrix organization and it can be done building trust, empowerment, and communication. Even in an organization using VSM, these traits can be helpful in driving the organization forward.

5.2 Second Research Question

The second subchapter of the analysis analyzes the second research question; What prerequisites are required of a Lean leader in a multidimensional matrix organization working with Value Stream Management?

5.2.1 The Leader's Role According to the Three Theories in Brief

By reviewing the theory previously presented in this thesis, some clear similarities but also a few difference can be identified in the role and qualities needed by a leader. Even if several terms and concepts are present in all or the majority of the theories, a slightly different focus is sometimes emphasized. The leader's role according to Lean leadership is heavily focused on soft parameters such as aligned values and principles, teamwork, supporting activities as well as involvement of people. Team building and teamwork is a big part of matrix where key characteristics are creating a team culture, establishment of roles and responsibilities and communication. Even though the leader's role in VSM theory is described from a results oriented perspective with emphasis on KPI's related to quality, cost and delivery, it also has a soft side to it.

5.2.2 Soft Skills Required by a Leader

One red thread mentioned in all theories is the importance of knowledge building and continuous investing in improvements of employees but also in building new skills. Lean leadership theory states the importance of facilitate employees to continuously learn and to allow for self-development, which is the leader's role. By supporting the employees in training and skill development Petersson et al. (2012) state processes can be done more efficiently. Bartlett and Ghoshal (1990) state invest, train and develop the employees mindset and skills is of greater importance for a leader than finding a utopian matrix structure.

These authors agree of the importance of development of employees even though they publish in different fields. A leader in a matrix organization is expected to be able to lead without authority and in Lean, the term leader does not automatically mean manager.

It is also key in not only Lean leadership and VSM but also in matrix organization to show respect for people. It is the role of all leaders at EPS, not only VS manager to live as Lean leadership theory advocates, even though it is not named as being a Lean leader.

5.2.2.1 Leader as a Coach

During the interviews at EPS there were two VS managers which used other words to describe a facilitation or coaching role, in line with Lean leadership theory. One stated their role is to provide support and build prerequisites for the employees to do their job. Furthermore, a second VS manager said their role is to build leaders which is aligned with Liker and Convis (2012) statement of Lean leadership development second point; coach and develop others. In this section the leader is lifted as a coach which challenge potential future leaders. The members of the VS manager's management team, which are located close together, seem to have a good way of exchanging knowledge. One initiative to further move towards building new skills and share competences between roles is to bring in a logistics manager and pull material handler as well as customer lead into the VS. These roles are expected to be cross-trained to understand each other's roles, which show how EPS is moving towards a further mature stage of VSM, reducing number of shared human resources. There is still a challenge of how to make sure the mindset of people is aligned and focused on VS and creating value for the customer. Furthermore, Lean leaders build their organization bottom-up even though strategic directions come from the top. The purpose is to solve problems where they occur and free time for leaders to think strategically. As presented from an interview with the Lean manager it is highlighted that some managers' lack in fully living as a Lean leader in everything they do, but to start working as a Lean leader has to continuously be encouraged by top management.

5.2.2.2 Incentives

At EPS, several VS managers outlined one part of their role as a leader is to build a well-functioning team, but also to build a successful factory. In a situation where resources are located both in different functions as well as locations, the VS managers have realized the importance of creating teamwork. The statement is aligned with the theory of matrix organization where team is in focus as not all resources are possible to control. According to Liker and Convis (2012) Toyota includes teamwork in the incentive system which assist the leaders in driving their team towards perfection. Even if the importance of building a team was lifted, a lack of incentive systems for teamwork was identified. At work center level, a standardized teamwork incentive system is implemented, however no such incentive system was identified in the VS manager's management team. To create commitment and ensure dotted line roles in the matrix organization also feel part of a VS team, incentives are important. Furthermore, as the VSs are expected to work as an individual factory, some synergies between them are still requested.

5.2.2.3 Aligning Goals and Healthy Tension

Alignment is a key concept of both Lean as well as matrix theories. Alignment between the leaders and employees, and between values, vision, principles and strategy will assist in striving for a common goal. The alignment of goals can help the leader in embracing and solving conflicts according to matrix theory. Even though alignment is key, Lean leadership and VSM both state challenging employees will push them outside their comfort zones, which will assist in striving for perfection. Matrix theory speaks of healthy tension where a balance must be found between conflict and alignment, lack of conflicts may be a sign of a malfunctioning matrix. According to matrix theory, it is the leader's role to negotiate objectives with other dimension which has conflicting goals. Even if conflicting goals exists, the leader should ensure everyone moves in the same direction anyway and to have an understanding for other dimensions in a matrix organization. Furthermore, implementing a matrix structure can often include redefining the role of middle managers and this might be what is needed to reduce the risk of misaligned goals and mixed priorities. The purpose of a matrix organization is to be able to have several strategic priorities simultaneously, but it is important to remember that it is still one organization and act as one unit. This further support the need for increased communication, both formal and informal, across dimensional borders to be successful as a leader in a matrix organization.

As presented, EPA work with goal alignment all the way from top management by breaking down KPI Gold through their PD matrix process. Even so, during interviews with employees within all dimensions, the issue of misaligned goals was raised. Due to pushing down the ownership and accountability, the process of breaking down goals is different in order to suit the different dimensions. The tension occurs when two dimensions use the same KPI, but measures it slightly different leading to one dimension is performing as planned, whereas the other dimension is below their target. The way EPS work with goal alignment from top management at GKN is in line with theory, however the VS managers did not see the purpose of healthy tension. For the VS managers, conflicting goals only created tension and they did not realize the purpose as these conflicting goals often stopped them from deliver to customer in time and fulfill other responsibilities of their role. During interviews it was identified the VS manager does not have standard, either informal or formal, communication channels with some functions affecting the VSs. Some are invited to meetings to report, but are not present all the time where others does not even have a single meeting invite. Though both matrix managers and direct managers should be conducting the PDP process jointly with the employee, some VS managers presented difficulties aligning goals with other middle managers.

5.2.3 Application of Lean

For a leader in a Lean organization a prerequisite is to understand Lean principles, communicate Lean philosophy with the employees and base decisions on facts. Lean leadership theory focus on the holistic philosophy of Lean, however VSM was developed to gain a strategic approach to VS mapping and keep a flow focus through all processes (Tapping and Shuker, 2003).

Lean leadership demands the leader to know the direction and through continuous improvement steer the organization towards the ultimate goal. The success of the improvements depends on how well the leader steer the Lean initiatives. Even if matrix theory does not focus engagement in applying any Lean tools, it can be argued the leader must be engaged in and understand how to work in a matrix structure to pass the message of importance. The role of a leader in accordance with VSM theory is also to drive future state improvement initiatives by focusing on making the production flow in accordance to customer needs. Keyte and Locher (2004) state it is the role of the manager to ensure successful VSM. Kaizen mindset, means improvement mindset and it is the leader's role to continuously train the employees in thinking about how to improve.

The VS managers seemed to have a clear understanding of their role as leaders according to Lean. A focus of the extended VS, including supplier, customer and the flow of physical product, as well as being responsible for the VS financials shows an understanding of the strategic focus of both Lean leadership and VSM. However, only one VS manager mentioned this, but others lifted the importance of continuous improvement by building a culture, use and teach Lean tools and philosophy and use flexible and efficient leadership. One VS manager stated their role is to improve methods and ways of working to improve the flow, supporting the VSM theory to focus on the process. The education provided to VS managers include how to work with Lean tools, the holistic view of the extended VS and further contain eight principles of which GKN believes to be operational excellence, closely related to Lean and is expected by the VS managers to lead by.

