



Division of Production Management
Faculty of Engineering
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Operational Excellence and Lean Production at Haldex

Improving Haldex Way – The Value Stream Approach

Authors: Hjalmar Sventelius
Sara Öhrström

Supervisors: Johan Valett, Haldex
Bertil I Nilsson, Lund University, Faculty of Engineering

Preface

This Master Thesis is the final part of a five year master's degree in Mechanical Engineering, and Industrial Engineering and Management at Lund University, Faculty of Engineering. The thesis was conducted during the spring of 2013 on initiatives from Haldex.

It has been a true learning experience and a great opportunity to work at a global company such as Haldex. The atmosphere have been very welcoming from the beginning and given an immediate feeling of commitment and involvement, enabling for open discussions at an early stage.

We have been truly amazed by all the support and encouragement that has been given throughout the thesis, and would sincerely like thank everyone involved. A special thanks goes to Johan Valett, supervisor at Haldex, for invaluable advices and continuous support, and Bertil I Nilsson, supervisor at Lund University, Faculty of Engineering, for very helpful guidance and sharing of expertise. We would also like to thank our steering committee at Haldex, Peter Elisson, Julie Kochert, Mary Murphy, Sarah Nelson and Anders Pålsson for all discussions, feedback and support.

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Hjalmar Sventelius

Sara Öhrström

Abstract

Title: Operational Excellence and Lean Production at Haldex: Improving Haldex Way – The Value Stream Approach

Authors: Hjalmar Sventelius and Sara Öhrström

Supervisors: Johan Valett, *Vice President Haldex Way*, Haldex

Bertil I Nilsson, *Adjunct Assistant Professor*, Department of Industrial Management and Logistics, Faculty of Engineering, Lund University

Steering Committee: Peter Elisson, *Change Agent Haldex Way*, Haldex
Julie Kochert, *Manager, Quality Systems-Haldex Way*, Haldex
Mary Murphy, *Change Agent Haldex Way*, Haldex
Sarah Nelson, *Sr Change Agent*, Haldex
Anders Pålsson, *Manager Logistics*, Haldex Landskrona

Background: The increasing demands on the vehicle market regarding cost effectiveness, efficient production and innovative solutions create an unforgiving environment for the suppliers. Haldex has developed Haldex Way, a management and improvement framework focused on lean production to meet these demands. Although lean methodologies are utilized at Haldex, Haldex Way has currently issues with consistency and applicability in all areas of the organization. To address these issues and stay on the cutting edge of the market, further development of the Haldex Way concept must be made.

Problem Definition: The identified problems with the currently existing Haldex Way can be summarized as:

- *Slow improvements of result.*
- *Low level of utilization and low general buy in of Haldex Way.*
- *Lack of ownership and applicability of Haldex Way in implementation.*

Purpose: The purpose of this Master Thesis is to develop an improved framework for Haldex Way and a specific approach for the Value Stream processes. The approach should provide a descriptive way of how to work towards excellence and is specifically focused on improvements of Haldex' strategic KPI's; *inventory days* and *delivery performance*.

Methodology: The thesis is built on a case study with a combination of an exploratory, explanatory and descriptive approach, to provide an in-depth understanding for the underlying problems. A qualitative research method was used with several interviews and observations at different sites as well as thorough literature studies. Abduction was used as an approach for linking the theoretical knowledge with the results from the interviews and observations. The development process followed a generic logic and loop adopted from the EFQM business excellence model.

Result: The main results of the Master Thesis are:

- *A redesigned Haldex Way framework with an incorporated generic logic.*
- *A descriptive Value Stream Approach.*
- *A redesigned challenge template.*

Conclusion: The development of an improved framework for Haldex Way with a pervading generic logic has made the structure much more coherent and consistent in every level. It has incorporated all areas of the Haldex organization and therefore also captured all the required applicability. The approaches have made Haldex Way less generic in its structure by linking the objectives closely with the strategically important KPI's. The ways within each approach has also a more clearly defined content and scope.

Keywords: Lean, Haldex Way, EFQM, RADAR, Value Stream

Glossary

Approach	The approaches of the improved Haldex Way consist of methods and procedures for how to improve specific targets.
Challenge	A term for Haldex audits, perceived as having a more positive tone. A challenge is the assessment and evaluation of the work and progress with Haldex Way.
Delivery performance	A strategic KPI that measures the customer satisfaction and the performance of the value stream processes. It is defined as the ability to deliver products to customers without deviations, when the customer wants it.
Deployment	Realization of actions by a systematic implementation and integration of the approaches.
EFQM	European Foundation for Quality Management, a business model to create a culture of continuous improvements with performance in world-class.
Inventory days	A strategic KPI affecting the inventory holding costs and the performance of the value stream. Defined as the number of days material remains in inventory before being sold.
KPI	Key Performance Indicator is a measurement of the result for a site. Used to secure progression and development of areas concerning specific performance levels and targets.
LDMS	Lean Daily Management System, meeting structure designed to increase the speed of continuous improvement and enhance the cross-functional team interaction.
RADAR	The logic behind the EFQM model representing Results, Approach, Deployment, and Assess and Refine. Formed in a loop to evaluate and measure the performance and trigger continuous improvements.
Value Stream	The value stream consists of the activities that are required for the design and production of products which creates a value flow of material and information through the organization.

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1 Introduction

This chapter will create an understanding for the purpose of the thesis. This is done by giving an introduction to Haldex and Haldex Way, followed by a problem description and purpose of the thesis. Furthermore are the project deliverables and delimitations as well as the target audience presented. Finally an outline of the thesis is stated.

1.1 Context of the Thesis

Today the vehicle industry is very competitive with a high focus and pressure on reducing costs. The competition is now globalized as a result from open borders, efficient logistics systems and increased development within the area of information technology.¹ With this rapidly changing environment the need of applying appropriate and efficient performance measurements is of great importance. The utilization of strategically aligned Key Performance Indicators (KPI) is one way of addressing these issues.²

A larger share of the production and development activities is taken by the suppliers in the vehicle industry which has increased the importance of the supplier performance in the supply chain. The competition from low-cost countries and increased demand from customers of on-time delivery require the suppliers to find ways to reduce costs and improve the efficiency. Organizations are today actively taking actions to decentralize their structure to come closer to the actual demand from the customer. By shorten the distance to the customer the companies are able to respond faster and deliver Just In Time (JIT), and therefore also improve the level of satisfaction.³

Many companies in the vehicle industry have also implemented different production systems and improvement philosophies such as Lean and Six Sigma. In this way focus is put on the work with cost reductions and process efficiency, together increasing the competitiveness of the company.⁴

1.2 Haldex

The origin of Haldex dates back to the foundation of the Swedish company Halda in 1887 with watches, typing machines and taxameters as main products.⁵ Since then the product niche has changed with the development of innovative vehicle solutions and various acquisitions. Until 2011 the Haldex Group consisted of three separate divisions; *Commercial Vehicle Systems*, *Hydraulic Systems* and *Traction Systems*.

¹ Liu, et al., 2011

² Bititci, et al., 2012

³ Colovic & Mayrhofer, 2011

⁴ Tillväxtverket, 2013

⁵ Haldex Official Presentation, 2013

In 2011 Haldex Group performed a split and sold the hydraulic and traction divisions which led to the current structure, with Haldex as a separate company divided into two parts, *Foundation Brake* and *Air Controls*.⁶ This enabled an opportunity to work with an undivided focus on brake and air suspension systems. A reason for the split was stated by the former CEO, Ulf Ahlén:

“Clarity and credibility are important factors in a world filled with an abundance of competing business offers.”⁷

Haldex headquarter is located in Landskrona, Sweden, but Haldex has global presence with sales, development and production on four continents; Europe, North America, South America and Asia. The sales are divided into three major regions, the largest is North America with 56 %, Europe with 32 % and the Emerging Markets combined with 12 %. The main customers are manufacturers of heavy trucks, buses and trailers, together with aftermarket sales to truck operators and maintenance companies. Looking at the market shares of the different segments, trucks and buses stands for 30 %, trailers for 26 % and the aftermarket for 44 % of the sales. Haldex has more than two thousand employees worldwide and the net sales were SEK 4 billion in 2011.⁸

To ensure profitability and reach the objectives in a competitive and changing market Haldex has formulated a vision to target and strive for:

“The vision is to be the global commercial vehicle industry’s preferred choice as an innovative solution provider with a focus on brake and air suspension products. We will contribute to our customers’ success and achieve profitable growth by providing technology that improves vehicle performance and facilitates ease of operation. This creates value for both our customers and our shareholders.”⁹

A fundamental task for Haldex is to build a strong brand and create reliability towards the stakeholders and shareholders. Sustainability, both from an environmental and an economical perspective is essential for future success in the vehicle industry. Another key factor is the social responsibility and therefore Haldex stated their mission as:

“The mission is to develop and provide reliable and innovative solutions that improve safety, vehicle dynamic, and environmental sustainability in the global commercial vehicle industry.”¹⁰

⁶ Haldex Official Presentation, 2013

⁷ Haldex Annual Report, 2011

⁸ Haldex Official Presentation, 2013

⁹ Haldex Annual Report, 2011

¹⁰ Ibid

1.3 Haldex Way

Haldex wants to create a learning organization where the commitment, initiative and dedication of the employees ensure the success of the company.¹¹ Haldex Way is a framework and management philosophy originating from the lean philosophy created by the Japanese car manufacturing industry. The purpose and objectives of Haldex Way is stated as:

“Haldex Way is a system for establishing culture of continuous improvements by progressing and refining daily activities, with the objective of effectiveness and precision in Haldex Processes and Value Streams.”¹²

Haldex Way is not the goal itself but a way to conduct and monitor the work in a certain way and align the ambition levels by constant integration in the daily activities throughout the organization.

1.3.1 Haldex Way Tier Model

The Haldex Way Tier model, visualized in figure 1.1, is a step wise progression framework, consisting of five steps; Copper, Bronze, Silver, Gold and Platinum. In the first four Tier levels there are thirteen categories consisting of different lean tools and strategically important Key Performance Indicators (KPI). The KPI's and categories require various levels of implementation and need to reach certain targets to enable for progression one level in the Tier model. In the final Tier, Platinum, a generic business excellence model is incorporated since additional areas are needed for further progression towards business excellence.¹³

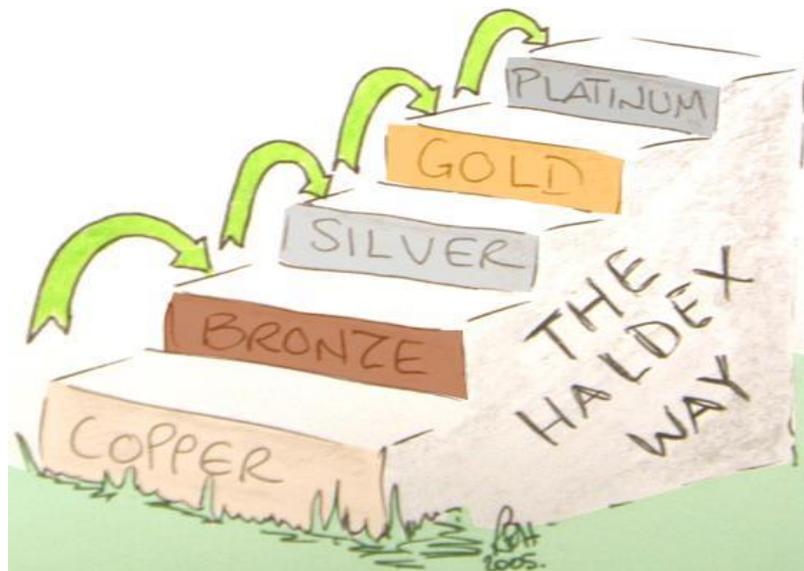


Figure 1.1; The Haldex Way Tier Model

¹¹ Haldex Annual Report, 2011

¹² Haldex Way Introduction, 2013

¹³ Ibid

1.4 Problem Description

Lean production methodologies are currently utilized within the work and use of Haldex Way, however for further improvements and enhanced results the Haldex Way concept needs to be developed. The main problem with the current Haldex Way is that the KPI targets for the different Tier levels are identical for every site and therefore not aligned with the site strategy. This results in slow improvements of the KPI's, which is amplified because of the lack of follow up on causes and actions linked to the KPI's.

Although Haldex Way and the Tier model are implemented in almost every part of the production and distribution sites, the general use and buy in of its possibilities and effects are relatively low on an organizational level. A reason for this issue is the content gap that currently exists in certain areas of the Tier model in combination with a too exclusive focus on lean production. Another reason is that the Tier model and different categories in some cases have evolved to become just a tool for compliance, used to check off different work methods.

The third concern is the lack of ownership and management support for the implementation and utilization of Haldex Way and the Tier model. A higher integration and involvement of Haldex Way in strategies on all levels is necessary. The issue with ownership also discourages the employees to take own initiatives to better adjust the methods to the business strategy.

Summarizing the identified problems with the current Haldex Way, three issues can be formulated:

- *Slow improvements of the result.*
- *Low level of utilization and low general buy in.*
- *Lack of ownership and applicability in implementation and utilization.*

1.5 Purpose and Objective

The overall aim of the thesis is to assess the stated issues with the current Haldex Way. The purpose is to align the improved Haldex Way with the business strategy and increase the general level of buy in. It is also to create an improved management framework with the means to establish Haldex as a cutting edge company of its market segment.

A new structure and additional content should be incorporated to address these issues. Descriptive ways of how to improve and develop the organization towards business excellence should be created. In addition, there should be an increased focus on the results and explanations of the reasons behind each suggested action.

The European Foundation for Quality Management (EFQM) excellence model will be integrated to address and fill the gaps of the existing Tier model. By differentiating the approaches for administrative and production operations the acceptance and use will be increased in the organization.

The main objectives of the thesis can briefly be summarized as:

- A. *In-depth understanding of Haldex Way and the Haldex Way Tier model.*
- B. *Co-development of a new framework for Haldex Way including and incorporating business excellence aspects.*
- C. *Development of a descriptive Value Stream Approach specifically focusing on improvements of the strategic KPI's inventory days and delivery performance.*

1.5.1 Project Deliverables

The main deliverable for the thesis to Haldex are the Value Stream Approach, presented in power point, and an executive summary of the thesis. The Master Thesis report and a scientific article will build the foundation of the deliverables towards the university. A presentation of the thesis will be performed at two seminars, at Haldex and at the Faculty of Engineering, Lund University.

1.6 Project Delimitations

The decision to develop a Value Stream Approach was made previous to this Master Thesis. It is based on Haldex' own evaluations of the work with the two strategically important value stream KPI's, inventory days and delivery performance. To specifically improve these KPI's with more efficient and effective value stream processes, an idea of a Value Stream Approach was created. The Value Stream Approach was developed by the authors of this Master Thesis with guidance from the supervisor at Haldex and Haldex change agent team. The development of the improved Haldex Way framework was done in close collaboration with the previous mentioned people, where ideas were discussed and joint decisions were taken. The authors have jointly worked with all parts of the Value Stream Approach and together determined the path of the development.

A delimitation of the Value Stream Approach is that the internal operations of the customers and suppliers will not be involved. Instead, the focus will be put on Haldex internal and inter-company operations to improve the efficiency and effectiveness of Haldex' processes, and secure that useful and appropriate data is exchanged. In this way Haldex internal operations will be provided with the best conditions for success.

The thesis is intended to describe and develop a way for the organization to work towards business excellence and not to develop the tools of the Tier model. An overview and development of the tools and methods will continuously be needed to keep them relevant and updated, however this will not be included in the thesis. Haldex has made a predetermined decision to integrate the EFQM business excellence model into the improved Haldex Way. This choice has directed the work with the Value Stream Approach and limited the options regarding the work with business excellence during the development.

When making any organizational change it is important to understand the different views and obtain a picture as complete as possible. The thesis is developed at Haldex headquarter and production site in Landskrona combined with a study visit at the distribution site in Weyersheim. Since Haldex is a global company with many facilities it might not be sufficient for a complete picture. To address this issue the change agents, operating at Haldex sites around the world, will help communicate and provide different perspectives and experiences. However, it is important to remember that a lot of the information is collected from secondary sources which might, in some cases, give a biased view of the reality.

1.7 Target Audience

It is of great importance making the thesis in a susceptible way to everyone in the Haldex organization, to create a positive attitude towards the changes. The primary target of the thesis is therefore the organization in general and the management groups in particular, which puts great demands on how the methods and structure are communicated. The secondary target is the academic supervisors at the Faculty of Engineering, Lund University, as well as students interested in the subject. A third target group is the stakeholders interested in the company and the improvements made.

1.8 Project Outline

The project outline, presented below, summarizes the chapters and explains the objective and content of the specific sections.