- Create Lean VS
- Make Lean VS flow
- Make Lean VS flow visually
- Create standard work for management of Lean VS flow
- Make problems/disruptions within the VS flow visual
- Create standard work to have routine response to VS flow problems
- Teach employees problem-solving to maintain and improve the flow to customers through employee involvement
- Free leaders time to work on growing and improving the business

These principles are in line with the purpose of Lean leadership and VSM in terms of the leader's role to apply Lean in their leadership. The continuous improvement philosophy is incorporated in the Lean Enterprise education booklet in the People Excellence Module where focus lies on employee involvement and leadership. To make use of each other’s Lean initiatives, the Head of Operations have an activity open for participation for all VS each Wednesday where one VS is visited to see how they work with Lean. It is not mandatory, but recommended to participate in and is considered a good way to share experience.

5.2.4 Leader's Role in Using Appropriate Tools

Where Lean theory emphasized on soft factors VSM, which is built on Lean, also add the leadership dimension of focus on results. The leader of VS should have full ownership and take responsibility of the financials of their VS. The leader in VSM should own an established measurement system with performance measured. This measurement parameters are often shared with other functions which does not belong to the VS, meaning it is key to lead across functions. It is stated the VS manager must have access and support from the resources affecting their VS to be able to take full ownership of the deliverables. The leader is judged on the performance of their VS based on the pre-determined measures. Similarly, the leader in a matrix organization must establish clear roles and responsibilities for the reason of clarifying accountability of processes and measures. To ensure ownership is taken down the organization, a leader must build trust and provide clear roles of the employees. Hall (2013) state trust can be built by decentralizing control and empowering employees. In order to continuously improve an organization according to Lean philosophy, authors state it is the most important tasks of a leader to train and empower employees (Halling and Renström, 2014; Liker and Convis, 2012; Poksinska et al., 2013). According to both matrix theory and Lean leadership theory, a leader should never control the employees, they should rather work as a coach and facilitate work, no matter of the relationship. To be able to do this, the employee must trust the leader and understand the objectives of the tasks to be conducted. Assisting the leader in empowerment can be done through visual management, standard meetings and two-way communication.

EPS uses visual management in their standard way of working by has visual boards displaying the situation of the VS. The organizational culture is heavily focused on standardized meetings. Decentralization of breaking down the goals to targets and focus on problem solving at the source at EPS is potentially supporting building trust down the organization. In the PD matrix there is one part including the RACI model where responsibility of who is in charge of driving the strategic activity is outlined which assist in ensuring ownership is taken. Galbraith (2009) advocates conducting a RACI chart can be more useful in creating clarity of responsibilities than trying to define the meaning of dotted and solid line relationships. Furthermore, the VS managers stated their deliverables are not only soft factors and team building, they also have to ensure goods are manufactured in time, with the right quality. During interviews it was emphasized the role as a VS manager is to fulfill the KPI's to provide financial results. As the VS is their focus, they have the utterly responsibility that the manufacturing programs are planned based on customer demand and approve these. Just as mentioned in theory, the VS managers' teams consist of several functions and the need to manage these resources is key to deliver results. Even if there are several standard meetings that support two-way communication, lack of communication between the VS managers and the role of SQA was identified.

5.2.5 Leader Qualities

Lean leadership and VSM argue an important skill for a leader is to have facilitating or coaching skills. In Lean, Dombrowski and Miele (2014) argue coaching is key to allow for self-development of any employee, which is the first step of Lean leadership development. Furthermore, Liker and Convis (2012) elaborates a leader within Toyota must be curious and drive for self-development to coach others. A leader working in a matrix must act as a facilitator of communication and act as a mediator between cross-functional teams, hence being a good communicator is key. In relation to facilitating skills, a leader should have the skills of empowering employees. Empowerment is mentioned both by VSM and matrix theory as key success soft skills for a leader. Additionally, matrix theory states for leaders to lead in matrix organization they have to reevaluate the traditional view that authority is power. As mentioned previously, several authors in Lean leadership state empowerment is the most important part of a Lean leader's role.

The VS managers' different personalities shone through during interviews and observations. During different maturities and characteristics of the VSs, different personalities are needed and it also creates a heterogeneous group of leaders. The personalities of the VS managers affect how they communicate with their teams. To their help they have the Cathedral model, which in detail assists in describing how they should coach, recognize and give constructive feedback. In this way, it is possible to standardize a way of communication even though personalities are different. The Cathedral model is an excellent leadership tool according to both Head of Operations and the interviewed Lean manager to develop leadership communicative qualities, however none of the VS managers mentioned it when asked about Lean leadership.

The quality of empowering the employees was found in all VS managers and they all expressed how they trust their team to solve their own problems and only raise them if it is unsolvable without VS managers' input. Even though the VS managers did not use empowerment as a term, it was stated that it is important to trust employees to take responsibility and ownership, which can be interpreted as empowerment. Other qualities which were stated by VS managers important to have as a leader was to be brave, analytical, democratic, choose the right team, detailed oriented unafraid and enjoy the role as a leader.

5.2.5.1 Problem Solving at the Source

To have problem solving skills is a sought after quality in leaders according to both VSM and Lean, but also in matrix theory. In VSM, the leader is supposed to work hands-on with any potential problem that occurs and in Lean, it is important the leader is close to where problems occur and have a "go and see" attitude. Matrix theory suggest a leader's problem solving skills can be developed by having experience from several parts of the matrix as it allow for a holistic approach of the organization and interfaces between dimensions. As Liker and Convis (2012) mention, a critical quality of a leader is to be able to look at a potential challenging situation and analyze the current state without drawing any hasty conclusions.

The way matrix and Lean leadership theory formulate these qualities of a leader enhance the importance of create understanding for others and keep an organizational holistic view.

During interviews with the VS managers having holistic view for all dimensions is considered important. The holistic view was considered to have understanding of several different areas and dimensions of GKN and was thought to create authority and respect amongst employees. Even if the VS manager expressed a holistic view as important to run competitive VS, it was sometimes perceived to be a lack of understanding and prioritizing other VSs in situations where resources or capacity is shared as well as viewing EPS as one organization. One VS manager emphasized the importance possessing problem solving skills and to share these with the employees to create a "problem solving at the source" culture. When the observation was conducted, all VS managers showed a "go and see" attitude as they were all present in their VS operations, speaking with their employees.

5.2.5.2 Standards

A Lean leader must understand and be engaged with Lean philosophy, and in VSM the leader must have knowledge and fully understand the characteristics of their VS. Work according to established standards is a core concept of Lean. Martin (2005) mention working in accordance with standard methods and processes can assist a leader in facilitating cross-functional teams in a matrix structure. Furthermore, in Lean the leader must be humble allowing themselves to make mistakes to learn from where the leader in a matrix organization should possess interpersonal and negotiation skills.

A hot topic for VS managers is whether more processes across VSs should be standardized or not. Where some VS managers want more standard ways of working and visualization, there are others who want more freedom to develop their VS as they want. The Lean manager stated the VS managers who requests standards work with the Lean coaches to develop them, and if others later want to apply these, they are welcome to do so.

5.2.6 Summary of the Second Research Question

The purpose was to investigate what is required of a Lean leader in a matrix organization working with VSM. This subchapter presented key leaders qualities and responsibilities in accordance with the three theories. There were many similarities between the theories and the case where soft skills were mainly emphasized as prerequisites. A leader should work as a facilitator, or coach, and challenge their employees continuously to allow development and possess problem solving skills. Empowerment of employees and build knowledge was mentioned in all theories as well as the case as important actions for a leader. Likewise, providing team incentives is a major part of any leader's' role. It is up to the leader to ensure alignment between vision, values, principles and strategy. Considering the similarities between the theories, Lean leadership is considered to be appropriate theory to apply for a leader in a matrix organizational design working with VSM.

5.3 Third Research Question

The last subchapter of the analysis addresses the third research question; What are important factors when creating a strong cross-functional team, given the three concepts of matrix organizational design, Value Stream Management and Lean Leadership?

5.3.1 Creating a Team

Lean philosophy is presented as being heavily team-oriented where the individuals are responsible for self-development whereas the team is responsible of achieving results. Furthermore, matrix theory also presents matrix organizations to be a team-based organizational form where cross-functional teams play an important role of executing the diverse strategic objectives. Structure was mentioned as a means to dictate how cross-functional teams are set up and should operate, but structural changes can make an organization rigid. For an organization to be flexible team members need to be naturally collaborative, which means leaders and teams have to be able to work outside a set structure. Due to the complex structure of a matrix organization many authors have highlighted the importance of hiring the right people, with the rights skills to thrive in a matrix structure. According to Maskell (2015), it is the VS manager job to define the VS team and the organization should provide the manager with people who can support and improve the VS. Additionally, the team should be created to complement the VS managers' knowledge. As human resources are often shared early in the VSM maturity model, it is important to build strong teams through commitment. Shared resources are also a factor when working in a matrix organization and it is the leader's role to create and lead the team with members from several functions. VSM theory also states it is not only important to assemble cross-functional teams, but also to cross-train the employees to ensure they know how to conduct more than one task.

From the interviews, it was noticed all VS managers agreed a strong team is equal to a strong VS. Factors such as participation, building commitment and providing challenging tasks were mentioned as important when building a strong team. One VS manager presented the importance of having heterogeneous teams where members can complement and challenge each other for better results. Other important team characteristics raised were continuous improvement thinking, having clear scope with clear boundaries and to have fun together. The GM said that it is important to supply the VS with the resources they request, since the amount of resources is connected with a VS ability to be competitive. No functional manager will be held responsible for a VS shortcoming and should therefore not be in control VS resources. However, there is clearly a gap between the dimensions in this area since it has been presented as a challenge to receive sufficient resources.

There is a request from the VS managers to create a "win and lose together" attitude in their team, but who are their team? The reporting lines play one role, but also the physical location of the team members - the closer the team members are, the less important are the solid, dotted or no relationship lines.

However, it is not possible to be close to everyone in the team due to limitation in space, insufficient resources but also due to some resources are shared across VSs. One VS manager expressed the team to be everyone contributing to the VS in one way or another. In order to extend VS teams outside the current reporting relationships there is a need to bridge the dimensions where managers on both sides and on different levels plays a vital role, especially when employees are deployed from one dimension to another dimension of the organization. Being strategically proactive in how to run a VS in how to run a VS in the long run can become difficult when resources are shared between VS as well as only having resources deployed on a yearly basis. Cross-training employees, who have jobs affecting similar parts of the VS, may realize stronger bonds between functions. Currently, the purpose of implementing a logistics manager to the VS is not only to pull the team closer, but also allow for cross-training between functions impacting the supply chain. This new role is hoped to bring ownership for the supply chain, which has experienced a lot of issues in previous structure due to no bridge between the dimensions. One of the challenges raised during interviews and observations is quality, and one VS manager raised the need of cross-train the employees working with quality to create understanding and engagement between these functions, rather than playing a blame-game. The cross-training of the logistics team members will also remedy the challenge mentioned by one material planner regarding who will assist in doing the material handlers daily activities whilst the person is on supplier visits.

As Galbraith's presents in the Star Model (see figure 3.3), organizational design drives behavior, which results in performance and culture. When desired performances and culture are known, as in the case at EPS where VSs should be effective and efficient to deliver KPI Gold and strive towards a continuous improvement culture since it is highlighted as key to be competitive, the Star Model can be look at from a bottom-up perspective (see figure 5.1). This means all five parameters need to be intentionally designed to support these results to be accomplishable, both from an organizational perspective and when creating strong teams. Failing with one of the parameters can result in risk of not achieving desired results.

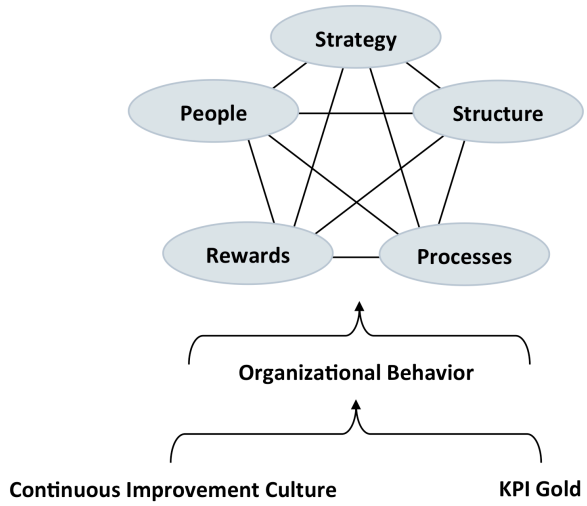

Figure 5.1. Star Model from a bottom-up perspective.

5.3.2 Involvement of Employees

Mentioned by all three theories to be one key success factor when building a strong team is involvement of employees. Coaching and ability to facilitate other are two key Lean leader characteristics. Team members should be encouraged to generate suggestions and ideas for improvement. Furthermore, Lean theory state employees at lower levels should be a part of driving improvements where VSM theory state it is necessary to involve all employees to maintain a focus on the VSs. If employees are not involved in the work, it is considered to be a waste. Empowerment is mentioned together with involvement, as it is just as important. The leader's role is not to involve employees by telling them what to do, rather the employees should run their own development and the improvement initiatives to make operations better. Matrix theory state there is a need to involve everyone to create an understanding of relationships and roles. It is up to the employee to evaluate what skills they need to develop in order to facilitate cross-functional teamwork. Normally both project management skills and collaborative skills trainings should be offered to people working in a matrix organization, which may also benefit an organization working with VSM. It is the leader's role to guide the team members and have face-to-face communication. Communication should preferably be carried out with everyone at the same time in order to minimize the chance of providing different information to different employees. In VSM theory face-to-face communication is also emphasized together with being geographically close to build a strong team.

VS managers all agreed employee involvement is important to facilitate a strong team. In the Lean Enterprise booklet there is one section in the People Excellence Module raising the importance of involving employees where continuous improvements plays a large role as well as standardized methods such as Leadership Standard Work and using visualization. Furthermore, one part of EPS operations excellence statement is to improve the flow to the customers through employee involvement, which further support how employee involvement is key at EPS. The current morning structure is a way of, besides follow up on current measurements, creating a team culture around employee involvement as well as a standardized communication channel through different roles and levels, from TL to Head of Operations. During these meetings involved employees are provided an insight to how their job affects other parts of the organization. For other important roles, who are not currently represented in the VS team such as SQA, to gain insight of their contribution and effect on the VS they could also be invited to the morning meeting. The Lean Enterprise states if the VS managers are not able to create employee involvement, it generates waste, which is consistent with Lean theory. By allowing employees freedom to solve the problems at the source, leverage to be involved is provided. Furthermore, employee involvement and a continuous improvement culture were also raced when describing how the VSs are competitive. To create employee involvement one VS manager underlined providing information and goals as essentials, other words used in referring to involvement was openness and belonging. Limited office space was mentioned as one challenge to involve people and create a feeling of team spirit. It is hence important to find other ways of involving employees who are not physically located in the VS facility. The Lean manager highlights discussing soft factors, such as involvement and importance of feeling belonging to a team, could definitely be improved.

5.3.3 Respect and Trust

Besides employee involvement all three theories bring up the importance of soft factors, where respect and trust are two factors that are highlighted in all three theories. Through mutual respect and trust a good work environment can be created. In Lean theory respect for people, environment, community and customer is a core values. VSM theory states trust can be built through communication, which should flow through hierarchical levels and functions. Galbraith (2009) says both informal and formal communication should be established to facilitate collaboration and trust between the matrix dimensions. Key factors in leadership according to VSM are to operate through empowering others and, as in Lean, respect for people. Matrix theory also states through decentralizing control trust can be established by empowering employees to take ownership. Hiring the right people who possess the right skills such as influence without authority, having a collaborative mind-set as well as the ability to create social networks and trusting relationships were also mentioned.