- Chapter 1, *Introduction*, introduces Haldex and Haldex Way and explains the purpose, problem and delimitations of the Master Thesis.
- Chapter 2, *Methodology*, describes the different research strategies, methods, approaches and techniques for data collection used in the thesis. It also presents and visualizes the research process that has been used as a foundation for the development of the improved Haldex Way.
- Chapter 3, *Frame of Reference*, provides an explanation of the underpinning theories for the Master Thesis. This includes theory of lean, business excellence, change management as well as specific theory linked to value stream improvements and the history of Haldex Way.
- Chapter 4, *Empirics*, gives a presentation of the current Haldex Way, the Tier Model and Tier Challenge. In this chapter the improvement categories with the main content of Haldex Way is presented. It also describes what a Haldex challenge is and how the challenge template is used.
- Chapter 5, *Analysis*, forms the foundation for the Value Stream Approach and is divided into four parts; improvement categories of interest for the Value Stream Approach, the identification of gaps in the Tier model, good practices at Haldex, and finally a summary in form of a list of requirements for the Value Stream Approach.
- Chapter 6, *Result: Improved Haldex Way*, describes the Value Stream Approach in specific. There will also be a general presentation of the improved Haldex Way, with its underlying logic and different modules. Finally, the redesigned Tier Model and challenge template will be introduced.
- Chapter 7, *Conclusion*, includes an explanation and reasoning behind the structure and content of the improved Haldex Way. The linkage between the improved Haldex Way and the theory will as well be presented.

- Chapter 8, *Reflections and Future Work*, consists of the final comments on the thesis regarding methodology and credibility. The academic contribution, future recommendations for continuous improvements of Haldex Way and personal reflections will also be discussed.
- *References*, sources used in the thesis including books, articles, web pages, Haldex internal documents and the people interviewed.
- *Appendices*, attached current and improved challenge template as well as parts of the Value Stream Approach.

2 Methodology

This chapter includes the methodology chosen for the thesis. Initially, the research and theoretical approach is presented. This is followed by the research strategy and design, as well as the methods for data collection. Finally the credibility is discussed together with a presentation of the overall research process for the thesis.

2.1 Research Approach

Depending on the purpose of the research and definition of the problem, there are several different research approaches that can be used. The most commonly used are; *exploratory, descriptive, explanatory, normative and improving studies*.¹⁴

Exploratory studies are used to understand the extent of an identified problem and to create an initial understanding of the problem. This type of studies is used to visualize the current state and to explore the problem in an environment where the information is limited and often inadequate.¹⁵ *Descriptive studies* have a describing characteristic and answers the question what. This means that when the initial understanding is created from the exploratory research, the focus of the descriptive study is to describe the defined problem in detail.¹⁶ An *explanatory study* explains the reason why certain situations, behaviors or problems occur. It also tries to find the interrelationship between the causes and effects for the identified object of the study.¹⁷ *Normative studies* can be compared to descriptive studies, but with the focus on how the research desirably should be performed and what the ideal result should be.¹⁸ *Improving studies* have a problem solving characteristic and the purpose is to find a solution to an identified problem.¹⁹

The Research Approach for the Thesis

For the thesis both an exploratory, explanatory and a descriptive study are used. The exploratory study is conducted to create an initial understanding of the current Haldex Way whereas the descriptive study provides a more comprehensive and detailed picture of the situation. This is used to analyze and capture the relevant material needed for the development of the improved Haldex Way. Explanatory research is used to some extent, to realize what causes the current problems and what the effects are. Finally, improving studies are used to enable the development of the Haldex Way framework and the Value Stream Approach.

¹⁴ Höst, et al., 2006

¹⁵ Ibid

¹⁶ Frankel, et al., 2005

¹⁷ Höst, et al., 2006

¹⁸ Wallén, 1996

¹⁹ Höst, et al., 2006

2.1.1 Induction, Deduction and Abduction

In the beginning of every research project a decision must be taken regarding what framework the theoretical knowledge should build on. There are three different ways describing how to receive the required knowledge on which the conclusions can be drawn, these are *deduction*, *induction* and *abduction*.²⁰

Deduction is visualized in figure 2.1 and has an initial focus on existing theoretical framework, created in previous literature. This knowledge is then drawn into theoretical conclusions that are tested. Finally conclusions are drawn based on the theoretical conclusions and the test results.²¹

Induction is presented in figure 2.2 and is initiated by existing knowledge from prior research. However, in comparison to deduction, an inductive research approach uses this knowledge when performing real life observations and evaluates the truthfulness. The result from these observations is then finalized in theoretical conclusions.²²

Abduction, visualized in figure 2.3, is the combined version of the two previous theoretical research approaches. The process of abduction is initiated with the theoretical knowledge and then transferred into observations of reality. In the next steps the theory is matched with the result from the previous steps and a new theory is suggested. Finally the conclusions are applied on the studied object.²³

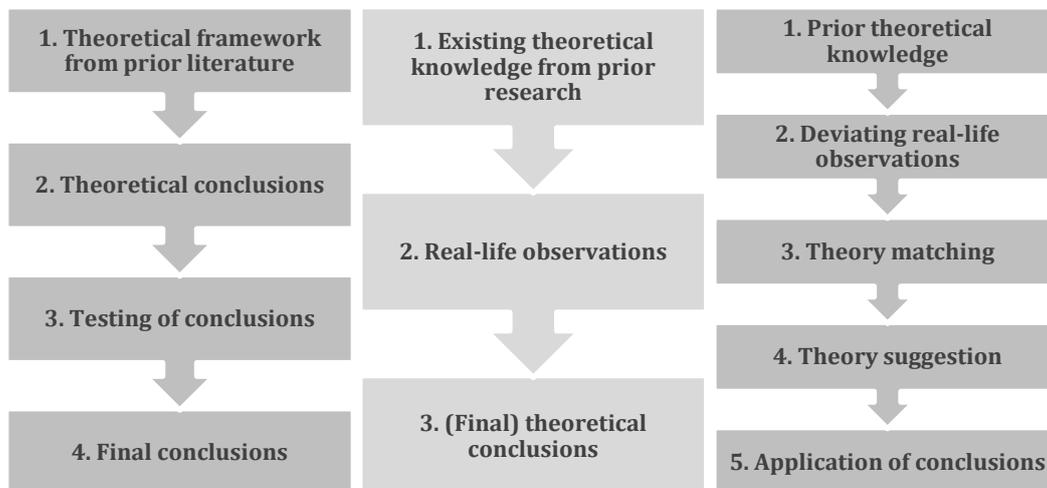


Figure 2.1; Deduction

Figure 2.2; Induction

Figure 2.3; Abduction

²⁰ Kovács & Spens, 2005

²¹ Ibid

²² Ibid

²³ Ibid

Theoretical Research Approach for the Thesis

The theoretical research approach that will be used in the thesis is abduction. To increase the understanding of the current state at Haldex and enable the development of the Value Stream Approach, collaboration between the theoretical framework and real-life observations will also be used, which all are typical characteristics for the abductive approach.

2.2 Qualitative and Quantitative Research

The two research strategies, qualitative and quantitative research, differ significantly from each other. When conducting a quantitative research the main goal is to provide a strictly objective description of the studied object, whereas the qualitative study gives a more subjective interpretation of the context and the studied objects. Another distinction between qualitative and quantitative data can be found in the characteristic of the collection of information. Qualitative data is primarily retrieved through descriptions, documents and semi- or unstructured interviews. Quantitative data consists of experiments, surveys and structured interviews with emphasizes on the measureable numbers.²⁴

The possibility to measure the result from a quantitative study simplifies the search for causing factors and enables conjunction analysis. Another advantage is based on the increased credibility of the research since the presentation of data can be in form of effective and easy understandable tables and diagrams. However, a criticism against this research strategy has been that not everything is measurable and by trying to measure certain phenomena not measurable results in a simplified picture of the reality. If not appropriate techniques for collecting data is used, the extensiveness of the material can result in a too complex structure to evaluate.²⁵

By using a qualitative research strategy with semi- or unstructured interviews, a more in-depth understanding of the different views and opinions of the individuals is created and can be achieved. Disadvantages with qualitative studies are the difficulty of ensuring the accuracy of the information and to cover enough sources of information to get a representative result. The quality of the result is also at risk, depending on the lack of standardized statistical procedures for managing and evaluating the data.²⁶

Qualitative Research for the Thesis

The development of the improved Haldex Way requires many semi- and unstructured interviews and observation which results in a lot of subjective input regarding the current structure. In addition, data collection will not include any measurable data and therefore a qualitative research strategy is suitable for the thesis.

²⁴ Runeson & Höst, 2009

²⁵ Denscombe, 2009

²⁶ Ibid

2.3 Research Designs

There are a number of research designs developed for different kinds of studies and problems. The most prominent ones are *case studies*, *desk studies*, *surveys*, *longitudinal studies* and *action research*.²⁷

A *case study* is based on an existing environment and experiences from an examination of a single case. It investigates a present phenomenon and highlights unique features of a specific case. The case study is especially interesting to perform when the boundaries are not clearly defined between the studied phenomenon and the real-life.²⁸ Archival data can be collected in a case study and refer to previous documents, organizational charts or earlier gathered measurements from the organization. The accuracy and validity of the archival data can often be confirmed through interviews. It is especially important to ensure the relevance and transferability of the retrieved data, to assure generalizability.²⁹

Desk studies are a form of secondary research, which means that the collection and processing of the data already is done and all the needed information is available, even though it was gathered for another purpose.³⁰ *Surveys* are conducted in form of questionnaires and structured interviews and are used for execution of comprehensive and detailed reviews and evaluations. This design is especially used within the social science when the data is collected from a cross section. Surveys are especially good when connection patterns should be identified.³¹

Longitudinal studies can be used to visualize changes and trends in the business. The research design is based on historical data to complement information about the current situation. Longitudinal studies are useful to understand developments in the organization. Hidden mechanisms and processes can be visualized, and important change patterns can be discovered. This creates an understanding for the decisions taken historically and facilitates the ones to come. However, because of other undocumented factors also having an impact on the change patterns it can be hard to exclusively draw conclusions based on this kind of research design.³²

The final research design is *action research*, where the observer has no limitations of interaction, on the contrary active participation is encouraged. An action research often involves changing processes in the organization and focus on the reality. In the initial phase of action research the problem is identified, followed by implementation and evaluation of the solution from an observed point of view.³³

²⁷ Frankel, et al., 2005

²⁸ Ibid

²⁹ Runeson & Höst, 2009

³⁰ Kotzab, 2005

³¹ Denscombe, 2009

³² Bryman & Bell, 2011

³³ Näslund, 2002

Research Design for the Thesis

The research design used in the thesis consists of a case study, desk research and longitudinal study. Case study is used to visualize the current state of Haldex Way, identify the problems and find the boundaries between the described theory and the experienced real-life. Desk research will be used to understand the theory behind Haldex Way and to investigate how decisions are made presently at Haldex. Longitudinal studies will have the same purpose as the desk research, but with the purpose of understanding historical decision points and development of support documents.

2.4 Methods for Data Collection

2.4.1 Primary Data

In order to ensure the reliability of the gathered data it is important to focus on the primary sources of information. Interviews and observations are two examples of sources for primary data.

Interviews

Interviews is a usual and recurrent technique for gathering data. Depending on the depth and degree of structure, interview can be of three different types; *unstructured interviews*, *semi-structured interviews* and *completely structured interviews*.

Unstructured interviews aim at creating a personal atmosphere to reveal and understand unspoken reflections and thoughts.³⁴ The unstructured interviews have also a more explorative purpose. The exact opposite to unstructured interviews are completely structured interviews used more for an explanatory purpose.³⁵ *Completely structured interviews* are characterized by specific questions and can be seen as a survey that is completed verbally instead of in written form. The step between the two kinds of interviews is the semi-structured version. *Semi-structured interviews* contain both specific questions and questions open for discussions. The comparability of the information obtained in these three types of interviews will decrease from the completely structured interviews to the unstructured interviews.³⁶

³⁴ Frankel, et al., 2005

³⁵ Höst, et al., 2006

³⁶ Frankel, et al., 2005

Interviews for the Thesis

In the thesis interviews will be used to collect data from different stakeholders in the Haldex organization, to create an overall view and understanding of the current situation. The interviews will mainly be semi-structured with an interview guide as guidance together with a recording machine for follow up. The interview guide will build on information gained on the content of the currently existing Haldex Way to understand and enable analysis of what content to include in the Value Stream Approach. There will also be some cases of unstructured interviews to more freely have discussions and affect the direction of the interviews so new perspectives can be found.

At the initial phase of the thesis interviews were held with employees at the Haldex site in Landskrona. Managers at different levels and from different processes were contacted and interviewed. The interviews with the managers enabled understanding of the way of working at Haldex and with Haldex Way. A steering committee was involved later on in the development phase with additional interviews and discussions specifically focusing on comments and feedback of the improved Haldex Way and the Value Stream Approach.

Selection of Study Group

The main selection of interviewees was chosen from Haldex organization. Employees especially working with the value stream processes constituted the sampling frame. The non-probability sampling method called "purposive sampling" was used. This implies that the result of the research is a biased sample and that it cannot be generalized for other organizations or recognized as representative for the whole Haldex organization.³⁷ However, the interviewees were carefully judged as relevant for the thesis and a probability sampling method was not an option for obtaining information since this would not have provided the relevant information.

Observations

Another technique to collect data is to use observations, where a phenomenon is studied. There are four different types of observations, depending on the degree of interaction and the cognizance of being observed.³⁸ The two extreme situations are the complete observer and the complete participant. The complete observer has a low interaction with the observed environment but the awareness of the attending observer is high. The complete participant has both a low degree of interaction with the observed situation, and the knowledge of existence within the observed environment is small.³⁹

³⁷ Bryman & Bell, 2003

³⁸ Höst, et al., 2006

³⁹ Frankel, et al., 2005

Observations for the Thesis

Observations are made during the entire research process. Many of observations will be related to how the current Haldex Way categories, tools and methods are used in a real production environment, and what in the use seen as good respectively bad, or not working so well.

At the initial part of the thesis internal education will be provided by Haldex in form of an introduction day at Haldex as well as briefings of Haldex Way by the supervisor at Haldex. The internal education is hard to categorize as either an interview or observation, but is defined as an observation since only few questions will be asked. Since the thesis will be located at Haldex in Landskrona the daily interaction will also influence the thesis and be a part of the techniques used to collect data, as a form of daily observation and interaction.

Feedback by Steering Committee

In addition to the interviews and observations several discussion took place with the steering committee at Haldex. Since the supervisor where located at the same site as the authors the discussions with him where on a more frequent basis whereas the discussions with the other change agents where more of a scheduled nature throughout the whole project. These discussions included both brain storming and argumentation for specific ideas for the improved framework or Value Stream Approach, as well as directions for the development. This provided a source of information that was directly linked to the work with improvements within Haldex entire organization and facilitated the decision making when issues and problems where faced.

2.4.2 Secondary Data

Secondary source of information is important to establish appropriate and required theoretical foundation to understand and address identified issues.⁴⁰

Literature Review

A literature review is used to gather data from already existing theory, relevant to the subject. The literature review focuses on specific topics and is used to analyze the existing data with the purpose of identifying gaps.⁴¹ A literature review constitutes the foundation and frame of reference, and enables the following parts to be underpinned by recognized views and statements. Because of the large quantity of available information, prioritization of available literature in the topic is necessary. This is facilitated when the problem and objective is clearly defined.⁴²

⁴⁰ Höst, et al., 2006

⁴¹ Ibid

⁴² Bryman & Bell, 2011

Literature Review for the Thesis

A literature review has been conducted throughout the thesis with research made in several academic areas. Several books have been found and studied by searching the Lund University library catalog Lovisa, and the main search engines for academic journals and articles has been the LibHub and the LUBsearch (Lund University library search). Examples of search topics and key search words are *lean, business excellence, change management, value stream, supply chain improvements, EFQM, performance measurements and key performance indicators*. Interesting articles has provided good reference lists that have been further examined. The literature review has acted as the foundation on which the development of the Value Stream Approach lies upon.

Additional Secondary Data for the Thesis

Since the thesis is located at Haldex production site in Landskrona, Haldex intranet will be available for data collection. Documents such as the current challenge template with information on requirements to improve in the Tier model will be used throughout the thesis. This information will facilitate the understanding of the current state and specifically for the categories of Haldex Way with content relevant to the value stream processes. Standards and guidelines for some of the Haldex Way tools will also be available on the intranet and used during the development work of the improved Haldex Way and the Value Stream Approach.

2.5 Credibility

2.5.1 Reliability

There are different approaches to secure the accuracy and quality of a research study. Reliability is one commonly used approach to secure the quality of the collected data and the analysis. The concept of reliability also refers to aligned measurements without dependence of time or measurements equipment. High reliability indicates small variations and consequent measurements or questionnaires. A high degree of consequence is preferred when for example conducting interviews to ensure the trustworthiness of the answers.⁴³

Reliability of the Thesis

Accuracy is an important part of the thesis and will be secured by having a reliable approach towards the development of the framework and the Value Stream Approach. It is preferred to conduct a thesis with high degree of reliability and this will to some extent be achieved by the established interview guide and the focus on a qualitative research, enabling reconnection to absent parts.

⁴³ Denscombe, 2009

2.5.2 Validity

Validity is an approach to secure true data and methods, reflecting the existing environment and covering important areas identified. Validity is important to ensure exact and correct information, to increase the credibility of the research and the conclusions reached. To ensure the validity in interviews some controls can be done, but it is often hard and perhaps even impossible to secure the information during and after interviews because of the personal emotions and experiences affecting the outcome. Some methods applicable to validate the information from interviews are to compare the obtained information with other sources. The interviewed person can be given access to written material from the interview to confirm both the participation and the information. Another way is to use reasonable thinking, to conclude whether the interviewee possesses the desired information or not.⁴⁴

Validity of the Thesis

The validity of the thesis will especially be secured during the interviews. The approach is to apply validity to ensure that the questions are asked in a way that makes it possible to retrieve the valid answers, not as a structured interview, rather to secure understanding between the questions asked and the answers obtained. This lies within the framework of conducting a well-structured interview guide with elaborated questions. Even though the interviews will be of unstructured or semi-structured characteristics the predetermined guideline of questions need to be thought through to secure the validity of the thesis. The validity of the literature review will also be examined, whether the authors of the books and articles and the content are trustworthy, authentic and representative for the subject.