Decentralizing control and creating ownership of task was mentioned through several interviews as common practice to create trust, respect and employee involvement in VSs. Top management provides VS managers with authority in order for them to create competitive VSs. In turn, the VS managers decentralize control and empower their management teams to take ownership for their own segments. Head of Operations said during an interview that great progress has been seen in the way VS managers take responsibility and ownership of their role. Besides taking ownership of own task it is also highlighted that a holistic perspective is important, both between VSs and within VSs, where all members should support and complement each other. One VS manager also mentioned listening and being responsive are other ways to build a strong team.

5.3.4 Alignment of Goals

To have aligned goals is mentioned by both Lean and matrix theory. It is important for all members of the team to be aware of the vision and strategy of the organization and how their daily activities will assist in reaching the vision. If misaligned goals are present, there is a great chance of failing in building the team, hence it is important to break down the strategy in a way that the team can see the common goal with clear objectives. In a matrix organization this is even more important to build commitment to the team, as the team members may not be used to work together previously. Martin (2005) states standardized methods and processes can reduce the risk of creating conflicts between team members who are used in doing things in different ways, standards can hence facilitate cross-functionality in teams. Hoshin Kanri (PD matrix) is suggested by Lean theory to align goals and the RACI model is used in matrix theory to clear roles and responsibilities. When a team has been established and goals outlined, it is key to have a proper incentive system in place. Galbraith's (2009) Star Model considers rewards as important as the structure in an organization and according to Lean theory, a team incentive system is necessary and considered as more important than individual rewards. By having an incentive system in place, teamwork can be encouraged independently of the relationship between team members.

Improvement suggestions and continuous learning can be realized no matter if the relationship lines are solid, dotted or no line on the organizational chart.

EPS conduct a PD matrix four times a year to align goals with the strategies and in their PD matrix, and RACI is included to ensure ownership is created. Lack of clarity in roles and responsibilities can lead to increased anxiety and decreased effectiveness. The importance of having clear objectives was raised during interviews, as it will emphasize why some tasks are conducted. Many VS managers stated the importance for all team members to understand why they are doing something in order to collaborate and erase borders between dimensions. The common goals should also work as a reminder that even though they are working in separate dimensions, they are one organization, which need to make money to survive. This is the strongest reason for teamwork and builds commitment, not only to the team, but also to the organization. The VS managers have proposed the rest of the organization should be arranged in accordance to generate the most effective and efficient support to VSs. From the interviews, it was clear all VS managers believed rewards and incentives to be a vital part of fostering good teamwork. Rewards are given further down the organization, however no standard incentive system is implemented for the VS manager's management team.

5.3.5 Summary of the Third Research Question

Since cross-functional teams plays a large role in matrix, VSM, and Lean leadership theory the purpose of the third questions was to investigate what important factors should be considered in an organization where all three theories are present. Comparing all the theoretical concepts it is clear teamwork plays a vital role and similarly, in all three theories it is the role of the leader to build a strong team to be successful. When creating a strong team a basic requirement is having employees who can operate in a complex organizational structure. To be able to thrive in a matrix setting several characteristics was highlighted as important such as being naturally collaborative. Additionally, a strong team was also characterized as being heterogeneous where team members can challenge and complement each other to reach better results. A leader should also continuously challenge the employees within the team to keep a high level of engaged team members as well as always strive for continuous improvement in both processes and in the team. By cross-training employees it is possible to continuously build knowledge, yet another important factor for ensuring a strong team.

A matrix organization can be ambiguous and confusing where for example employees can have multiple reporting lines. Providing the team with clear and aligned goals as well as clarity in roles and responsibilities descriptions can help to reduce the matrix ambiguity and clearly address who is part of the team. Each member should understand how their role contributes to the group and overall company goals. When a team is created it is important to motivate them through providing incentives as well as involving employees and empowering to take ownership of their own work situation. Since employees in a matrix organization can be shared between dimensions it is important to view the team not only according to the organizational structure but everyone that contributes to the team. Creating a team culture based on trust and commitment, both between members and leaders is therefore crucial.

6 Discussion

In the discussion chapter the author's will debate the effect the method choice had on the research, the key results, limitations and future recommendations.

6.1 Discussion of Research Purposes, Theory and Methodology

The aim of this research was to identify the relationship between matrix organizational theory, Value Stream Management and Lean leadership in a manufacturing organization. To identify synergies and highlight challenges which come with the two theories, a case study at GKN EPS was conducted. The purpose was to investigate important factors in creating a cross-functional team working in accordance with the three theories mentioned above, using EPS as a case study.

The research questions developed for this research were believed to be relevant in a world where competitiveness across borders are increasing and organizations strive to identify the best practice operations for their organization. However, in hindsight the research questions were either slightly too broad or too many to investigate at the same time. Combining three theories created difficulties in seeing clear synergies and there was also a risk of not investigating each theory deep enough to identify aspects which are not key, but still important. The width of the research questions also affected the data collection, especially through interviews, as it was hard to keep a clear agenda while addressing all three theories.

Data was collected through ethnography where the researchers took the role as observer-as-participant meaning there was an openness of the purpose when interviewing and observing behavior. Even if this form of research is ethical in terms of minimizing lack of informed consent and deception, it still can cause harm to participants as they may feel as they are exposed to stress or evaluation. The last ethical considerations was reduced by clearly state no person would be evaluated, only the way Operations are run is looked at. The quality of data may also have been affected by researchers acting as observer-as-participant as it may provoke unnatural behavior and answers based on what is the right thing to say rather than the actual opinion, referred to in theory as reflexivity. This research's results may have been impacted by the reflexivity, however it is nearly impossible to confirm.

Furthermore, all interviewees were asked if they wanted to be anonymous, of which all but one did not feel the need to be. For this reason, anonymity was applied in the research as far as possible by excluding names and gender, but as for some roles there might be just one or two persons, the identity of the respondent may be obvious. As most interviewees waived the option to be anonymous, combined with a recording of the interviews, may have generated further reflexivity in the answers.

During the data collection process, researchers ran the risk of going native by see it from the organizational perspective rather than the research and be consumed by the organization's expectations. The researchers felt at times the risk of going native was present as sidetracks emerged out of the detailed empirical data collection.

However, a close contact with supervisors from both the university as well as the organization ensured the researchers stayed loyal to the problem and addressed the aim of the research. The researchers may also have been biased in the way data was collected by subconsciously looking for indication of similarities to the theory when studying the case and ignore facts contradicting theory. Due to the researchers' lack of knowledge of the case studied, interviews were conducted either unstructured or semi-structured to allow for the interviewees to describe the way the organization works from their perspective. Even if the interviewees were chosen on random some sense of selectivity bias may have been present due to the researchers selected to interview employees who they thought to have a great impact on the VSs. Hence, some important roles may have been lost in the selection process. The interviews are considered to have reduced the respondent bias, but also improve the quality of the data collected through increasing the objectivity, not letting personal values interfere with the result. Despite the efforts of reducing the respondent bias, it is impossible to eliminate it completely.

Several actions have been taken throughout the research to ensure high quality of the data. To increase the credibility one key informant reviewed the finished report to ensure what is stated is aligned with reality, which increased respondent validation. All interviewees who have participated got the opportunity to provide any input or change requests before it is published, however it could have been beneficial to ask a few more persons to read through the report to ensure it correspond to reality. Thick descriptions of the organization is used through a great number of figures and tables in connection with a detailed description of how the organization is structured, relationships between roles and responsibilities, provided in the empirical chapter. The challenge for the researchers was to identify what parts were necessary to include. As the studied case is a complex organization, the researchers felt the need to provide a substantial amount of information in order for other organizations to evaluate if the result is transferrable to their situation. A potential pitfall presented in the method was access to documentation, however we had no problems to retrieve access to internal documentation. All documents reviewed and notes taken during observations are kept which will assist in case an auditor want to confirm the reliability of the report. The researchers chose to not transcribe the interviews, however the recordings are saved and accessible if requested.

6.2 Discussion of Key Results

The three questions were created to investigate how the three theories could be combined, and what synergies and trade-offs could be found affecting the merging of theories. Firstly matrix design and VSM were addressed from an organizational perspective. Later the theories impact on leadership and cross-functional teams, two important parameters in the theories, was investigated. When the theories of matrix structure, VSM and Lean leadership were compared to each other and to the case study conducted to see how these concept are possible to work with simultaneously, different results were found. Though the case provides an in-depth view of how the theories work together it is important to remember all organizations and industries are different and this research has only scratched the surface of the collaboration between the theories.

6.2.1 First Research Question

Addressing the first research question whether an organization can work with a matrix design and VSM in parallel the researchers found it possible based on the alignment of the two theories and the case study. The research showed no great differences which could potentially hinder an organization to work with both VSM and matrix structure. However, when it comes to allocation of resources the two theories have to be balanced. The structural location of resources is an organizational decision and should be based on all the matrix's strategies as well as the outspoken organizational power balance. In VSM theory, the flow of product is always in focus and no considerations needs to be taken into account when it comes to resources allocation. In an organization with both matrix design and VSM it is not only the VSs who have the authority to pull resources close, other dimensions may also have an impact. This trade-off needs to be acknowledged and balanced for both theories to work together and we believe it raises the need for a very clear power balance. If the organization state the VS dimension has the greatest power, it is easier for VS to structurally locate resources in VS to make it autonomous. However, if other dimensions have greater power, it will be harder for VS to allocate resources in their dimension, hence we believe the merging of the matrix design and VSM will require VSs to be core business hence to have the greatest power.

Some important characteristics were similar in both theories, but there were also other key points for one theory, which was not present in the other theory. The differences were not contradicting, rather complementing the each other. For instance, to influence without authority was identified as key for any leader in a matrix organization to lead a cross-dimensional and cross-functional team but was not mentioned in VSM. It can also be argued that influencing without authority may not play as big part in VSM organizations due to the simplicity in design, but we believe that a VSM organization could benefit from leaders who are able to lead without authority. Whilst in a matrix organization, where multiple strategies are executed from different organizational dimensions, there is a greater need to share resources hence influencing without authority plays a much larger role. Employees who are willing to follow a leader, which does not pay their salaries, seem to do so because they trust the leader, which can be a good trait for a leader in any organization.

From analyzing the empirical data it can be considered EPS is more developed and mature in working according to VSM than in a matrix design. Even if top management state the organization has worked in a matrix previously, the purpose of working in a matrix seem to never have been this outspoken before. Many employees seem to grasp the understanding why working with matrix is important, however there seem to be a gap between understanding the structure and knowing how to operate in it. EPS has a complex matrix structure, which has been proven during the course of the research. It was difficult, and in some cases impossible, to find organizational charts that showed the current organizational structure, reporting lines and roles. This can partly be explained to be due to undergoing changes, but even from interviews it was apparent employees found it difficult to understand how the matrix works, especially outside their own role and VS.

It is important for management to realize the complexity a matrix design brings hence strong leadership is needed to lead the organization in the right direction, helping employees in the transition while being able to balance power and share authority. This is important in all the three dimensions of EPS and the lack of these leadership qualities in one dimension will consequently affect leaders in the other dimensions. Unnecessary conflicts and power struggle between dimensions can be experienced as a result in case the leadership qualities are not present, which in turn can result in decreased cross-functionality.

If all dimensions pull in different directions through misaligned goals, there is no point in trying to affect any employee a leader does not have solid line relationship to since the employee will presumably obey their direct manager. The case study supported this claim by having the issue of VS managers wanting to control resources to be able to deliver their objectives, which has a different priority in other dimensions. To facilitate the leaders in EPS to influence without authority the organization will have to lay a foundation through, for example, clarify power balance and making sure it is understood in all dimensions. Roles and responsibilities can have to be redefined in order to generate clear purpose and connection to the strategies they aim to fulfill. When strategies are clearly understood it is important to state how to operate in daily activities to mitigate the risk of sustaining business as usual, especially when changes will be made to existing structure and role definitions. This often comes down to the role of the middle manager, which will have to translate top management strategic objectives to more hands on performance indicators for employees to act on. Top management on all sides of the matrix has to support the middle managers in this task.

6.2.2 Second Research Question

In the second research question Lean leadership theory was compared to what matrix and VSM theory identifies as the leader's role in the respective type of organization. Both matrix organizations and organizations working with VSM can be so called Lean organizations, leaders can act as Lean leader in both types organizations. Since the first research question proved VSM is compatible with matrix organizational theory, we assume Lean leadership can also be used in an organization combining the two theories. Furthermore, the first research question resulted in highlighting several soft factors that should be addressed when combining the theories. As Lean leadership also addresses the importance of soft factors this further proves Lean leadership compatibility. Even if all three theories address what characteristics are important for a leader and there are clear similarities, a slightly different focus was found between them. Lean leadership emphasize soft factors and appreciate coaching skills, matrix theory focus on teamwork and communication due to the cross-functional nature of the structure and VSM theory place more of a results oriented focus.

The case study indicated the greatest issue a VS manager experience is to lead in a matrix constellation where they are a matrix manager, which means having to share resources with other managers. Lean leadership characteristics, such as empowering other, has been shown by VS managers in their management team, but VS managers presented difficulties to do the same for roles that were not represented in their team.

The lack of focus on coaching employees with dotted and no line relationship seem to be due to EPS is a fairly immature matrix organization, which is shown by the level of confusion and tension. Even if theory state healthy tension is good to balance trade-offs between dimensions, we believe tension is never healthy in the transition phase of settling in work in a matrix organization. Tension will automatically occur hence focus should not be to creating healthy tension, rather more focus should be on aligning dimensions. Once how to work in a matrix organization has been established, the focus of Lean leadership seems to be possible to emphasize. As the first step of Lean leadership is self-development it is necessary for the leader to be aware of how to conduct tasks in their VS before coaching others. To assist leaders to evolve as a Lean leader EPS provides various models and standards.

When asked about their role description all VS managers answered unanimously, almost word by word. What this depends on was speculated during the course of the research whether the VS managers actually thought this to be true or just reflected what they had been taught. Their description is consistent with what their manager, Head of Operations, states. Not only do they agree with him, all VS manager also showed they live by their role description which convinced us the VS managers considered their role to be similar based on a mutual goal. This shows the importance of having aligned goals, understanding why and how to conduct tasks. We believe clear description of roles and responsibilities can be of help when the why and how is unclear. The VS managers were also surprised that all of them answered unanimous, since it was often stated by them they had different personalities and views. Even if it is true, all were very engaged leaders and showed a clear appetite for improving their VS to make it more competitive. All VS manager highlighted the importance of having a strong team by their side in order to create competitiveness, which is one of the reasons the VS manager often mentioned a request to expand their team with additional functional roles. As the VS team grows with more and new functional roles the VS managers will have to put more and more emphasis on empower and trust in the team.

As the VS management team takes further ownership of their part in the team, the role of the VS managers will take a more strategic form and the focus will be on coach and develop leaders rather than work with daily operations in the VS. Lean leadership qualities such as empowerment, facilitating, motivating and encouraging will then grow in importance and must come naturally to the leaders as the VS matures.