2.5.3 Transferability

Transferability refers to the ability of applying the result on other situations. The main purpose of transferability is to adopt the result on similar activities from a general basis, rather than finding a unique result for the given and specific situation. Transferability demands a representative result adaptable to other environments and situations, a result possible to generalize.⁴⁵

Transferability of the thesis

Transferability is essential for the thesis. The development of the improved Haldex Way and the Value Stream Approach needs to be structured in a way so that it constitutes a foundation for the development of the remaining parts of the improved concept. The implementation will gradually take place at all the production sites at Haldex, why the developed framework and the Value Stream Approach need to be adaptable and transferable, for all Haldex sites worldwide.

⁴⁴ Denscombe, 2009

⁴⁵ Ibid

2.6 Research Process

The research process, visualized in figure 2.4, displays all important parts of the thesis, within the overall time frame. To be able to achieve the desired outcome, the initial step is to define and understand the problem and objective. This will enable formulation of delimitations for the thesis. A literature review will be initiated early to increase the understanding of the activities at Haldex and link this with the knowledge gained from theory. To continuously document the work and even out the work load of the thesis over time the content of the report for the thesis has been produced throughout the entire research process.

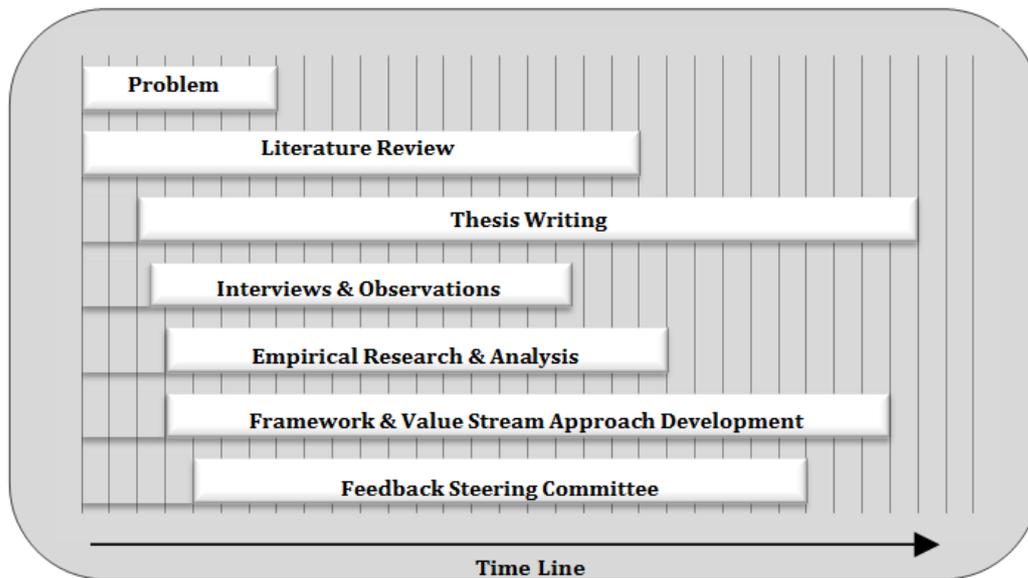


Figure 2.4; The Research Activities of the Thesis Process

Interviews and observations will be an important part of the research process, focusing on the existing Haldex Way as well as advantages and disadvantages currently experienced. Already at an early stage ideas and issues regarding value stream processes will be evaluated and examined in the empirical research process, described in more detail in the following section. Since the main deliverable to Haldex is the Value Stream Approach a lot of time will be spent on the development of the improved Haldex Way and the Value Stream Approach, where the framework needs to be established before fully focusing on the development of the Value Stream Approach. A steering committee, consisting of Haldex' change agent team, will be involved and consulted during the development of the framework and the Value Stream Approach to obtain valuable comments and feedback on the progression and development.

2.6.1 The Empirical Research and Analysis Process

The main objective of the thesis can be divided into two parts; the redesign of the Haldex way framework and the development of a Value Stream Approach to guide towards value stream result improvements. The empirical study and analysis of the current Haldex Way has been conducted through a four-step process, shown in figure 2.5.

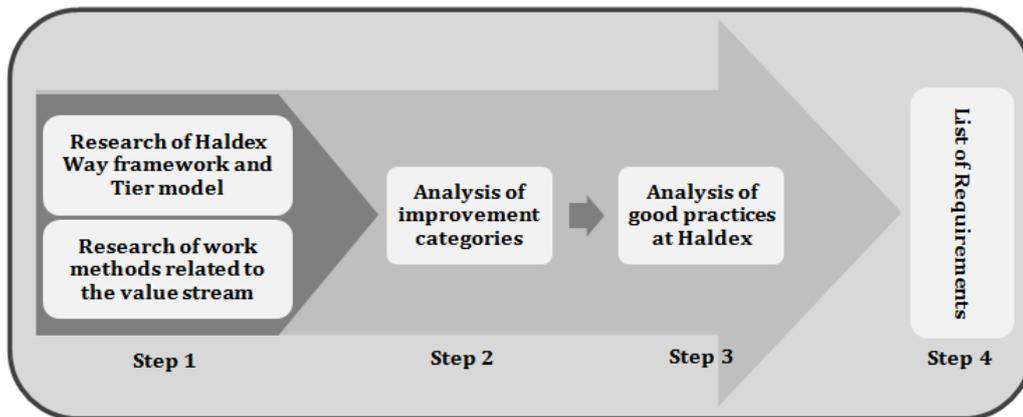


Figure 2.5; The Empirical Research and Analysis Process

Step one consists of two parallel processes, including research of the overall Haldex Way framework and Tier model, as well as identification of everyday work procedures related to the value stream processes. The following steps are together forming the analysis. In the analysis the material of interest for the Value Stream Approach and gaps in the current Tier model are identified. The information gathered through the first three steps then creates a list of requirements for the Value Stream Approach.

3 Frame of References

In this chapter the theory of lean will be presented, since it is the origin of Haldex Way. Further on business excellence will be described because of the incorporation and usage as a logic behind the improved Haldex Way. Change management will be examined due to the redesign of the current structure and for the ability to face a continuously changing market. To ensure the level of quality and reliability of the Value Stream Approach, theory specifically linked to value stream improvements are also introduced. Finally, the history of Haldex Way is described to give an understanding of the ongoing journey of improvements.

3.1 Lean

Lean originates from the Toyota Production System, TPS, which is a production philosophy that emerged after the Second World War. At that time, Ford was a successful car manufacturer with the development of mass production. However, because of the scarcity of resources in combination with small production volumes and many different models, mass production did not seem appropriate for Japanese manufacturers such as Toyota. When Toyota sent managers to the United States to study Ford and the mass production system they did not return impressed by the results. The mass production system led to overproduction and several defects both in machines and products, which were hidden because of the large quantity of material and the uneven flow in the production and inventory. Ford had at that time a large capital and an international market which made the waste in the production not as critical as for Toyota, facing the opposite conditions with little capital in a small market. Toyota therefore decided to incorporate the continuous material flow from the Ford production system, but instead of using the usual mass production introduce a single-piece flow to eliminate waste, continuously improve the processes and meet the demands of the customers. This was the foundation for the Toyota Production System and since it proved to be very successful for Toyota many western companies have tried to imitate and implement the same system and philosophy.⁴⁶

The expression lean was first introduced by Krafcik in 1988 to describe the Toyota Production System and had its breakthrough in 1990s when Womack, Jones and Roos released the book *The machine that changed the world*. Six years later Womack and Jones published *Lean thinking*, which proceeded with the examining of lean as a production philosophy with principles and tools. It also provided implementation guidelines on how to introduce lean as a mindset in the organization and how to become a lean enterprise.⁴⁷

⁴⁶ Liker, 2009

⁴⁷ Shah & Ward, 2007

Womack and Jones identified five principles of how to think and work with lean, summarized in the following points:

- Specify the *value* of the product to the customer.
- Visualize the *value stream* for each product.
- Create a *flow* of the value without interruptions.
- Let the customer *pull* and initiate the production.
- Compete against and towards *perfection*.

If these five lean principles are understood and linked together they will facilitate the implementation and maintenance of lean as a production philosophy.⁴⁸

3.1.1 Creating Value to the Customer

Within the lean concept one of the focus areas for improvements is waste reduction or *muda*, which is the Japanese word for waste and a commonly used lean term. Muda can be identified as providing the wrong product or service to a customer, or as everything that does not add value for the customer. Therefore tracking and tracing the operational activities and what value they are creating is essential.⁴⁹

The activities can be divided into three different categories; value-adding, non-value adding but necessary activities also called Type One muda, and finally non-value adding and unnecessary activities also called Type Two muda. In lean, reduction of non-value adding activities is an important part to reduce the waste, improve the overall efficiency and focus on producing what the customers want and when they want it.⁵⁰

The value-adding activities are visualized by understanding what deliverables the customer desires from the process, which also defines the value created to the customer. The non-value adding activities can be divided into seven types of waste which are presented below.

1. *Overproduction*: products produced even though they are not demanded, will create waste through excess inventory, inventory costs and transportation.
2. *Waiting*: an operator monitoring an automated machine, waiting for the following step in the process, or being out of work tasks because of material shortage, production delays or bottlenecks in the processing.
3. *Unnecessary transport*: transportation of work in process or material, inefficient transportation or transportation in and out of inventory or between processes.
4. *Over processing*: activities performed not add value to the final product, inefficient processing due to poor tools creating both

⁴⁸ Womack & Jones, 2003

⁴⁹ Ibid

⁵⁰ Ibid

unnecessary activities and defects, or products developed with higher quality than demanded.

5. *Excess inventory*: unnecessary amount of raw materials, work in process or finished goods, impedes visualization problems in production scheduling, delays from suppliers, defects and long set-up times.
6. *Unnecessary movement*: all types of movement during the process, such as searching and reaching for the right tools and components but also walking between the processes.
7. *Defects*: products with defects or demanding adjustments or reparation, all type of reparation, recast, replacement production and control are waste of handling, time and energy.

Overproduction is often seen as the worst type of waste since it triggers the other types. According to lean a large inventory is most commonly resulting in shortage of the actually required product. Lean is therefore focusing on producing what the customers demand at the right time.⁵¹

3.1.2 Visualization of the Value Stream

Another focus area of the lean concept is the value stream. The objective is to visualize the complete value stream for each product or product family and identify the waste in every work activity to enable further improvements.⁵² Womack and Jones define the value stream as:

*“We apply the term “value stream” to the entire set of activities running from raw material to finished product for a specific product and we seek to optimize the whole from the standpoint of the final customer (the ultimate customer of the good or service).”*⁵³

The definition indicates a need of visualizing the entire flow of products from supplier to customer, and demands an overall understanding of the whole organization and the flow of products in particular.

Standardization of the work activities is a lean technique used to improve the value stream and create stability in the processes. By standardizing the work the responsibilities for the employees will be clarified and the processes within the value stream will be more efficient and effective.⁵⁴

Visual control is another lean technique used to improve the visibility in the value stream, and refers to the visualization of different types of information. This could be done by using white boards or microbus displays showing the current state and need. The visualization of different work activities and processes provides the

⁵¹ Liker, 2009

⁵² Womack & Jones, 2003

⁵³ Ibid

⁵⁴ Spear & Bowen, 1999

employees with direct feedback in form of real-time updated information on the current situation. It also functions as an encouraging incentive for performance improvements as well as creating a working environment of involvement and creativeness.⁵⁵

3.1.3 Creating a Flow

There are three steps that need to be taken into consideration when improving and creating an even flow. The first step is to focus on one product in the value stream and follow the path through the entire value stream process. The second step is to change and rethink the organizational structure from the functional way of thinking into a more process-oriented way of thinking. The third step involves more specific tasks and tools required to implement to reduce and eliminate backflows and wastes of all types.⁵⁶

Takt time is a lean technique often used to improve the flow.⁵⁷ The concept is equivalent to the pace of the production and is built on synchronization of the production rate and the sales rate towards customers. For a given production line the takt time is calculated as the effective working time available per shift divided by the customer demand per shift. The takt time will then give an indication of what pace to keep in the production to smooth the operations and avoid over- and underproduction by producing according to the takt time calculations and the actual demand.⁵⁸

Another important lean technique used to improve the flow is reduction of the changeover times. By minimizing the changeover time the possibility of having a large product variety will improve. There will be a reduced need of different machines for different products when the changeover times are decreased and different products can be produced in the same machine. With a good operations planning and efficient changeovers considerable savings can be made and the possibilities of satisfying varying customer demands will increase.⁵⁹

3.1.4 Using the Pull Concept

In lean, the customer is in focus and the overall objective is to provide value to the customer by only produce what is requested. This is the reason for the fourth lean principle, pull, which is based on the idea of the operations to be triggered by internal and external customers before any work is initiated. The flow can be improved by daily ordering based on firm orders from customers instead of monthly or weekly ordering on forecasts. This is typical for pull systems and a principle in lean thinking.

A pull system has many advantages; one of them is reduction of the amount of work in progress (WIP) and the cycle time by introducing limitations in the operations

⁵⁵ Womack & Jones, 1996

⁵⁶ Womack & Jones, 2003

⁵⁷ Ibid

⁵⁸ Hopp & Spearman, 2008

⁵⁹ Holweg, 2007

with *kanban* cards, where the amount of kanban cards represents the number of WIP. The production flow can be smoothed by controlling the number of kanban cards and only producing when the customer demands a product. A properly managed pull system can also result in improved quality and reduced costs due to improvement work performed closer to the customer with continuous feedback on the product quality, and also contributed to by the focus on demand and not forecasts, which enables lower inventory levels.⁶⁰

3.1.5 Believing in Perfection

The final lean principle is about striving towards perfection and never being satisfied. It is important to not see lean as a project but as a way of living and breathing, a philosophy without an end. There is always something that can be done better.

Continuous improvement is one important part of the lean philosophy and to be able to implement lean within an organization an awareness of the further work must be established. This is also linked to the important success factor of an implementation not becoming just a project but a philosophy and a way of thinking and working. Womack and Jones describe continuous improvement in a thoughtful way:

“Perfection is like infinity. Trying to envision it (and to get there) is actually impossible, but the effort to do so provides inspiration and direction essential to making progress along the path.”⁶¹

Hopp and Spearman have identified three factors as keys to success in any improvement project and can be summarized as:⁶²

- Measurement alignment.
- Integration of information into existing ERP system.
- Training of employees.

Measurement alignment refers to alignment of strategic KPI's and understanding of process KPI's impact on the strategic KPI's. Alignment also need to be achieved on how to perform and conduct the measuring process as well as establishing standardized procedures and calculations to ensure consistency of the results obtained. *Standardization* is an important factor to ensure measurement alignment and by having a standardized foundation it will enable for continuous improvements. Applied specifically to the value stream, measurement alignment refers to inventory days and delivery performance as strategic KPI's having appropriate process KPI's defined, but also securing the numbers being measured in the same way and calculated with the same numbers and parameters.⁶³

⁶⁰ Hopp & Spearman, 2004

⁶¹ Womack & Jones, 2003

⁶² Hopp & Spearman, 2008

⁶³ Ibid

Integration of information into existing ERP system refers to as a large extent as possible integrate all information automatically into the ERP system to facilitate the handling of information and avoid human errors. The KPI's need to be updated in the ERP system to be accurate and add any value by providing precise and correct information. For the value stream results it refers to integration of the strategic KPI's inventory days and delivery performance and the respectively process KPI's affecting the value stream and possible to include in the ERP system.⁶⁴

The third factor regards *training of the employees* and will facilitate continuous improvements by securing the knowledge and competence within the company and the team. People responsible for different tasks in the value stream should apply the train the trainer perspective to increase and secure the own knowledge and teaching skills. The internal competence will also be developed and help during improvement works.⁶⁵

3.2 Business Excellence

In the beginning of the 1940s, Deming and Juran established quality as a concept and a way of evaluating, assuring and improving the performance of the business. The mindset and way of working with quality and continuous improvements were first adopted by the Japanese manufacturers and it took several decades before western companies responded to the enhanced level of quality and performance of the Japanese competitors.⁶⁶

It was not until the eighties, when the quality movement emerged in the west through the understanding of quality as a strategic differentiator, the real competition began. The first Total Quality Management (TQM) approaches and models were then created.⁶⁷ These models focused on improving the efficiency and effectiveness of the company's processes by developing and improving the skills and competencies of the people. In addition they addressed important issues such as customer satisfaction, benchmarking, continuous improvement, learning and teamwork.⁶⁸

⁶⁴ Hopp & Spearman, 2008

⁶⁵ Ibid

⁶⁶ Adebajo & Mann, 2007

⁶⁷ Porter & Tanner, 2004

⁶⁸ Ibid

Because of the extensiveness and the absence of guiding theory for the TQM models many organizational implementations were unsuccessful. There was a great need for a better structure and increased level of usability.⁶⁹ To meet this need and increasing the demand for the stakeholders and shareholders, the first business excellence model (BEM) and quality award were developed.⁷⁰ Adebajo defines business excellence as:

*“Excellence in strategies, business practices, and stakeholder-related performance results that have been validated by assessments using proven business excellence models.”*⁷¹

The main purpose and objective with the BEMs is to utilize well-known and successful business principles combined with implementing a systems thinking and align multiple organizational improvement activities to achieve world-class performance.⁷² Most of the BEMs can trace the roots to the early TQM models. However, some of the main differences between the TQM models and the BEMs are that the BEMs are more holistic in the approach and the improvement activities can be completely integrated in the organization’s processes. The TQM models are developed more as ‘bolt-on’ quality programs, whereas the BEMs instead try to create a behavior and a standardized way of working.⁷³

There are several BEMs currently existing on the market, however, since the European Foundation for Quality Management’s (EFQM) excellence model has been used for guidance and inspiration during the development of the improved Haldex Way, a more detailed description of this will follow.