6.2.3 Third Research Question

The second research question is also closely connected with the third questions in regards to building strong teams according to the theories. A strong team can be subjective to what a leader herself considers, but this research tries to objectify the concept by finding synergies between the theories. Leaders play a natural role in the development of cross-functional teams. Engagement, empowerment and continuous improvement culture are three factors highlighted as important according to theory and the case study. These factors are also closely related to a leader's ability to influence without power, especially in a matrix organization.

We believe the challenge lies in how to develop engagement and empowerment in a team member which the leader may not have daily contact with and may not sit close to. Furthermore, how can a leader ensure a shared resource in their team is engaged and committed to the leaders VS? How to create commitment and empowerment in a cross-functional team with performance reporting to several managers must be investigated.

It is not only the leader who plays an important role when creating a strong team, the whole organization needs to be aligned. As mentioned in the analysis can the Star Model, seen in figure 3.3, be viewed from a bottom-up perspective to build a well-functioning organization based on the culture, performance and desired behavior, see figure 5.1. All five parameter should not only be in place when designing an organization, they should also be aligned when creating teams with the right abilities to reach desired performance and live a culture.

According to the VS managers a strong team is a strong VS. The team should consist of the roles the VS require to deliver requested results. This research did not aim to change any current structure at EPS, only supporting them with key factors that should be acknowledged when operating in accordance with the three theories. The organizational structure should reflect the matrix strategy and power balance. At EPS it was clear some important functions were not aligned to generate the most efficient support for the VSs. VS managers often highlighted a need to implement these resources into their VS. Structural changes are important to dictate power and generate alignment for goals, however, there are other ways to establish cross-functional collaboration. Creating processes and communication channels outside the structure is needed in a matrix organization, as well as to hire people who can share authority and collaborate with others. If EPS wants to create structural changes in the functions, moving the roles into the VSs or create other ways of generating support is up to EPS to decide. The GM said during an interview "*as a leader, you need to be greater than yourself*". Maybe a VS needs to be greater than the roles shown in a structure?

6.3 Limitations of the Study

The limitations of this research are divided into limitation due to theory respectively case study.

6.3.1 Limitation Due to Theory

One limitation to this research, which has been mentioned previously, is the lack in existing theory combining matrix organizational theory and VSM theory. The combination has therefore been generated by studying the two and finding similarities and differences and where possible synergies could be found.

Two of the theories used in this research, matrix design and VSM, both strive to increase competitiveness. Matrix structure created competitiveness through balancing more than one strategy and VSM through focus on effective and efficient flow. Besides investigating on how matrix structure and VSM can be combined, this research has focused on the important factors leaders and cross-functional teams should acknowledge in operating according to these theories.

Though both leaders and cross-functional teams play a vital role in creating competitiveness, it can simply not be guaranteed. The research can only provide suggestion on actions to close the gap between theory and practice.

Additionally, though this research has aimed to address the most prominent and important factors according to the theories it should be acknowledged that there are still other factors that could be needed to be addressed in creating and leading cross-functional teams.

6.3.2 Limitation Due to the Case Study

Acknowledged from the beginning of the research was that EPS had been undergoing a larger organizational change since being acquired by GKN from Volvo Aero during 2012. After the acquisition strategic focus has shifted from functional development to effective VSs and customer oriented Programs. Due to the organizational approach to strengthen the VS teams with roles from the Functional dimensions, EPS was undergoing structural changes during the duration of the research. Examples of changes made just before or during the thesis are: one VSs manager started the position weeks before the start of the research, two VSs was combined to one VS, material handlers were moved into the VS teams and logistic managers was institutionalized in the VS's management team. All these structural changes impacted the result of the study where some role descriptions and responsibilities were redefined. The changes could also have impacted interviewees answers where some answered, for example, that they did not really know what their role included due to the recent changes.

This thesis has focused on only one of the three dimensions at EPS, the Operations dimensions including the six VSs. Empirical data has therefore been mainly gathered from this dimension. Delimiting the other two dimensions from the research has been acknowledge as a risk of sub-optimizing the organization in favor of the VSs, and thereby not strengthening the VS from a holistic perspective where all three dimensions has been taken into consideration. Nevertheless, VSs are stated as core business and is the business unit producing value for the end-customers. Furthermore, resource-wise is Operations much larger with approximately 700 employees compared to the other core business, Programs, which is much smaller with less than 50 employees. The effect and need of leadership and cross-functional teams can thereby be argued to be greater in Operations. Optimizing VSs does not necessarily have to lead to sub-optimization but the risk must be acknowledged. For future research an investigation of EPS from a holistic perspective can be of interest to find the best possible balance of trade-offs between the three dimensions. The important factors that should be considered by leaders and team members raised from this research, is applicable for any matrix manager, regardless of dimension.

21 semi-structured interviews were conducted during the research and the interviewees were chosen through randomization selection of roles that represented employees who impacted VSs. The sample size and group could have had an impact of the result from the empirical finding from these interviews.

From a larger group or different representatives the results may have been different however this risk was acknowledged from the beginning and aimed to mitigate throughout the research by choosing interviewees from different dimensions. Many of the interviews were however conducted to grasp the complexity of EPS organization.

6.4 Recommendations for Future Implementation and Research

As this research only scratch the surface on whether the theories can be combined, the result should be tested in other industries and with multiple cases to identify the applicability. This research provides only a holistic image of how the theories can complement each other while highlighting challenges.

Future research could be conducted in order to analyze whether one theory's strength could remedy another theory's pitfalls. Furthermore, it could be an interesting to benchmark between industries and organizations in order to identify whether these theories work better in some cases or others.

The researchers believe many organization works in this structure today, more or less outspoken, and can benefit from identifying the challenges and how to address these. Working in a matrix design with VSM may not be the most common way for organizations to work, however to stay competitive organization seem to try and adapt several different theories in the quest towards finding the optimal structure which work for them. This research can possibly assist in future research where two theories are to be compared.

It would be interested for future research to look at how the different maturity levels of matrix design, VSM and Lean leadership impact challenges experienced by the organization. Furthermore, it would also be interested to investigate whether there are any optimal conditions for combining the three theories in terms of for instance size of the organization and geographical spread.

7 Conclusion

The aim of this research was to identify the relationship between matrix organizational theory, Value Stream Management (VSM) and Lean leadership in a manufacturing organization. Based on the case studied, a conclusion was drawn that VSM is applicable in a matrix structured organization as it can assist in achieving one out of several strategic objectives. One potential consequence is that in VSM each value stream (VS) is supposed to be independent of each other whereas in a matrix structure, the organization should have a holistic perception to achieve two or more strategies. This tradeoff has to be acknowledged and managed for the two theories to coexist.

Power balance can be shifted to one or more sides of an organization and should reflect the matrix's strategies. Furthermore, it is vital the power balance is explicitly understood through the organization to reduce the risk of confusion and conflicts between dimensions. A conclusion was made that if VSM is applied in a matrix organization the VS dimension must be defined as core business and be provided with greater power to ensure prioritizations are made in the VSs favor. If it is not, there organization will not be able to focus on flow.

The difference in maturity an organization possesses in the different theories has an impact on organizational behavior. To operate in a matrix organization with VSM the first step should be to evaluate what maturity in accordance to the two theories the organization possesses. If the organization is immature in one theory and mature in the other, the potential challenges of the immature theory will be more important to address. The studied case is considered to have a high maturity in terms of VSM but not as progressed in working in accordance to matrix organizational theory, hence matrix challenges are experienced.

The Star Model has been used in this case to promote important parameters for organizational design where, not only structure, but also strategy, processes, rewards and people should be aligned to make up an effective organization. These five areas are also mentioned as key in both VSM theory but also as a Lean leader. Rewards and people are in focus for a Lean leader in order to develop the employees where processes and strategy, referred to as True North values, is key in Lean theory, which is the basis for VSM. Even though structure in the Star Model refers to power distribution and authority, it is important to not get caught in the quest for the optimal design. Organizations need to find other ways to promote the right organizational behavior. The challenge is not to draw new lines on a map, the challenge is to clearly describe why a matrix design is chosen and then teach the organization how to work in a matrix. It seem to be plausible the further away from the understanding why an employee is operating in a matrix structure, the more important are clear role description, important characteristics of a Lean leaders as well.

Matrix organizations are complex and leaders play an important role in making the matrix work. Top management needs to clearly dictate power distribution and strategic objectives, which is similar for both matrix theory and Lean leadership.

However, matrix theory state middle managers need to be able to share resources and authority across dimensional boundaries which are contradicting to the role of a VSM leader whose responsibility is to lead autonomous VSs. Lean leaders should operate as coaches and facilitate cross-functional teamwork through empowerment. Leaders need to provide clarity in role and responsibility, and goal alignment to provide an organizational environment for employees to operate in. In combining the two theories there is an increased need to address soft factors. Lean leadership has therefore proven compatible in this type of organization. Leaders have to share authority and power across dimensional boundaries.

Influence without authority is a leadership quality, which should not be underestimated. This research indicates the importance of influencing without authority is key to succeed in a matrix organization in combination with creating processes, and formal and informal communication channels where the structure is lacking and reporting lines are missing. The risk of using authority to influence creates insecurities for leaders, which generates a controlling behavior and an emphasis on reporting lines. The importance of communication and trust is a prerequisite in order to run successful VSs. Alignment of goals between dimensions as well as arranging functions to generate efficient support to VSs have also been acknowledged during the case study as important parameters to create competitive VSs. Healthy tension was mentioned as a concept referring to slightly contradicting goals to avoid sub-optimizations, but from this research a recommendation is to try to avoid this type of tension in an immature matrix organization. Tension will automatically occur, hence it is more important to focus on alignment of goals. As a matrix organization mature, healthy tension can be introduced.

To create a strong team, the leader must be aware of the members of the team. In VSM theory, the team is employees which report to the leader, however in matrix theory the reporting relationships with dotted and solid lines blurs the boundaries of a team. In a matrix organization following VSM, the team is all employees affecting the VS and does not necessary have a reporting relationship to the VS manager. To create a unified and strong team, communication and involvement of all members is key to limit misunderstandings and tear down dimensional barriers. An action for building a team is to cross-train employees to gain flexibility and understanding of each other's roles. By cross-training employees, the leader provides challenge for self-development and it can also assist in creating a holistic view. If employees are cross-trained, it will be easier to deploy them in different VS, providing flexibility and ensuring each VS does not become too independent. By creating team rewards spanning the complete team, independent of any reporting lines, a strong team culture can be built. In both VSM and matrix theory, rewards and team incentives play an important role as it aligns team members towards a mutual goal and facilitate communication.

8 Recommendations

Our assignment from EPS was to identify how it would be possible to strengthen the VS and emphasize flow. From a large portion of interviews and through observations, we found the way EPS drives Value Stream Management (VSM) is certainly in line with how theory describes it. In fact EPS leans toward mature VSM based on Baggaley and Maskell's (2003) maturity model presented in Chapter 3 due to the progressed VS focus observed in the Operations dimension. Lean tools are applied and the Lean thinking of continuous improvement culture and respect for people is widespread throughout the organization. There are recommendations we can make to strengthen VS such as create completely autonomous VS with no shared resources and replace all expensive physical resources which today demand high utilization rate to ensure payback. However, we believe EPS is well aware of these VS improvement areas hence we will base our recommendation on what we believe is the root cause to why the development of strong VS may be staggering; the matrix organizational design. The research indicate a incomprehension from employees how to operate in a matrix organization. We believe if a matrix design is not fully acceptable in an organization, it can generate waste in terms of confusion and ambiguity with the employees. Once this waste has been minimized, EPS will be able to identify potential improvements to increase flow. During the research there were a few factors identified which hinders EPS from moving forward in their organizational development today;

- Lack of mutual agreement of power balance across dimensions
- Too much emphasis on the structure of the organization
- Hard to influence without authority and limited cross-functional integration

Recommendations will be based on how to mitigate these three root causes and will be presented below. Our recommendation will consist of five action plans in how to overcome these barriers which we believe today hinder EPS from strengthening VS further, see tables 8.1-8.5. These five action plans entails development of Star Model, develop a long-term strategy for where EPS want the organization to be in terms of leaderships and relationships, create a clear power balance, establish formal and informal communication channels and develop team incentive systems. We are certain of that EPS is already working continuously with many of our suggestions put forward. However, these recommendations are based on empirical challenges found during the case study combined with theoretical key success-factors for a well-functioning matrix organization working with VSM.

8.1 Conduct Star Models for alignment

EPS follow a Lean culture with continuous improvement and with clear performance objectives in terms of KPI Gold. The culture and performance at EPS seem clear to employees and the purpose is to drive a behavior of empowerment, influence without authority and cross-functional teamwork, hence a recommendation is to conduct the Star Model bottom-up. What is needed to build this type of behavior when the culture and performance is clearly established? This is where the Star Model comes in. According to theory, as well as according to EPS, a VS should be considered an autonomous factory, or an organization of their own, hence it would be possible to conduct a detailed Star Model analysis for each VS and ensure all five parameters (see figure 3.3 and 5.1) are aligned.

To ensure all VS still have a comprehensive view of EPS as one organization, a holistic Star Model can be conducted by the Head of Operations and VS managers to align the different VSs and link them to the organization's vision. By having a holistic Star Model for all VS managers, but leave it up to each and everyone to create a detailed version of their own, would provide each VS manager leverage to create their own organization structure and take ownership. Based on how autonomous a VS is, it will affect whether it is appropriate to coordinate the Star Model between VSs. As VS-E depends on VS-D, the need for connecting the Star Model is higher than for VS-C, which is almost autonomous. Even so, by coordinating and standardizing areas of strategy, rewards and processes would allow an easy transition between VS for employees, as it would facilitate better cross-functional integration when rotations are conducted. Today, EPS mainly emphasize the structure and discuss the importance of reporting lines. People and skills are also debated related to the effect functions have on deployment of resources. Operations should evaluate what rewards and processes will drive the behavior requested? By conducting these Star Models EPS can reap benefits of alignment between the organizational design and the employees. Our recommendation is hence to discuss the factors structure, strategy, processes, rewards and people on the quarterly strategy meetings and how these are affecting the VS to align the organization with the performance, culture and desired behavior.

Table 8.1. Action plan to conduct a star model

Action Plan	Action	*Conduct Star Model.*
	Why	*Align important parameters for a well-functioning matrix design with the organization performance, culture and desired behavior.*
	How	*Workshop discussing the parameters in the model during Strategy days.*

8.2 Set goals in terms of organizational and leadership development

EPS has a very clear process for setting and following up goals related to the VS performance, but is it possible to apply this process to obtain a clear vision and strategy for where leadership and organizational development is expected to go? It is clear EPS understand to be successful everyone must strive towards the same goal in terms of performance which is equally important when it comes to operating in an organization, hence it is key all employees understand why and how to work with both matrix design and VSM. If there is a selected few who are not willing to work in a matrix organization or according to VSM because they do not understand why or how, the likelihood of failure is high.

Our recommendation for EPS is to share the vision of where the organization is desired to be in the future with goals of both VSM and matrix design, outlining which maturity level in terms of both theories are requested. A clear roadmap for organization development and how to achieve a higher maturity level should be developed to align the vision of EPS with all the employees as alignment is important to succeed with both matrix design and VSM. Clear milestones should be outlined to ensure EPS is moving in the right direction and to have a way of closing the gap between the current and future organizational state.