3.2.1 The EFQM Excellence Model

The EFQM history began in 1988 when fourteen CEOs joined forces to develop a management tool for improving the competitiveness of the European organizations and close the performance gap towards the American and Japanese markets.⁷⁴ The idea with the EFQM model is the applicability for every type and size of an organization, and it is irrelevant whether it is in the public, private or voluntary sector.⁷⁵

There are three integrated components, together forming a coherent system and the overall EFQM concept; the underlying principles of excellence, the framework of the model and the RADAR logic.⁷⁶

⁶⁹ Chiles & Choi, 2000

⁷⁰ Porter & Tanner, 2004

⁷¹ Mohammad, et al., 2011

⁷² Ibid

⁷³ Porter & Tanner, 2004

⁷⁴ EFQM, 2013

⁷⁵ Adebajo & Mann, 2007

⁷⁶ EFQM, 2010

The Underlying Principles of Excellence

The underlying principles of EFQM form the essential foundation for achieving lasting organizational excellence and can be seen as a common language for the senior management or the attributes describing an excellent culture. A brief explanation of the meaning of these principles is adopted from EFQM and presented below:⁷⁷

- *Adding Value for Customers:* Excellent organizations consistently add value for customers by understanding, anticipating and fulfilling needs, expectations and opportunities.
- *Creating a Sustainable Future:* Excellent organizations have a positive impact on the world around them by enhancing their performance whilst simultaneously advancing the economic, environmental and social conditions within the communities they touch.
- *Developing Organizational Capability:* Excellent organizations enhance their capabilities by effectively managing change within and beyond the organizational boundaries.
- *Harnessing Creativity & Innovation:* Excellent organizations generate increased value and levels of performance through continual improvement and systematic innovation by harnessing the creativity of their stakeholders.
- *Leading with Vision, Inspiration & Integrity:* Excellent organizations have leaders who shape the future and make it happen, acting as role models for its values and ethics.
- *Managing with Agility:* Excellent organizations are widely recognized for their ability to identify and respond effectively and efficiently to opportunities and threats.
- *Succeeding through the Talent of People:* Excellent organizations value their people and create a culture of empowerment for the achievement of both organizational and personal goals.
- *Sustaining Outstanding Results:* Excellent organizations achieve sustained outstanding results that meet both the short and long term needs of all their stakeholders, within the context of their operating environment.

Both the principles *adding value for customers* and *succeeding through the talent of people* have clear links to two of Haldex Way's core values, customer first and respect for the individual. The remaining six principles are to some extent fitted in the third core value, passion for excellence.

⁷⁷ EFQM, 2010

The Framework of the EFQM Model

The framework of the EFQM excellence model, visualized in figure 3.1, is based on nine different criteria, grouped into two categories, enablers and results. There are five enablers including *leadership, people, strategy, partnership and resources*, and *processes, products and services*. The remaining four result criteria are *people results, customer results, society results* and *key results (or business results)*.⁷⁸

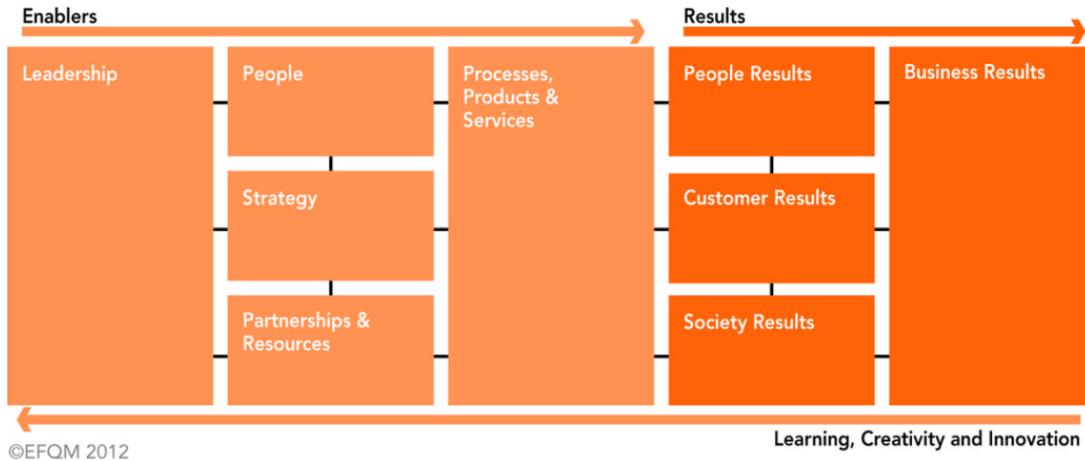


Figure 3.1; THE EFQM Excellence Model

The enablers are related to the processes, structure and means of the company, whereas the results are linked to the performance aspects. The general idea behind the EFQM model is for the results to drive and be directed by the enablers.⁷⁹

The RADAR Logic

The RADAR logic is presented in figure 3.2 and provides a structured framework used for recognition and assessment of both procedures and performance. The intention with the never-ending loop is to encourage the organization to continuously improve the operations and processes.⁸⁰

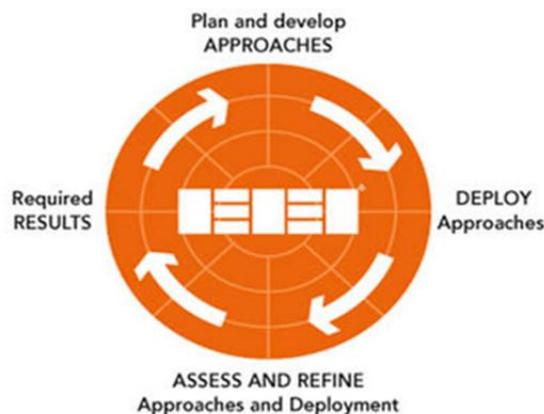


Figure 3.2; The RADAR Logic

⁷⁸ EFQM, 2010

⁷⁹ Asif, et al., 2011

⁸⁰ EFQM, 2010

The logic is built on four different steps; *results, approaches, deployment, and assess and refine*. Initially the required results need to be determined to create a coherent view of what the objectives of the business are. The second step is to define the tactic course of action by developing a set of sound and integrated approaches to achieve the required results. The third step is the realization of actions and the systematic deployment of the planned approaches to achieve successfully implementation throughout the organization. Finally assessments considering the efficiency and effectiveness of the approaches and the deployment are done combined with refinements and adjustments for continuous improvements.⁸¹

3.3 Change Management

Creating an agile and competitive approach enables the company to adapt when the context, opportunities and challenges change, generating a high-performing and successful business.⁸² The continuous work with improvements and adaptations requires a corporate awareness of the importance of change management and how to incorporate it in the daily activities. To understand change management the concept change must be further discussed and explained.

3.3.1 Understanding Change

Understanding and defining change is a difficult task since there are numerous and varying definitions of the concept. It is important to realize that it is an interdisciplinary theory without clearly defined boundaries. A way of explaining the difficulty with defining change was stated by Dawson as:

“There can never be a universal theory of organizational change, as change involves a movement to some future state that comprises a context and time that remain unknown.”⁸³

Many have argued for a classification of the change will clarify the purpose and improve the result of the change efforts.⁸⁴ A classification framework, described by Hughes (2006)⁸⁵, which enables a structured way of defining the change is based on a number of questions; *what, why, who* and *how*.

Some of the main benefits that have been recognized when making a classification of the change is that clearer communication between the people involved is achieved, dominant paradigms in groups or organizations are discovered, strategic issues are more easily dealt with and finally change agents are provided with a structured tool for reflection.⁸⁶

⁸¹ EFQM, 2010

⁸² Mohrman & Lawler, 2012

⁸³ Hughes, 2006

⁸⁴ Ibid

⁸⁵ Ibid

⁸⁶ Ibid

Drivers for Change

Another important part to understand is how the external and internal organizational environment affects the organization and drives the change. It is these contextual changes forcing and pushing companies to change. The external contextual factors stretch from a general perspective, such as changes in the economy, politics, legislation or socio-cultural changes, to more immediate factors, such as changes in competitors strategies, increased level of competition and supplier quality. Internal factors driving change are human resources, the administrative structure, the products or services, the technology and the history and culture.⁸⁷

3.3.2 Three Approaches to Change Management

There are three major theoretical foundations on which the change management concept lies upon; *the Individual Perspective school, the Group Dynamics school and the Open Systems school.* ⁸⁸ All of these perspectives; the individuals, the groups and the organization play a part in the process of change but it is the leaders having the onerous task of achieving the objectives and making everything happen.⁸⁹ To do this, it is important to understand all of these perspectives and how they interact with each other.

The Individual Perspective School

To successfully implement a change in an organization it is important to realize the central role of the individuals. Without the support and motivation on the individual level, change efforts are likely to fail. Choi (2011) states that far too many leaders underestimate the importance of understanding the individual change process leading to unsuccessful implementations.⁹⁰

There are four approaches to individual change; *the behavioral, the cognitive, the psychodynamic and the humanistic approach,* all shown in figure 3.3.⁹¹

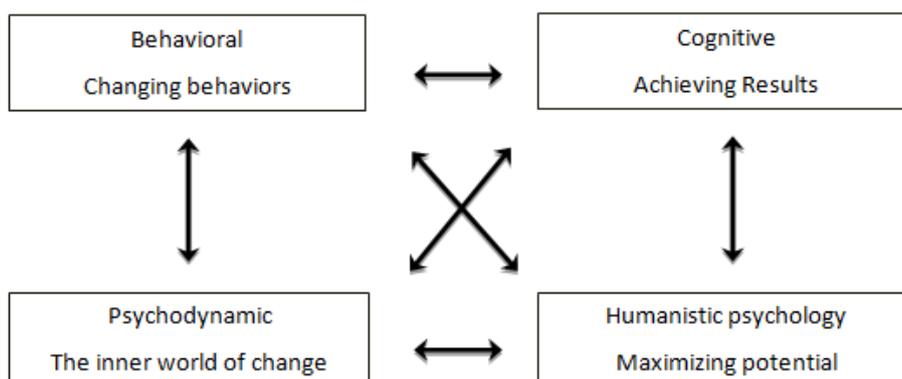


Figure 3.3; The Four Approaches to Individual Change

⁸⁷ Hughes, 2006

⁸⁸ Burnes, 2009

⁸⁹ Cameron & Green, 2009

⁹⁰ Choi, 2011

⁹¹ Cameron & Green, 2009

The Behavioral approach originates from how individuals interact with the environment and how rewards and punishments can affect and change the behavior of an individual. There are many examples showing that if a behavior is rewarded it is also likely to be repeated, but if it is ignored or punished it tends not to.⁹²

The Cognitive approach is based on the behaviorist theory, but with the belief that individuals are acting in a certain manner depending on how they are experiencing and thinking in a situation and not how they are responding to an external stimuli. If the internal thought processes of an individual are changed the reaction and response to a situation will differ.⁹³

The Psychodynamic approach is based on the idea of humans experiencing different internal psychological stages when going through a change. This is especially important for managers to understand when outlining different kinds of change projects. The origin of the idea came from a research study made on terminally ill patients who faced a very difficult message. However, even though the context and level of seriousness is very different, the individuals facing changes within an organization will go through the same change process of five stages; *Denial, Anger, Bargaining, Depression and Acceptance*.⁹⁴

The Humanistic approach combines parts from the three previous approaches but at the same time develops an additional mindset. Both the fundamental human needs and path to personal growth are addressed in this approach. The needs are described by Maslow's pyramid, stating the hierarchy of needs to be satisfied as; *physiological, safety, love and belonging, self-esteem and self-actualization*. The path to personal growth is about understanding the journey a person goes through life.⁹⁵

The Group Dynamics School

To make changes in organizations it is crucial to understand how people are affected by others and how they interact in teams. To further describe this interaction the term team must be defined. Hughes (2006) defines team as:

*"A team consists of a distinguishable set of people (1) who interact with each other dynamically, interdependently, and adaptively, (2) who work toward a common and valued goal, and (3) who each have specific roles or functions to perform."*⁹⁶

The group dynamic school highlights the forces, tensions and symbolic interactions forming a group or team. The behavior of the individual is seen as a result of the continuous adaptation needed to function within the boundaries of the team. The

⁹² Burnes, 2009

⁹³ Cameron & Green, 2009

⁹⁴ Ibid

⁹⁵ Ibid

⁹⁶ Hughes, 2006

main focus should instead be put on influencing and changing the group's *norms*, *roles* and *values*.⁹⁷

Norms can be both implicit and explicit, where the former is the informal and unwritten rules of a team everyone might not be consciously aware of. These norms define the atmosphere, establish specific behavioral expectations on the people within the group and in some way give a hint on how other people in the group will behave. The explicit norms are the written and formal norms which everyone knows about. However, it is the implicit norms often playing the vital part of the group dynamic and actions.⁹⁸

The *roles* of the individuals within a team can be described as how the team or the different individuals are expected to behave and interact with each other and the environment. Roles can have many titles and are formally defined by work descriptions and performance targets. If the roles are not clearly defined, the team will be lacking in structure and coherence, which in the end will lead to bad performance and uncertainty of achievement of the required results.⁹⁹

Values are the third important factor when influencing a group behavior. It is the values of a group determining what is right and wrong. The values are harder to determine than the previous factors since they almost always exist without a conscious awareness among the group members. Even though they cannot be formulated it is very important to be aware of them when changes in patterns and behaviors of a group are being made.¹⁰⁰

The Open Systems School

By adopting the perspective of the open systems school the main focus is changes in the entire organization. This perspective is basically a process oriented view of seeing things. The supporting processes are systematically described and evaluated, to understand and determine how to improve the performance and the functioning of the organization. The meaning of the systems being open is that they are affected by both the external environment as well as the internal factors of the system, therefore if changes are made on one of the sub-systems or supporting processes it will result in a chain reaction traveling to the other parts, which in extension also will affect the external environment. The main objective and purpose with this approach is to create an overall synergy and focus on the overall performance of all the processes of the organization. This is achieved by establishing a good coordinated structure with clearly defined interdependencies, together striving towards a common goal.¹⁰¹

⁹⁷ Burnes, 2009

⁹⁸ Hughes, 2006

⁹⁹ Burnes, 2009

¹⁰⁰ Ibid

¹⁰¹ Ibid

3.3.3 Planned and Emergent Change

There are two different ways describing how changes appear, in a planned or emergent manner. The difference between the two approaches is that the planned approach advocates a sequential perspective where change is conducted in loops through projects with a start and finish line, while for the emergent approach the main objective is to build an organization continuously adapting and changing. By looking at change from these perspectives different approaches on how to make successful changes has been developed. ¹⁰²

Theories on the Planned Approach

One of the most prominent and used theory of the planned change approach is the one created by Lewin, based on a three-step model of change. The model, presented in figure 3.4, is based on the concept of organizations tending to remain or return to the initial steady stage when change measures are faced. This means that a shift from one steady stage to another requires actions to be made intentionally and motivationally combined with embedding the new and ending stage within every level of the organization.¹⁰³



Figure 3.4; The Three Step Model of Change

However, to understand and work with the three-step model Lewin's concept of the force field within an organization must be described, see figure 3.5. The force field analysis is a way of recognizing the driving and restraining forces towards change which gives a holistic view of the initial picture. The basic idea is to be able to successfully make changes the driving forces must be greater than the restraining forces. There are two ways to go about; either try to add to or strengthen the driving forces or reduce the restraining ones.¹⁰⁴

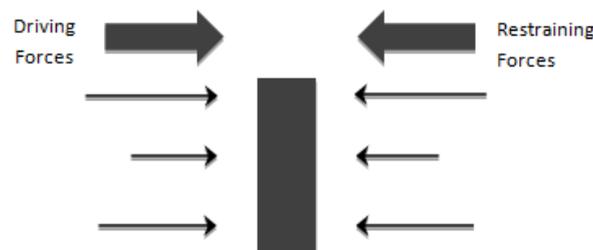


Figure 3.5; The Force Field Analysis

¹⁰² Burnes, 2009

¹⁰³ Ibid

¹⁰⁴ Cameron & Green, 2009

The force field analysis is a part and a prerequisite for step one, *unfreezing*, in the three-step model. This step aims at defining the current state, bring the driving and resisting factors to the surface and visualizing the desired end state. The second step, *moving*, concerns the actions needed to move towards a more desired behavior. This requires both involvement and participation from everyone in the organization. The third and final step is *refreezing*, focusing on establishment of new routines and ways of behaving together with rewarding the successful results.¹⁰⁵

Another approach on how to make successful changes, in a planned and sequential fashion, is presented in an eight step process by Kotter, see figure 3.6. These steps are presented from a managerial perspective and the main recurring factors for an efficient and successful leader is the ability to communicate and develop visions to inspire others.¹⁰⁶

The first four steps concern creating a positive attitude and behavior towards the change, encouraging questioning of the present conditions. The following two steps, step five and six, are established ways to reach the objectives and the final steps, the seventh and eighth step, are anchoring the changes in the corporate culture. Several steps can be worked on at the same time but it is crucial to progress through all of the eight steps to create a solid foundation for the work and finally consolidate the changes.¹⁰⁷

¹⁰⁵ Cameron & Green, 2009

¹⁰⁶ Kotter, 1998

¹⁰⁷ Ibid

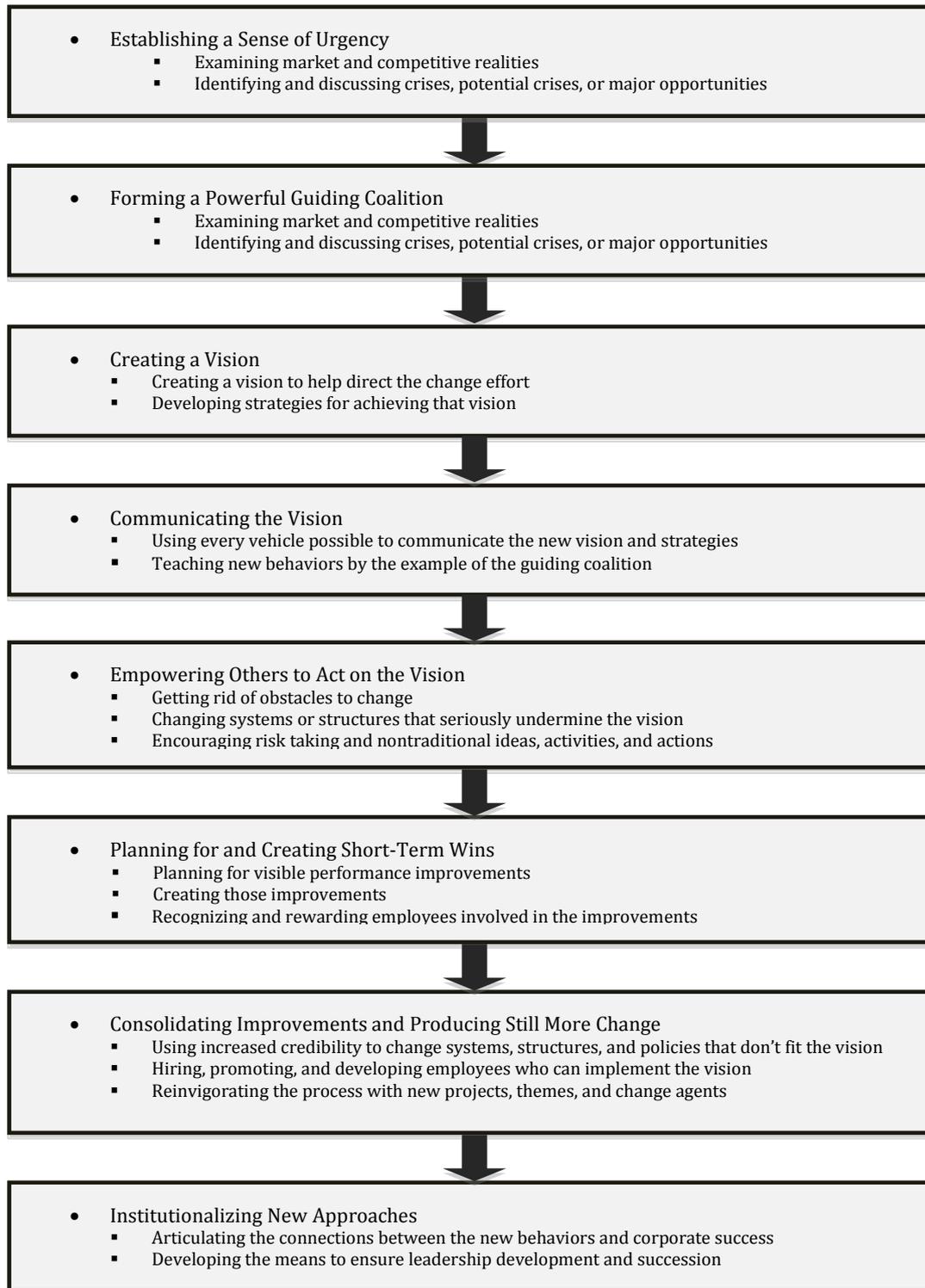


Figure 3.6. Kotter's Eight Step Process for Successful Change

The Emergent Approach

The advocates of the emergent theory are many but the views on what emergent change is and how to approach changes vary. The major similarity between the proponents is the strong rejection of the planned approach. One definition of change is:

“Change is as a continuous, dynamic and contested process that emerges in an unpredictable and unplanned fashion.”¹⁰⁸

Even though these theorists argue about the definition and the absence for a universal and general way of how to approach change, Burnes (2009) mentions five main factors consistently mentioned in the literature and presented in figure 3.7.¹⁰⁹

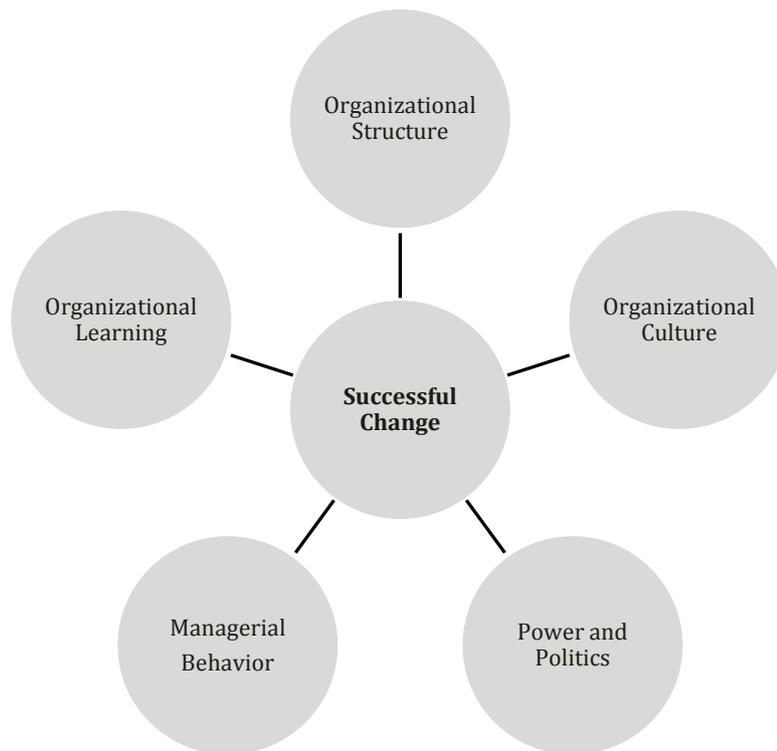


Figure 3.7; The Determinants of Successful Change

The Organizational Structure describes the overall hierarchy; who is in charge, how people relate to each other and if it is a rigid or flexible organizational structure. These factors will determine where the main driving forces will be and if the structure will ease or complicate the facilitation for change. The preferred and main view is that a flat and flexible structure is more responsive and adaptable to change and will more efficiently tackle difficulties in the process.¹¹⁰

Organizational Culture is one of the fundamental parts in organizations and is vital to create an understanding for the culture to make changes. The culture is deeply imbedded in the organization and to make changes differing from traditions and

¹⁰⁸ Burnes, 2009

¹⁰⁹ Ibid

¹¹⁰ Ibid

unwritten rules are hard. A way to avoid this problem is to establish a culture of change within the organization, meaning that change is imbedded in the daily work and way of doing things.¹¹¹

Power and Politics focus on the need for support on every level in the organization and the importance of a common language and vision, attracting a broad audience. These two will build a consensus about what needs to be done and establish a feeling of urgency driving the change forward.¹¹²

The Managerial Behavior and the role of managers are seen from a different perspective when adopting the emergent approach. Instead of the traditional view of managers who direct and control, the main role is to involve, participate and facilitate the change by coaching and gathering cross functional teams, identifying the possibilities for improvements and needs for change.¹¹³

Organizational Learning is the final factor, crucial to understand to learn from mistakes and achieve successful changes. The idea is to encourage commitment on the individual level to analyze, evaluate and draw conclusions from the experiences and knowledge which then can be transferred and translated into organizational learning. It is important to distinguish organizational learning from the learning organization. The connection between the concepts can be described as:

“Organizational Learning describes attempts by organizations to become learning organizations by promoting learning in a conscious, systematic and synergistic fashion that involves everyone in the organization. A learning organization is the highest state of organizational learning, in which an organization has achieved the ability to transform itself continuously through the development and involvement of all its members.”¹¹⁴

Learning can be achieved in many ways. Two commonly mentioned ways are the single and double loop learning. The *single loop learning* is about identifying and detecting errors and mistakes, and then learning by correcting them. This type of learning is the easiest and often the most common practice in companies because it does not require any further investigation about the root-causes.¹¹⁵

The *double loop learning* however, is about questioning the procedures and structure of how things are done to create a deeper understanding, and encouraging and implementing new, more effective behaviors.¹¹⁶

¹¹¹ Burnes, 2009

¹¹² Ibid

¹¹³ Ibid

¹¹⁴ Ibid

¹¹⁵ Argyris & Schön, 1995

¹¹⁶ Ibid

3.4 Theory for Supply Chain Improvements

This part is specifically focused on theory applicable for improvements of the supply chain and value stream performance, as well as reference material for the development of the Value Stream Approach.

3.4.1 Process Management

In today's heavily pressured and rapidly changing environment of the vehicle industry, the need for companies to be flexible and adaptable is greater than ever.¹¹⁷ The evolvment and unpredictability of the global economy combined with increased utilizing of information technologies and larger corporate network structures has created a complexity demanding a multicultural environment with both cross-functional knowledge and thinking. Therefore a process orientated organization with management of the business processes is an essential factor for success.¹¹⁸

Process Visualization

To create an understanding for the processes within the organization visualization is important. The most commonly used tool for the visualization of processes, is the process map. A process map is used to provide an easily understood explanation of the interrelations between and within the departments of the organization and shows how the processes create value for the customer. By determining and visualizing which processes actually exists forms a common view of how the organization works. Process maps have several applications and can be used for various reasons, both as a tool to create understanding of the process as well as a basis for improvement and redesign of the current state.¹¹⁹

Process mapping can be conducted in several ways with different levels of detail. To be able to develop a process map it is important to understand the fundamental components of the process, seen in figure 3.8.¹²⁰

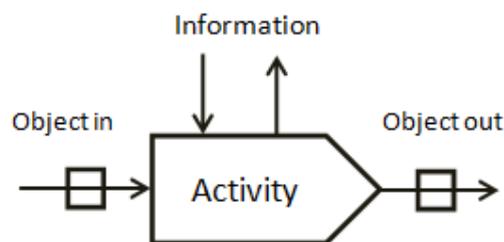


Figure 3.8; The Fundamental Components of the Process

¹¹⁷ Mohrman & Lawler, 2012

¹¹⁸ Becker, et al., 2003

¹¹⁹ Ibid

¹²⁰ Ibid

The *object in* is the trigger, initiating the process, without an object in the process will not start. The *activity* is the operations processing and refining the object in or additional input. *Resources* are the means necessary to perform the activity. *Information in* respectively *out* is what supports or directs the process. Finally the *object out* is the result of the transformation and is equal to the object in for the following process.

To facilitate the development and structure of the processes a classification is made. There are several names on the different levels of processes but the most common ones are *core processes*, *support or sub processes* and *management processes*. In figure 3.9, the different levels of the process are visualized. By identifying the different types of processes the focus of improvement activities can be delegated more appropriately to the needs.¹²¹

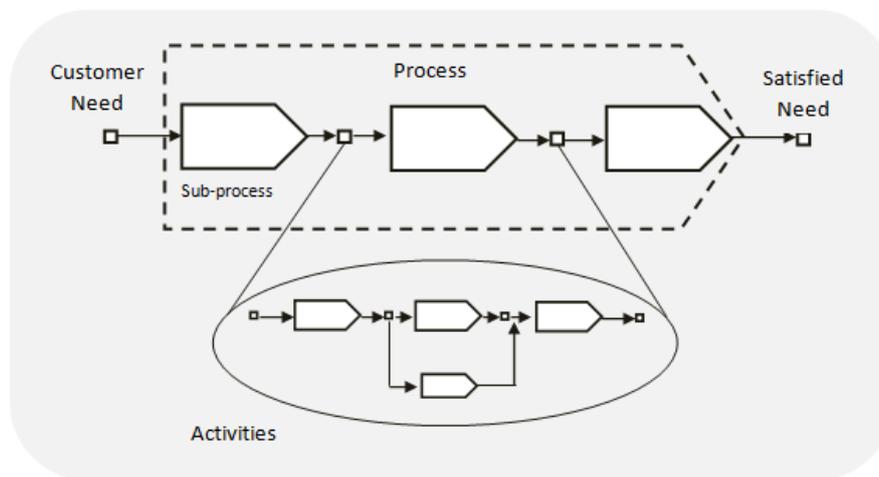


Figure 3.9; Process and Sub-process

Core processes are directly contributing to the creation of value for the customer. They are often cross-functional and involve several departments. Core processes are only initiated at specific events, such as initiation of production when a customer order is received.¹²²

Support processes do not add value, instead the main purpose is to facilitate and enhance the performance of the core processes. These processes can be both event and plan initiated, which means that the maintenance of production can be initiated either when brake-downs occurs or on a regularly scheduled basis.¹²³

Management processes are often plan initiated and has an indirect effect on the value added to the customer. An example of a management process is the development of strategies for the organization.¹²⁴

¹²¹ Harmon, 2007

¹²² Jonsson & Mattsson, 2005

¹²³ Ibid

¹²⁴ Ibid

Ljungberg and Larsson have suggested an eight-step approach for the development of a process map. Before the initiating the actual mapping an important success factor has been stated to be gathering of a cross-functional team, representing every part of the process. In this way no perspectives will be missed.

1. *Define the purpose of the mapping* to be able to set the right scope with *appropriate start and end points*. A clear understanding of the process' purpose and objective before the mapping starts will facilitate and improve the result.
2. Conduct a *brainstorming session* where all possible activities are found. These could then be written on post-it notes or similar to build a puzzle of the process.
3. *Arrange the activities* in an order everyone agrees upon.
4. *Merge* the activities representing and describing the same thing or *add* activities that are missing.
5. *Define an object in and out* for every activity to link them together into a process. This step is often skipped which results in maps with a lot of activities stacked on top of each other without a defined input and output. By defining the object in and out a greater understanding is created combined with an assurance of the logic of the map.
6. *Assure that all activities fit together* by looking at the objects of the different activities. In this way missing activities can be identified.
7. *Determine a general level of detail*, control that all activities are on the same level and define suitable names for each activity. The level of detail is often hard to decide upon, but by considering the purpose of the process mapping an easier decision can be taken.
8. *Refine the map* until a satisfying description of the process has been obtained. Final adjustments of the map are important to make an accurate description of the process.