An outline of the type of leadership qualities EPS believe are important for a VS manager could be established. The VS managers are following the Lean leadership principles today in terms of leading the employees with solid line relationships; challenge, Kaizen, "go and see" and respect for people. In the long run, it could be beneficial for the VS managers to apply these parameters for the whole VS team, independently of the reporting relationships. To train the VS managers in how to use emotional intelligence in their daily leadership could be beneficial as it may help them understand both their own emotions, but also other employees in the VS team.

Table 8.2. Action plan set organizational and leadership goals

Action Plan	Action	*Roadmap desired organizational development and future requested leadership qualities.*
	Why	*To stay competitive and align employees with the vision of EPS.*
	How	*Identify current state and evaluate where improvements are needed to develop a future state.*

8.3 Create clear power balance and reporting relationships

Tension is experienced between dimensions at EPS hence top management must clearly state the power balance between the dimensions. It is important to ensure the power balance reflects the strategy of the organization, in this case, the focus on core business of Operations and Programs. Power balance and authority, together with how decisions are made, are part of the structure of the organization. By speaking of strong VSs and Programs, EPS top management seem to have embraced this philosophy of defining power balance, however it must be as obvious to every single employee at EPS in order for VS managers to be able to influence resources which they do have either a dotted or no relationship to. A clear power balance will reduce the VS managers need to control human resources which have dual reporting relationships as a clear prioritization from the employee can be made without question. Benefits of a clear power balance can be generating less frustration as employees will know which manager to prioritize. Additionally, clear power balance will reduce the need to control resources, as VS managers know that they have full mandate to manage their VS. To assist we recommend to conduct clear and updated role description including reporting relationships and expectations on how to work in a matrix organization. The role descriptions in the OMS system should be updated to ensure all employees have access to their responsibilities. As VS managers are used to have RACI charts in their PD matrices, it could be an idea to develop these also for daily tasks related to the role descriptions to further clarify functional roles affect on VSs. The RACI chart can describe what their role is, how it should be conducted but also explain the reason why the task is important and what other roles are affected by their work. By clarifying responsibilities and roles, the ambiguity due to dual reporting can be reduced.

Table 8.3. Action plan for clear power balance and reporting relationships

Action Plan	Action	*State power balance and prioritizations.*
	Why	*Reduce ambiguity and frustration of dual reporting.*
	How	*Continuously express power balance including detailed information on how to act in a matrix organization. Clear role description and RACI chart can be of assistance.*

8.4 Establish formal and informal communication channels

To reduce the rigidness of the structure of an organization, processes enabling information flow must be established. At EPS today, VS managers speak of how reporting lines does not matter, but they still want resources to have some form of official relationship to them. Our recommendation is to create forums for informal communication with the resources needed which the VS managers feel as they do not control today. It does not have to be an official meeting every week, rather a lunch or a coffee. The aim is to create a sense of trust and commitment which in turn will generate loyalty to the VS. Loyalty and trust can allow VS managers to influence resources without having any direct reporting relationship or authority over them.

Furthermore, formal meetings should also be open to resources impacting the VS. When strategies are discussed between VS manager and the VS management team, a consideration would be to include other roles which operate within the VS team to ensure everyone feel as they are winning and losing with the VS, but that they can also affect the future of the VS's performance. Employee involvement feeds commitment hence it is important to invite roles affecting the VS to important meetings. The VS managers could review current meetings to evaluate where it could be a good idea to invite roles which they have no or little contact with. One recommendation is to draw a communication chart with the VS in focus and then map all roles affecting the VS. Different lines can be drawn based on what type of communication is used today; formal, informal or no communication as well as one- or two-way communication. The chart will assist the VS manager to identify what communication channels needed to be developed. After the material handler has been transferred into the VS, the hopes are to integrate the Supply Chain function to the VS in order to have an extended VS focus. Potentially it is enough for the VS manager to have both formal and informal meetings with the logistics manager and leave the contact with i.e. SQA to the logistics manager or material handler. Even so, to build a strong VS team it may be beneficial for the VS manager to have informal meetings where there is currently lacking communication to create trust and commitment. The communication chart can assist in identify these relationships as well.

Table 8.4. Action plan establish communication channels

Action Plan		
	Action	*Create formal and informal communication channels.*
	Why	*Create commitment, trust and loyalty to reduce reliance on reporting lines.*
	How	*Communication chart to evaluate current communication and where improvement is needed.*

8.5 Develop team incentive systems

Currently, there seem to be a lack of a well-established team reward or incentive system on higher management levels, hence a recommendation is to develop a system facilitating cross-functional integration. The VS managers must first grasp the concept that all parties involved in the performance of the VS is within their team and thereafter, the current reward or incentive system should be evaluated to identify potential improvements. Team rewards will also automatically create both formal and informal communication channels between roles which are not communicating today and can motivate employees to ignore reporting lines and start working together as one VS team. By implementing a reward system cross dimensions, the benefits of reduced tension can be realized and a sense of belonging to the VS can be achieved by roles which are not physically located at the VS. Furthermore, a reward system may facilitate the VS managers in influencing without authority if the incentives are set to support VS and functional integration. If for instance CME receives rewards for contributing to the VS team, the VS manager may not need feel the same need to control the resource to be able to deliver result. Rewards can generate employee involvement, commitment, empowerment and challenge to the employees which are factors that can increase the ability to influence without authority. Our recommendation is to provide an incentive system which is easy to understand and to balance monetary rewards and simply recognition to gain all employees commitment as different rewards seem attractive to different personalities.

Table 8.5. Action plan develop team incentive systems

Action Plan	Action	*Develop current reward system.*
	Why	*Facilitate cross-functional teamwork to reduce the need for VS managers to control resources located either in Functions or Programs.*
	How	*Evaluate current system to identify what incentives are appropriate and how these can be incorporated in the current way of working.*

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Appendix

Appendix 1. Questions for Value Stream Managers

Guiding interview questions for unstructured interviews with VS managers
What is included in your role?
Who are members of your team?
Where do you and your team sit?
What differs your VS from others?
Semi-structured interview questions with the VS managers
What is a strong VS to you?
What are your VS strengths?
What are your VS challenges?
How do you make your VS competitive?
What is a strong team to you?
What role does solid and dotted reporting lines play in your organization?
What is required of you to build a strong team?
How do you motivate your team to work with improvements?
What does Lean leadership mean to you as a VS- and matrix manager?
How would you characterize a leader for a cross-functional team?
Mention three important parameters to strengthen the cross-functional integration at GKN.

Appendix 2. Questions for Semi-structured interviews

Semi-structured interview questions with the General Manager
Where is EPS today in terms of competitiveness?
What future strategies and objectives does EPS strive towards?
What are your competitive goals?
How are these goals translated and reflected in EPS?
What does the organizational structure look like today?
There is a change in moving towards Value Stream and Program focus;
When was the change initiated?
How is the relationship VS-Programs-Functions supposed to look like?

Semi-structured interview questions with the Head of Operations
What is a strong Value Stream to you?
What is Operations greatest challenge?
How is Operations making their Value Streams competitive?
Considering each Value Stream as one separate organization;
What response have this perspective gotten from VS managers?
What is needed to make it happen?
Does the VS manager have the prerequisites needed to create this type of structure?
Can the managers ask for help?
What do you believe should be standardized across Value Streams?
How do you work with Lean leadership?
Does GKN offer any education for VS managers in how to operate in a matrix environment?

Semi-structured interview questions with Functions and Programs
What is your role?
Who do you report to?
Who is your manager responsible for your career and salary development?
Where do you physically sit?
How does a working day look like for you?
Who are your closest co-workers?
Are you located in more than one Value Stream?
How much time should you allocate to the Value Stream vs your Function?