3.4.2 Sales and Operations Planning

The main objective for Sales and Operation Planning (S&OP) is to optimally match and balance the supply and demand from a planning perspective. It is a cross-functional process involving and aligning managers from both the demand and supply side, including; sales, marketing, customer service, manufacturing, operations, logistics, supply chain and procurement.¹²⁵ In good times capacity limits turn demand forecasts into constrained forecasts, whereas in bad times the capacities are adjusted to meet the variations in the demand. One of the commonly mentioned problems, stated by Goodfellow, is that the sales are planned in dollars and the production is planned in units. The overall budget reflects what the CEO wants to see, and to really close the loop all these plans should be agreed upon.¹²⁶

¹²⁵ Lapede, 2007

¹²⁶ Goodfellow, 2012

In figure 3.10 the relationship between the S&OP, the business plan and other types of plans is visualized.¹²⁷

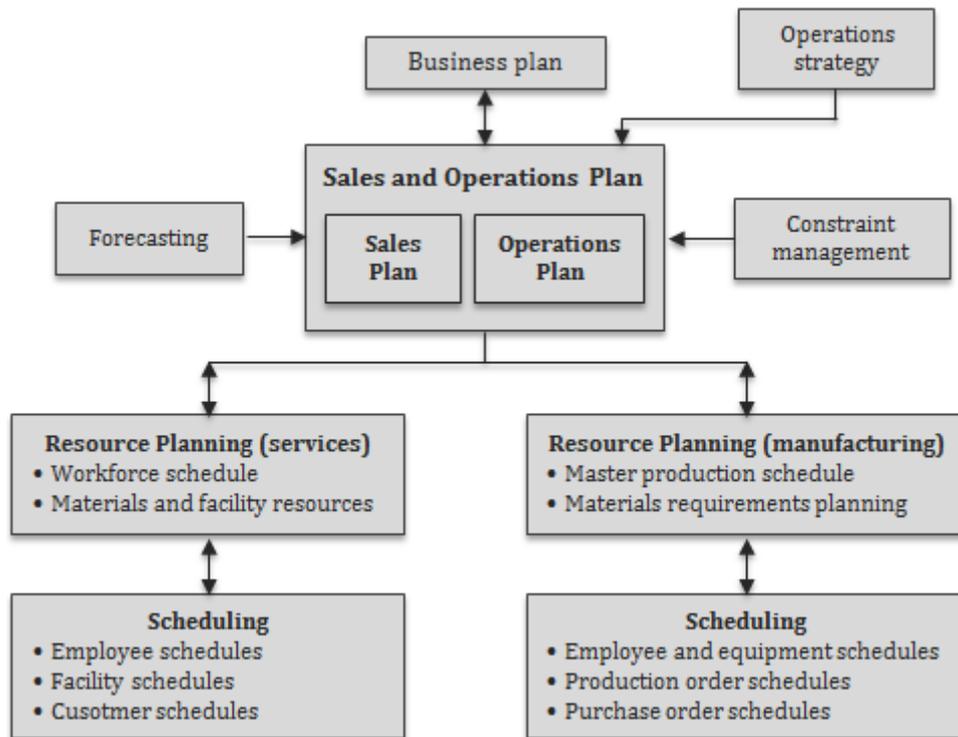


Figure 3.10; Relationship between the Different Levels of Plans

A business plan is a financial assessment of the future for an organization and is compiled with the combined expectations of the firm's operations, finance sales and marketing managers. It is also the framework for the sales and operations plan, which is the aggregated plan for all production and human resources. From the sales and operations plan the next level of planning is the resource planning. In this level appropriate workforce schedules are developed as well as determination of material requirements. The final level is scheduling, addressing day-to-day issues, such as specific schedules for employees and customers.¹²⁸

Since the S&OP is a cross-functional process, almost every part of the organization is involved. Figure 3.11 shows a detailed description of the required input to the S&OP process.¹²⁹

¹²⁷ Krajewski, et al., 2012

¹²⁸ Ibid

¹²⁹ Ibid

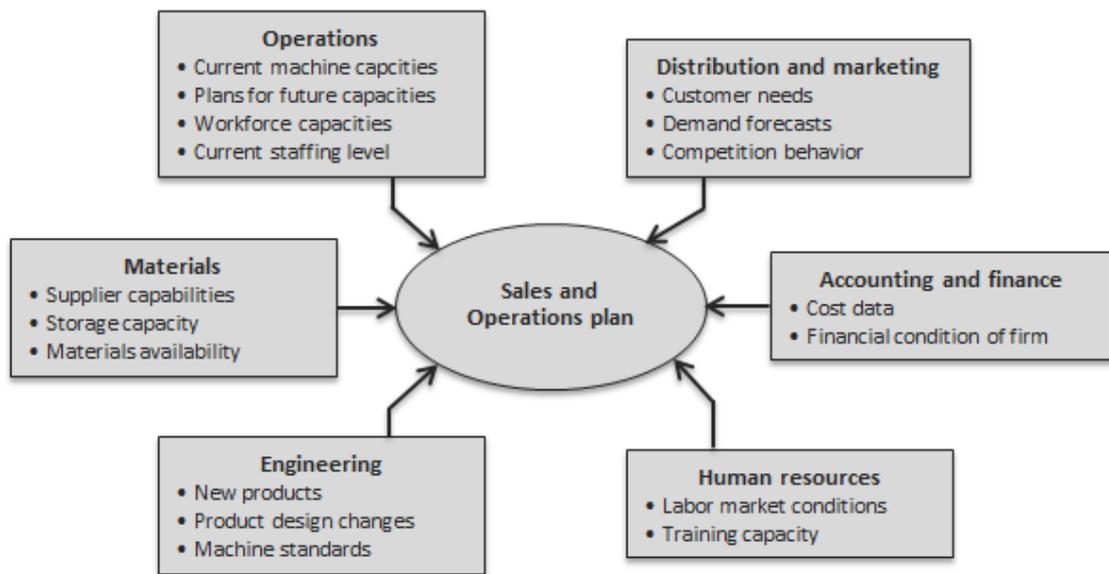


Figure 3.11; Input to the S&OP

All inputs must be explained and motivated, to ensure the reliability and feasibility of the plan. This coordination will also help and facilitate the synchronization of the flow of material and information through the organization.¹³⁰

The S&OP process can be described in five steps, shown in figure 3.12; *portfolio planning, demand planning phase, supply and resource planning phase, integration, reconciliation and finance, and executive S&OP meeting.*¹³¹

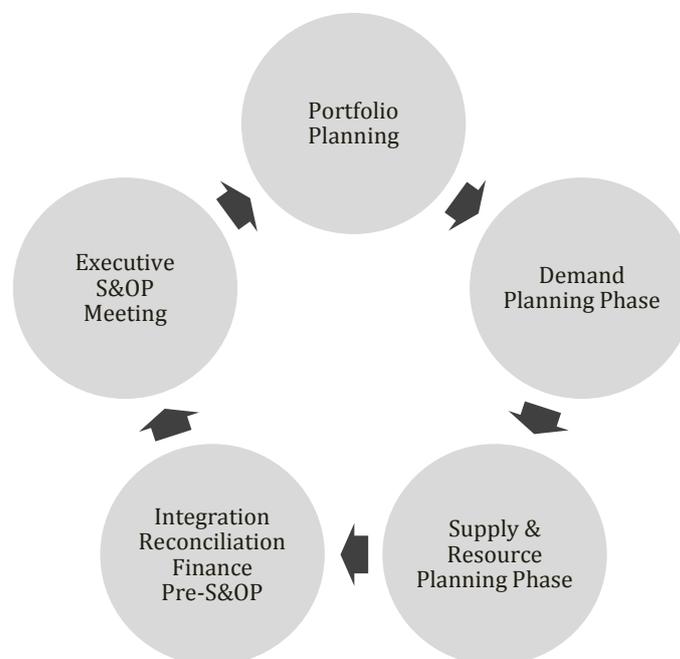


Figure 3.12. The Five Step S&OP Process

¹³⁰ Krajewski, et al., 2012

¹³¹ Goodfellow, 2012

The first step is the *portfolio planning*, this step can either be very prominent and time consuming or it can play a minor role in the process. It considers the introduction of new products as well as the replacement phase and spare demand for outdated products. A typical time to complete this step is at the end of the month so that the sales and marketing have the necessary information for the following step.¹³²

Demand planning phase is the second step with the main objective of creating an aligned demand plan, unconstrained and agreed upon. An unconstrained demand means that it is not the sales and marketing people's job to ensure the required capacity to exist; this question must be answered by the supply side of the organization. It is essential for this plan to be based on the actual demand, since forecasting otherwise will be completely useless for the supply side. By the end of each succeeding month the history of demands or sophisticated forecasting software can be used to generate a forecast for the future demand. Although it is important to remember that this will be a rough estimation since the environment most probably will not look exactly the same in the future.¹³³

Supply and resource planning phase refers to manufacturing processes, being the suppliers in the organization and required to deliver the requested demand always on time. The created supply plans have always followed three strategies; *chase*, *level* and *compromise*. *Chase* is when the manufacturer tries to follow the demand plan as close as possible, *level* is when the production is evened out to an average demand for a certain number of months, and *compromise* is a compromise between the two previous. The main objective is to create a balance between the supply and demand, which depends on which strategy that is used. There is always a possibility that the demand plan is not achievable. In that case adjustments to the resources, such as overtime or additional personnel, have to be considered.¹³⁴

The fourth step is *integration, reconciliation and finance* and is a meeting where all managers from the whole organization reconcile the differences from the previous steps and develop an approved presented as a recommendation to the senior management. The main objective in this step is to look at the balance of the supply and demand for every product family.¹³⁵

The final step for the S&OP process is the *executive S&OP meeting*. This is the step where decisions are taken. The financial numbers must be reviewed and unresolved conflicts need to be solved. All recommendations are considered, then translated into agreed actions.¹³⁶

¹³² Goodfellow, 2012

¹³³ Ibid

¹³⁴ Ibid

¹³⁵ Ibid

¹³⁶ Ibid

3.4.3 Supplier and Customer Communication

Introducing the concept of bullwhip effect will clarify why information sharing with the suppliers and customers are of importance. The bullwhip effect can be defined as the effect occurring when changes in customer demand causes companies in the supply chain to increase the orders to meet the new demand. The effect will usually flow upstream and leads to tremendous inefficiencies in form of excessive inventories, poor customer service and capacity plans, as well as missed production schedules. The bullwhip effect can be pictured as in figure 3.13 and visualizes how the information errors gradually escalate.¹³⁷

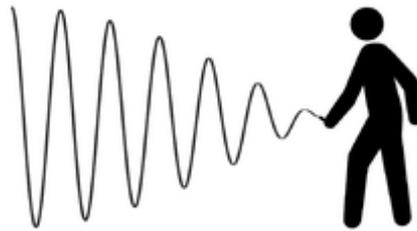


Figure 3.13; The Bullwhip Effect

There are different causes for the bullwhip effect and especially four have been identified to be¹³⁸:

- Demand forecast updating.
- Order batching.
- Price fluctuations.
- Shortage gaming.

As well as four primary causes have been found for the bullwhip effect, one initiative linked to each of the causes have been identified to eliminate the bullwhip-inducing behavior; *information sharing, channel alignment, price stabilization, and discouragement of shortage gaming.*¹³⁹

Information sharing is especially used as an initiative for the demand forecast updating cause. Point-of-sales (POS) data is initially involved as the foundation for information sharing and will be used to forecast the demand. Different techniques can be used to share information but the most commonly used system is EDI (electronic data interchange), requiring all involved parties to have an interface in place enabling for communication with the different ERP or MRP systems. Information sharing is becoming more and more common and the trend is pointing at a future with direct linkage to the sources of the POS data.¹⁴⁰

¹³⁷ Nahmias, 2009

¹³⁸ Ibid

¹³⁹ Ibid

¹⁴⁰ Ibid

Channel alignment refers to coordination of different efforts and can be done by pricing, transportation, inventory planning, or ownership with suppliers and customers. Channel alignment is used to avoid order batching and instead involve evaluation of optimal order quantities. Pricing is one way of coordinating efforts to align channels and avoid order batching. Pricing is usually affecting the order batching, by having fixed costs motivating order batching. Reduction of the fixed costs will therefore enable for smaller and calculated optimal order sizes. Fixed cost is to a large extent dependent on the paperwork in the ordering process and by introducing technologies such as EDI, the fixed costs can be reduced and the total cost structure and order quantity can be revealed and analyzed. Transportation is another factor affecting the order batching and refers to the economies of scale perceived with order batching since it is cheaper to order a full truckload than a partial one on a per-unit basis. To reduce the motivation of order batching transportation consolidation from multiple suppliers and outsourcing of the logistics processes can be used as initiatives to reduce the bullwhip-inducing behavior.¹⁴¹

Price stabilization can be used as an initiative to eliminate price fluctuations and refers to avoidance of price promotions motivating buying in large batches and storing items for future use. By agreeing on stable pricing with suppliers and customers, the sales pattern will have less variation and the risk of bullwhip-inducing behavior will reduce.¹⁴²

Discouragement of shortage gaming is an initiative to reduce the shortage gaming occurring when huge demand is expected and more is ordered from the supplier. If the expected demand is not there, then all products will end up as inventory and no more orders will be put because of the built-up inventory. To avoid shortage gaming and minimizing excessive orders, allocation can to some extent be done on past sales records rather than on orders to reduce the tendency of customers exaggerating orders.¹⁴³

¹⁴¹ Nahmias, 2009

¹⁴² Ibid

¹⁴³ Ibid

3.4.4 ABC Inventory Classification

ABC classification is one way of maintaining and controlling the inventory by ranking the articles, most commonly with the measurement of annual dollar volume of sales. Ranking and ordering the articles based on this measurement and graphing the cumulative dollar volume will give an exponentially increasing curve visualized in figure 3.14, usually called the Pareto curve.¹⁴⁴

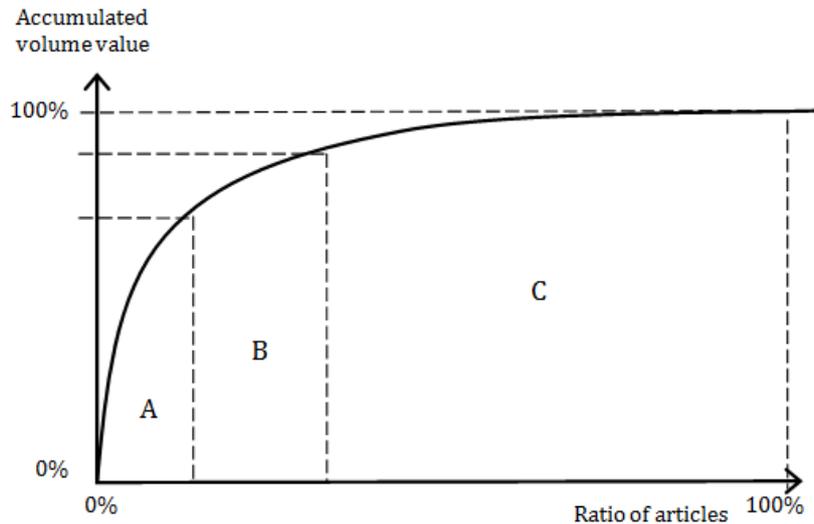


Figure 3.14; ABC Pareto Illustration Curve

The Pareto principle is also called the 80-20 rule, where 20 percent of the articles often represent 80 percent of the volume value or the turnover and these 20 percent of the articles are therefore called A items. A items have the highest resource attention with often reviewed inventory levels and carrying a high service level. B items are typically the following 30 percent of the articles and accounts for the next 15 percent of the volume value, with moderate resource attention and not such close scrutiny. Finally C items are the remaining 50 percent of the articles and account for the final 5 percent of the volume value, with low resource attention, resulting in infrequent large order quantities. Classifying the articles according to the ABC classification will facilitate the managing of material and the ordering process, since different articles will be given different amount of attention.¹⁴⁵

¹⁴⁴ Hopp & Spearman, 2008

¹⁴⁵ Nahmias, 2009

3.5 Haldex Way History

Haldex Way originates from the lean philosophy with a strong focus on customer satisfaction and world-class production and distribution. The history of Haldex Way, displayed in figure 3.15, begins with the development and release of the first Haldex Way booklet just after the millennium change.¹⁴⁶

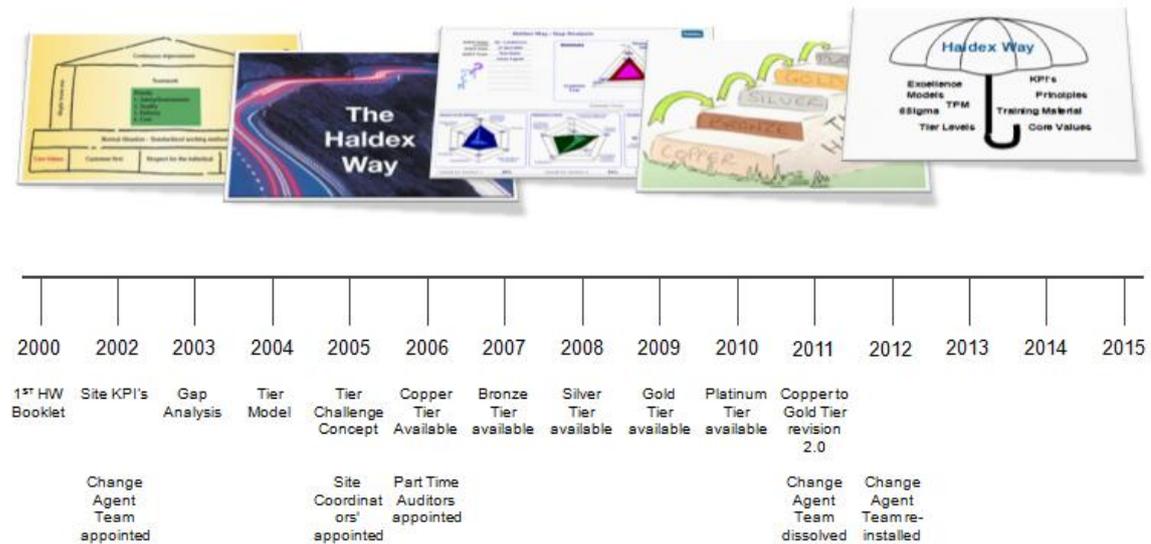


Figure 3.15. Haldex Way History

The following years were both site KPI's and Gap analysis introduced as a start to align the measurements and identify weaknesses. Between 2004 and 2010 the Haldex Way Tier model and challenge were presented as a tool for step wise progression and assessment. In 2010 a revision of the Tier levels and the challenge template were conducted through a master thesis. Later the same year, the split of Haldex was confirmed, dissolving the change agent team and holding back further developments of the Haldex Way concept. In 2012 the change agent team was reinstalled and the ideas of an improved Haldex Way began to evolve.¹⁴⁷

¹⁴⁶ Haldex Way Introduction, 2013

¹⁴⁷ Ibid

3.5.1 Previous Improvements of Haldex Way

The Haldex Way Tier model were first developed with four levels; Copper, Bronze, Silver and Gold. All steps in the Tier model were added gradually, to enable the sites to evolve further, face new challenges and achieve improved results. However, this way of developing the Tier levels resulted in different performance levels, tools and principles being included as progression through the levels were made. A consequence to this was therefore a lack of consistency between the steps making it hard for the employees to see the entire picture. To resolve the problems, improve the structure of the model, meet the demands from the sites and progressing from the existing final gold level, a Master Thesis were conducted. The purpose of Master Thesis were to review the existing Haldex Way, redesign an improved and consistent Tier model and further develop a fifth step, the Platinum Level.¹⁴⁸

The Master Thesis resulted in an improved Tier model currently used throughout the organization. The improved model gathered and reduced the number of categories with similar content in the different levels from a total of 33 categories, with 11 in the Copper level, 14 in the Bronze level, 19 in the Silver level and 15 in the Gold level, to 13 categories consistent in the entire model, shown in table 3.1. This created a coherent platform, clearer guidelines and an improved understanding of Haldex Way. It also enabled faster progression through the levels of the Tier model, because of the transparency between the Tier levels.¹⁴⁹

KPIs	Copper	Bronze	Silver	Gold
Haldex Way Values	Copper	Bronze	Silver	Gold
Teamwork	Copper	Bronze	Silver	Gold
Visualization	Copper	Bronze	Silver	Gold
Standardization	Copper	Bronze	Silver	Gold
Takt & Balanced Flow	Copper	Bronze	Silver	Gold
Consumption control	Copper	Bronze	Silver	Gold
5S	Copper	Bronze	Silver	Gold
TPM	Copper	Bronze	Silver	Gold
Mapping	Copper	Bronze	Silver	Gold
Set-up & Change Over	Copper	Bronze	Silver	Gold
Error-proofing	Copper	Bronze	Silver	Gold
6 Sigma	Copper	Bronze	Silver	Gold

Table 3.1; The Current Haldex Way Tier Level Structure

¹⁴⁸ Eckersten & Hörberg, 2010

¹⁴⁹ Ibid

When the master thesis was initiated the Platinum level had recently been added to the Tier model, but the content of the level was not totally in line with the rest of the Tier model. Adding the Platinum level meant a need to improve the business even further than in the Gold level. Therefore a Business Excellence model was integrated as the way of working in the Platinum level. An additional objective for the previous Master Thesis was therefore also to integrate Business Excellence into a new Haldex Way Tier model, shown in figure 3.16.¹⁵⁰

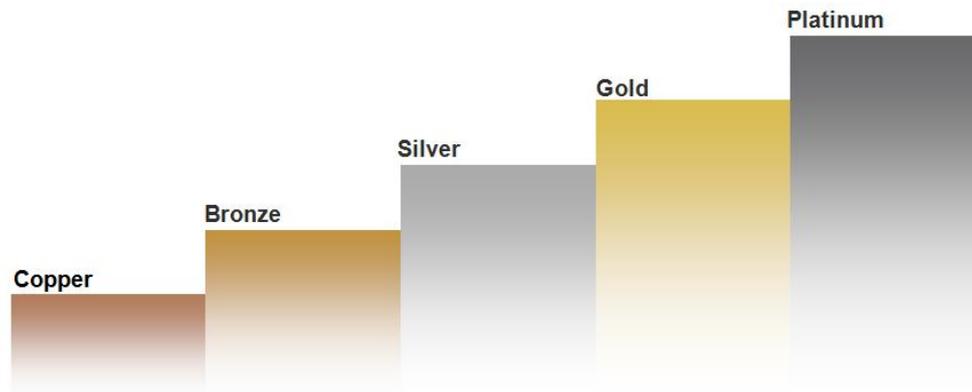


Figure 3.16; The Current Haldex Way Tier Model

¹⁵⁰ Eckersten & Hörberg, 2010

4 Empirics

This chapter represents the empirical research, which is the first step in the empirical research and analysis process. It is divided into two main parts; the research of Haldex Way framework and Tier model as well as research of work methods related to the value stream processes.

4.1 Haldex Way

The foundation for Haldex' success lies in the ability to satisfy the customer needs, gain advantages with the knowledge and expertise of the employees as well as continuously trying to exceed the shareholders' expectations. These cornerstones and beliefs of Haldex' organization are formed into the three core values:¹⁵¹

- *Customer First*
- *Respect for the Individual*
- *Passion for Excellence*

The core values of Haldex pervade the entire organization and are the foundation for all work and improvement activities. In figure 4.1 the Haldex Way house is presented, illustrating how the core values and standardized work methods combined with teamwork, consumption controlled processes and the quality assurance concept "right from me" intends to lead to continuous improvements.¹⁵²

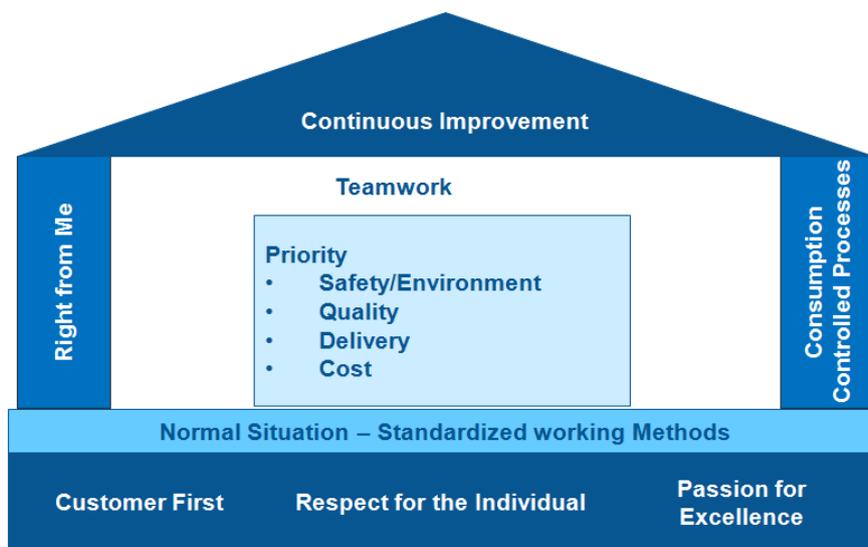


Figure 4.1; The Haldex Way House

¹⁵¹ Haldex Official Presentation, 2013

¹⁵² Haldex Way Introduction, 2013

Haldex Way is the means and not a target in itself with structures, tools and methods of how to improve the performance. By incorporate and focus on the core values a strong, adaptable and competitive brand is built. The management and improvement system aim at:¹⁵³

- Improving cost-efficiency and increasing productivity.
- Business & Operational Excellence through the entire value stream.
- World class production, supported by Leadership Excellence
- A culture of continuous improvements.

In addition to the core values there are currently ten principles included in Haldex Way, together describing how Haldex will achieve world-class performance:¹⁵⁴

Standardization is the foundation for improvement activities. The best procedure for every work task is identified, standardized and then used every time it is performed.

Takt time reflects Haldex sales and current market situation and provides a pulse to the organization. The takt time is defined as the available time divided by the customer demand. Takt time is the control of the daily output at each local site.

Leveled flow is used to create an efficient flow by dividing the products equal during the available time.

Balanced flow creates an even flow through the processes by an equal allocation of activities.

Consumption control is a pull method, which means that the production is not initiated until a customer demand is received. The processes are linked without any delays with different kinds of signal systems and visual buffer stocks.

Visualization is a tool to provide all employees with easy displayed information regarding the current status and other important topics linked to the work place.

Right from me considers control methods ensuring no errors are passed on further down in the value stream. In addition this principle is about the assurance that the tools, methods and instructions are adequate for the work tasks.

Real-time updates are important to minimize delays in the processes. If deviations are identified at an early stage there is increased chance finding the cause and taking the appropriate actions.

Go and see refers to a committing and participating leadership. By continuously involving the managers in the processes a greater understanding for the people and the problems are created.

¹⁵³ Haldex Way Introduction, 2013

¹⁵⁴ Dantoft, et al., 2006

Continuous improvements are essential for every successful organization. When the standardized normal state is established the working methods will continuously be challenged.

4.2 Haldex Way Tier Model

The Haldex Way Tier model is a framework for business improvements, assessments and deployment as well as a tool for step wise progression towards excellence. There are currently five steps in the Tier model; copper, bronze, silver, gold and platinum. Each of the four first steps includes thirteen categories.

The Tier model is used to establish common ambition levels and provide guidance for change from a prescriptive deployment of lean, in the first four steps, to a generic excellence model in the final step. By dividing the deployment into a step wise implementation enables the level of improvement work to vary across the different parts and sites of the organization. However, an alignment of the objectives and targets is created since these are fixed for each step in the model.

To progress from one Tier level to another a challenge must be successfully undertaken. In order to do so the specific requirements for the step must be achieved. A challenge is the Haldex term for audit but with a more inspiring and positive tone to it. The decision about when a challenge should be done is determined by the management at the local site together with the change agent team conducting the challenge. In table 4.1 a general description of the focus and what is required for the different Tier levels are presented.¹⁵⁵

¹⁵⁵ Haldex Way Introduction 2013

	<i>Copper</i>	<i>Bronze</i>	<i>Silver</i>	<i>Gold</i>	<i>Platinum</i>
Method	Tools and principles are introduced and training has commenced.	Employees are trained in the tools and principles of Haldex Way.	Deeper training in all Haldex Way tools is conducted. Specialist training where needed.	The organization excels in Haldex Way tools and principles in the day-to-day business.	
Implementation	Education of core values and principles are in place.	Understanding of core values and principles by all employees.	All work is conducted in line with the core values and principles.	The core values and principles are a part of the business' paradigm.	
Results	Tools and principles have been tried in pilot areas.	Tools and principles are in use in pilot areas and introduced in more areas.	Tools and principles are in place site-wide and are used daily for improvement activities.	Continuous improvement work is conducted as a part of everyday business using the Haldex Way tools and principles.	
	Basic understanding of tools and principles exist.	Signs of considerable improvements are seen in pilot areas that have used Haldex Way methodology.	Major improvement results site-wide by using Haldex Way are evident.	Very high performing organization in the Haldex Way (KPIs and methodology).	
	Core processes are mapped, defined and understood.	Core processes are stable and measured.	Core processes are managed and improvements are made.	Core processes are optimized and all improvement activities are understood.	
	Focus on introducing the tools and principles.	Focus on using the tools and principles.	Focus on achieving real improvement results.	Focus on high performance.	
					B U S I N E S S E X C E L L E N C E

Table 4.1. The Tier Level Requirements and Challenge Structure

Table 4.1 shows how the focus of the content and requirements for the first four Tier levels change and evolve from a generic to a more specific level. However, in the last step, Platinum, the introduction of a business excellence model makes the objectives more generic again. The result of the previous redesign aligned the different Tier levels to a much more consistent structure and made this change not as prominent as before, which is visualized as the dashed line in figure 4.2. ¹⁵⁶

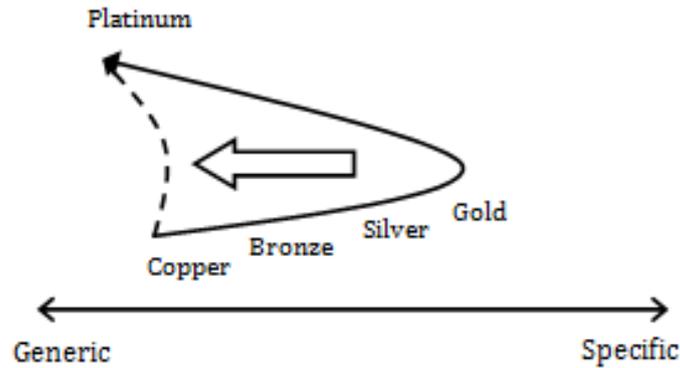


Figure 4.2. The Generic/Specific Split of the Current Haldex Way

This change was made to create more applicability in other areas than the production. By making the criteria and evidence in the challenges more generic the possibility of integrating the model into other areas, such as the administrative and R&D, was improved. However, the figure is in some sense a bit misleading. There is still an issue with applicability in other areas than production and distribution sites. It is also a quite large gap between some of the steps in the Tier model and the change from Gold Tier to business excellence requires a large effort. This issue must be addressed in the improved Haldex Way.

4.3 The Categories of the Tier Model

The 13 categories in the Haldex Way Tier model include guidelines, tools, methods, procedures and values for improving the performance of the organization. As progression through the levels of the Tier model the more comprehensive the categories get. Following is a brief description of the content of the categories presented, without splitting them between the Tier levels. This is done mainly because of two reasons; the first being that the improved Haldex Way will not be designed in the same way as the current one. Secondly, since the number of categories is equal for every Tier levels the largest difference between them are the increased level of detail and amount of tools and methods included. All information has been gained through Haldex intranet or during the interviews and observations conducted throughout the Master Thesis. An important notice is that the 6 sigma category introduced with the last redesign of Haldex Way has been replaced with a problem solving category.

¹⁵⁶ Eckersten & Hörberg, 2010

- **KPI's:** Includes guidelines on how to report and use strategic and process KPI's. The chosen process KPI's should be suitable and relevant for the purpose, and linked to both the site specific and the overall organizational strategy. They should be visualized and reviewed regularly in meetings. Causes for positive and negative trends in performance are analyzed with appropriate actions as a result.
- **Haldex Way Values:** Involves Haldex Employee Engagement Survey (HEES), employee development plans and training matrix. Training of tools methods and values and principles are scheduled regularly. The management should regularly communicate, inform, follow up and link KPI trends and results to the strategy.
- **Teamwork:** Introduces cross-functional teams to enhance understanding and communication across functions. Haldex Lean Daily Management System (LDMS) with standard agenda, status and action list is used for daily meetings. The gap analysis is used to identify and close existing gaps and training are conducted with focus on application to improve the processes and tool utilization.
- **Visualization:** Includes LDMS with meeting minutes for every meeting and communication boards for visualizing and communicating the results and track progression in specific tools such as 5S and TPM. It also introduces the visualization of work instructions and Haldex Floor Marking Standard to visualize the structure of each facility.
- **Standardization:** Focuses on standardizing the format of working procedures and templates such as, agenda for teams, improvement tools such as 5s and Gap analysis, and process and value stream maps. In addition the core competencies and critical process features are identified and documented for each area of the business to always ensure a high performance level. Advanced Product Quality Planning (APQP) is used as the project management model for new products and processes as well as the development of these.
- **Takt & Balanced Flow:** Introduces the concepts Takt time and Balanced flow and ensures that everyone is aware of the meaning with them. The Takt time is calculated accordingly to customer requirements and visualized on real time updated displays. The production lines are balanced with the use of Haldex way tools such as value stream mapping and process mapping.
- **Consumption Control:** Includes information and guidelines about different pull methods such as; Kanban, min/max levels or two-bin systems which signals when to initiate production. These methods are used to minimize the waste and improve the flow through the supply chain.
- **5S:** Presents the Haldex 5S standard for improving the structure, order and cleanliness. Improvement plans are developed and

regularly followed up on and audited. Safety issues are also incorporated in this category to minimize the accidents and enhance the overall safety.

- **TPM:** Consists of the procedures, standards and tools necessary for Total Productive Maintenance (TPM). The Overall Equipment Effectiveness (OEE) is calculated with updated constants such as; cycle and set up time, and trends over 6 and 12 months are tracked and visualized. TPM progress is also tracked and visualized. Haldex Process Stability standard with pareto analysis is used to minimize the losses in the operations. Cause and action lists are developed and followed up on.
- **Mapping:** Introduces process mapping and value stream mapping as a tool for continuous process improvement and optimization, and visualization of a future desired state. The maps are regularly updated and linked with improvement plans.
- **Set-up & Change Over:** Systematic analysis of the set up and change over's, and when to use the Single-Minute Exchange of Die (SMED) methodology. Process KPI's for set up and change over's are used to measure, control and track the time and actions spent during the activity. Documentation of the improvements is compiled.
- **Error-proofing:** Focuses on pro-active identification of opportunities for poka yoke. It involves the development and implementation of error-proofing tools and methods to eliminate deviations and link certain customer concerns with specific errors. Contingency plans and corrective actions are developed and taken for all customer concerns.
- **Problem Solving:** Includes problem solving teams with use of tools such as; tracking charts, pareto charts, fishbone diagrams and process maps with value add vs. non-value add identified. Corrective actions are analyzed and tracked and sent to the Quality council to assure the elimination of reoccurrence. In order to foresee quality issues and problems there are existing procedures for the development and update of control plans and work instructions for the; Design Failure Modes and Effects Analysis (DFMEA), and the; Production Failure Modes and Effects Analysis (PFMEA).

4.3.1 The Prescriptive Level of Haldex Way

In the current Haldex Way categories the way of communicating the content changes as progression through the Tier levels is made. The copper level is prescriptive in its way of presenting the tools and methods to create an initial direction and a consistent way of working with Haldex Way. The later steps however, are fairly non-prescriptive since it is important, when a knowledge base already exists, to let the people working with the processes choose where the efforts are needed. This has been the case in all versions of Haldex Way and was not change when the latest redesign was made. In the Master Thesis by Eckersten and Hörberg a description of the prescriptive and non-prescriptive split was easily presented as in figure 4.3 below.



Figure 4.3; The Prescriptive and Non-Prescriptive Ways of the Current Haldex Way

How prescriptive or non-prescriptive the categories are in the different levels is determined by the criteria and depending on the evidence needed in the challenge documents for the change agent team to complete a challenge.

4.4 The Haldex Way Tier Level Challenge

In the currently existing Haldex Way Tier level challenge the strategic KPI's are calculated and inserted into an excel spreadsheet visualized in table 4.2. Depending on whether the KPI targets for the specific challenge are met or not the different boxes will be filled in, for being above or below the requirements. The KPI's will be evaluated on a six months rolling average for the five best months and will give an indication if the KPI targets are met.

KPI Names <small>(Adjust names as applicable for Administrative sites)</small>	Requirement to be above or below target? <small>(Check applicable box - leave blank if not included)</small>	Results and Targets <small>(Fill in monthly Result and Target for the last 6 months)</small>						Average Result	Average Result excluding worst month	Average Target	Pass/Fail
		Result									
Inventory Days	<input type="checkbox"/> Above	Result						#####	0,00	#####	#####
	<input checked="" type="checkbox"/> Below	Target									
Delivery Precision	<input checked="" type="checkbox"/> Above	Result						#####	0,00%	#####	#####
	<input type="checkbox"/> Below	Target									
First Time Pass Rate	<input checked="" type="checkbox"/> Above	Result						#####	0,00%	#####	#####
	<input type="checkbox"/> Below	Target									
	<input type="checkbox"/> Above	Result									
	<input type="checkbox"/> Below	Target									
0-km Returns	<input type="checkbox"/> Above	Result									
	<input type="checkbox"/> Below	Target									
Distribution Center Service Quality	<input type="checkbox"/> Above	Result									
	<input type="checkbox"/> Below	Target									

Table 4.1; Haldex Way Tier Level Challenge KPI Measurements

When the KPI measurements have been evaluated the result is transferred into the dashboard for the specific Tier level challenge. The Gold Tier challenge dashboard is displayed in appendix A. The dashboard indicates the development and level of performance for each of the 13 categories with the differently colored bars in the bottom of the dashboard. They can either be red, yellow or green depending on what they have reached and what is required to improve in order to progress a level in the Tier model.

No category is allowed to be in the red area in order to progress. However, progression can be made even though two of the categories are in the yellow area, if the remaining eleven are green. In the top section of the dashboard there is a number of checkboxes controlling the fulfillment of the KPI and ISO requirements. All these, with no exception, must be achieved according to the Tier level target in order to progress one level in the Tier model.

5 Analysis

The previous chapter presented the current structure and content of the Haldex Way Tier model and challenge. To enable development of the Value Stream Approach an analysis of the current model is needed. The analysis is divided into two parts, analysis of improvement categories of interest for the Value Stream Approach and analysis of good practices at Haldex summarizing in a list of requirements for the Value Stream Approach.

5.1 Criteria for the Analysis

The main purpose of the analysis has been to determine what to include in the Value Stream Approach and not to focus on the current weaknesses. This depends on two reasons; the first being that the issues with the current Haldex Way structure and content are already identified by Haldex, such as lack of ownership, applicability and utilization of Haldex Way, which therefore will not need any further analysis. The second reason is that the Value Stream Approach, and the improved Haldex Way in general, will be based on a totally new structure.

To enable definition of the scope for the Value Stream Approach and decide what to include and what not, a number of criteria were set up. This was made by using the simplified picture of a process, visualized in figure 3.9. From this picture two conclusions were drawn; *every process must have clearly defined inputs in order to be effective and provide the required outputs, and the sub-processes must be efficiently managed and controlled to generate the required outcome.* By applying these statements into the context of the value stream, more specified criteria could be defined and established:

- The processes providing the input to the value stream
- The processes managing and controlling the material flow through the organization
- The communication and information sharing processes

The criteria were used as a basis for comparison and evaluation during the interviews with the employees and observations of the operations and processes within the organization. The interviews provided information of how the current work procedures looked like, which was compared to the improvement categories and requirements in the challenge templates.

5.2 Material of Interest for the Value Stream Approach

The identification of material from the current Haldex Way applicable and appropriate to include in the improved Haldex Way has been important for the development of the Value Stream Approach. By including already existing material into the improved version provides a sense of recognition and takes advantage of the current knowledge within the organization and existing material on the intranet. All the identified categories relate to the criteria and have clear connections to the improvement of the strategic KPI's for the value stream processes; delivery performance and inventory days.

5.2.1 KPI's

The KPI category is a part of every process of the organization as the most prominent tool for measurement, improvement and recognition. It is crucial to understand how to measure the performance and work with the results to make the appropriate and necessary improvements. By using suitable KPI's in combination with cause and action lists the linkage to the organizational and site specific strategies and performance levels can be clarified. This will be an important category for all processes within the Value Stream Approach.

5.2.2 Haldex Way Values

The Haldex Way core values represent the foundation for the organization and will therefore also be important for the development of the improved Haldex Way. To link the operations and work procedures to each core value together with Haldex' mission and vision is an essential factor for the understanding of the bigger picture. Furthermore, the core values will be closely linked to the results and KPI's of the Value Stream Approach, creating an understanding for interrelation between the work procedures and the achieved results.

5.2.3 Mapping

To create an overview and control of the complete value stream ranging from supplier to customer the Mapping category is used. Mapping is used to bring transparency to the processes and visualize the material and information flow through the organization. By mapping the processes ownership can be determined and waste and non-value adding activities can be eliminated, increasing the efficiency. The visualization of the material and information flow will also clarify, simplify and improve the communication within and across functions. Therefore tools and methods of the mapping category will be essential for the Value Stream Approach.

5.2.4 Consumption Control

In order to have smoothened and streamlined value stream processes the flow must be controlled. By managing the flow in and out of the production and distribution sites efficient and high performing value stream processes are obtained with consumption control methods such as kanban, min/max levels and two-bin systems.

5.2.5 Visualization

The most prominent method in the visualization category is Haldex' Lean Daily Management System (LDMS). It provides guidelines for regularly scheduled meetings on a daily, weekly and monthly basis to continuously track and communicate the status and progression of the business. The category includes visualization of both high-level and detailed process and organizational charts with clearly defined ownerships, crucial for understanding and improving the flow through the organization. Furthermore is visualization a concept essential for aligning and sharing information between and across different functions and processes, important to improve the value stream processes.

5.2.6 Takt and Balanced Flow

Both takt time and balanced flow has obvious links to the creation of an efficient and accurate operations flow. Takt time is introduced to pace the output of the facility and line balancing is used to even the work load between the different cells or stations and enable a flow of products according to the takt time. If the production flow does not meet the customer demand the customers will soon be lost. By visualizing the takt time with microbus displays or similar real time updates about the production status the conditions are provided.

5.2.7 Standardization

The standardization category is important to ensure process stability and enable high speed production processes with reliable performance at the lowest possible cost. Furthermore the development of work instructions for every process enables all operations to have a high and equal level of performance every day.

5.2.8 Remaining Categories in Haldex Way

Since the improved Haldex Way will include more approaches than only the Value Stream Approach, the remaining six categories in the current Haldex Way has been identified as not specifically important for the value stream processes. The TPM, set-up and changeover, 5S, and error proofing categories are typically more related to the production area. Team work and problem solving categories have a more generic applicability. Team work will to some extent be involved in all approaches but specifically in an approach addressing the development and performance of Haldex employees. Problem solving will be introduced as a methods and tool to assurance the overall quality in the organization.

5.3 Analysis of Gaps

During the interviews and discussions a number of tools and methods that lacked support in the current Haldex Way categories or needed development, were identified. The tools and methods were specifically linked to the work with improving the value stream processes and since Haldex Way should represent *the way of working at Haldex*, it is important to include the tools and methods in the Value Stream Approach.¹⁵⁷

5.3.1 Value Stream Related Activities

Stock taking, ABC classification, definition of minimum order quantity (MOQ) and methods for managing material are all important parts of the inventory processes. Guidelines and instructions for tools and methods linked to the inventory processes are currently not included in Haldex Way which creates a lack of consistency between the Haldex sites. These tools and methods are essential for the improvements of the strategic KPI *inventory days* and needs therefore to be incorporated in the improved Haldex Way and specifically in the Value Stream Approach.

¹⁵⁷ Dantoft, et al., 2006

Mapping in general and mapping the inter-company processes within the value stream in specific is another part that needs to be addressed and developed further. This is especially important because it will create an understanding for the different needs as well as improve the performance for Haldex to Haldex sites, being each other's suppliers and customers.

There is currently no guidelines and instructions on how to work with the material and operations planning, and sales and operations planning within Haldex Way. A coherent structure and standardized work methods as well as procedures for what, how and who to communicate with is important to enable efficient and effective operations within and between the sites.

5.3.2 Work and Communication Procedures

Although standardization and communication are included in the current Haldex Way, there is a great need for improving the work and communication procedures throughout the organization. In the current Haldex Way there is no evident support for the supplier and customer interaction except the Supply Chain Improvement Program (SCIP). The interaction with both the customer and supplier requires clearly defined communication and work procedures to understand the customer forecasts and volumes, and improve the accuracy and reliability of the information.

5.4 Good Practices at Haldex

To increase the level of buy-in and include new areas into the improved Haldex Way a research of good practices at Haldex were conducted parallel and combined with the interviews and observations. This part of the research has had a close connection to the descriptions and statements in the EFQM business excellence model, of how an excellent organization works and operates. What is described as good practices in the EFQM model was used for comparison and evaluation of a number of practices at Haldex. The ones that fitted well the descriptions and explanations in the EFQM model were documented to be included in the Value Stream Approach. By incorporate these practices with the already existing relevant parts of the current Haldex Way, the improved Haldex Way and the Value Stream Approach will be more comprehensive and perfected in its content.

A supportive management is recognized as a key success factor for all processes within Haldex. In some departments and areas at Haldex the management support is evident and particularly strong, mainly because of a successful spread of an encouraging and empowering mindset created within the management team. There is both a close and open communication, which is essential to understand the needs of the employees and to be able to provide continuous guidance and follow up. The fact that the success of a company lies in the hands of its people is another aspect especially realized within certain processes of the organization.¹⁵⁸

¹⁵⁸ EFQM, 2010

To match the pace of a changing and increasingly demanding market a strategy for every process and department must be developed and continuously improved.¹⁵⁹ This has also been identified to have clear linkage to how the management performs and currently works. With management communicating the strategy and understanding both the needs and expectations of the stakeholders and customers, as well as understanding the internal performance and capabilities, will enable to create clearly defined strategies addressing all relevant issues.

Another important factor is the importance of close and sustainable relationships with suppliers, partners and customers.¹⁶⁰ Currently this is only the case for a fraction of the suppliers and customers within Haldex. However, learning's from these relationships is crucial to be able to both receive what is asked for and meet the demands. The currently well working relationships are all based on three critical components; mutual trust, respect and openness towards each other. All these components together facilitate an understanding for the other partners' processes and needs which both parties will benefit from. It is also of great importance trying to create a win-win situation when agreements are set, since this creates a positive attitude towards the development of the partnership.

A good practice used within Haldex which is linked to the performance of the supplier, but not included in Haldex Way, is the SCIP. This is essential for the work with the suppliers and needs to be incorporated into the Value Stream Approach. The SCIP consists of a scorecard evaluating the supplier performance based on four different and fractioned criteria. Quality stands for 36 percent of the fraction, supplier delivery performance with right quantity on right time accounts for 31 percent, value improvement or cost stands for 20 percent and finally support or also called compliance add up with the remaining 13 percent of the fraction. For each of the criteria the supplier is rated on a scale from 0 to 5 and an average is calculated for the overall supplier performance resulting in an A, B, or C status. When the suppliers are ranked, all will be informed of their position and action plans are required from C suppliers to improve and if no progression is possible, change of supplier is evaluated.

¹⁵⁹ EFQM, 2010

¹⁶⁰ Ibid

5.5 List of Requirements

The previous sections in this chapter have presented important parts for the development of the Value Stream Approach. In order to link it closer to the criteria and create a more structured and clear foundation for the Value Stream Approach a list of requirements was compiled.

Four areas have been identified to meet the criteria and requirements for the development of the Value Stream Approach. These relate to the *interaction with suppliers and customers, the planning of the material supply and operations, the optimization of material flow through the organization and the control and management of the inventory*. Each area includes a number of different tools, methods and procedures related to the work with the value stream processes and improvements.

The inter-company value streams and customer and supplier relations are a current issue for Haldex and therefore appropriate work procedures must be established as well as improvements of forecasting and firm orders. The purpose of improving the interaction with the suppliers and customers and including it into Haldex Way is to improve the delivery performance and customer satisfaction as well as to optimize the inventory days in partnerships with the suppliers.

To ensure that the current and future customer needs is satisfied; forecasts of the demand must be received or calculated. However, to produce what is requested the demand forecast needs to be translated into supply forecasts. The planning is an important factor when creating an efficient flow, and if the input into the process is incorrect or badly estimated every part of the organization will suffer. Therefore, by improving the material and operations planning process will ensure both a higher accuracy of the delivery performance and reduce the inventory days.

It is essential to balance the flow and pace the output of the production processes according to the customer requirements. Therefore controlling and optimizing the flow of material and operations is required for the improved Haldex Way. If the planning process has determined what needs to be produced and the takt of the production pace is the determined, output according to this plan is a hundred percent accuracy towards the customers. By creating an efficient flow the time needed to produce the requested items will be less which also will reduce the inventory days.

Finally the control and management of the inventory focuses on the structure, methods and tools for improving the efficiency of the inventory processes. Management of the inventory is a fundamental factor for reducing the inventory days, but it will also lead to improved delivery performance towards the customers since the inventory accuracy will be high and enable for on-time delivery of the desired products.

6 Result: The Improved Haldex Way

In this chapter focus will be put on the presentation of the Value Stream Approach. However, to create an overall understanding of the improved Haldex Way the new framework with its modules and approaches and incorporated logic is also visualized and described. In addition, the redesigned Tier Model and new challenge template is presented.

6.1 The Foundation for the Improved Haldex Way

The improved Haldex Way is a complete redesign of the current Haldex Way structure. The core values are still the foundation of Haldex Way and pervade all processes. However, in comparison to the previous Haldex Way the principles are now excluded and instead incorporated in the daily operations and way of working at Haldex. The main changes and improvements made can be summarized as:

- *Introduction and incorporation of a new generic logic.*
- *Redesign of the Haldex Way house and framework.*
- *Development of modules and approaches.*
- *Restructuring of the Tier model.*

A new generic logic is introduced to provide a uniform and coherent way of performing work procedures and improvement activities. The house will still represent the overall framework for Haldex Way and sets the scope and objectives. Instead of categories, the new Haldex Way will consist of four modules with a number of approaches, applicable for different parts of the organization. The restructured Tier model is used for assessment of the performance and strategic results, achievements and recognition.

6.2 The Haldex Way Logic

To create a coherent and consistent framework and structure for the improved Haldex Way in general and the approaches and ways in specific, a generic Haldex Way logic needed to be adapted and incorporated. The intention with the logic is to apply it for the overall structure and let it pervade all tools, methods and practices.

The RADAR logic of the EFQM Excellence Model, presented and visualized in Figure 6.1, was chosen as a base and foundation for the Haldex Way logic. The choice of this logic was made after discussions with both the supervisor and steering committee at Haldex. The decision was taken due to on several reasons; the main one being how it is structured. Each way of the different approaches is radarized, which means that they are entered into the RADAR loop. This creates an underpinning vertical structure, aligning every part of the improved Haldex Way. It also facilitates the understanding for the horizontal structure since every tool and method linked to the improvements of a strategic KPI is gathered in the same approach.

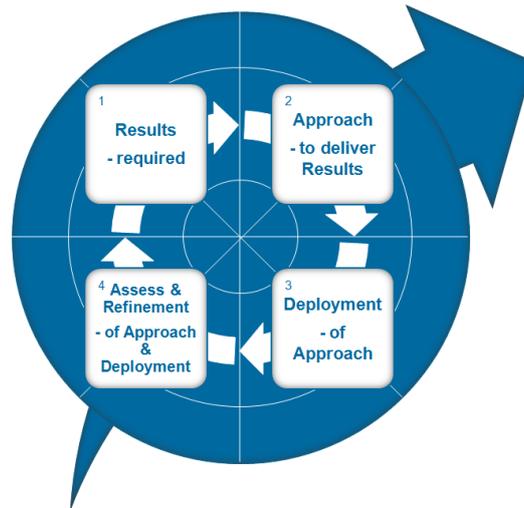


Figure 6.1; The Haldex Way Logic

6.2.1 Applying the Haldex Way Logic to the Value Stream Approach

Initially for each part of the approach the required result is presented, i.e. the results expected to be achieved when focusing on the specific part of the approach. Introducing the required results will facilitate the understanding and clarify the purpose of the part of the approach. It will also provide an opportunity to decide which improvement activities appropriate focusing more or less on.

The second step is the development of an approach of how to achieve and deliver the stated results. This part works as a table of content for the following step, presenting what is needed in terms of key factors required to be in place and well-functioning to ensure accurate and successful results in the desired area.

When the approach is developed, the third step is the deployment of the approach, also representing the main content. The deployment is the comprehensive and descriptive part of the improved Haldex Way and will provide guidance on a detailed level of how to work and improve the specific parts of the approach.

The final step is the assessment and refinement which is incorporated in the end of each part of the approach with tools and methods to achieve refinements within the specified area. Finally an overall assessment template applicable for the entire approach will be presented.

6.3 The Improved Haldex Way House

The improved Haldex Way house, visualized in Figure 6.2, is the result of the redesign of the structure and layout of Haldex Way. The house consists of four modules; the Business module, the Preparations module, the Operations module and the Results module.

Each of the four modules contains appropriate approaches developed to address issues and provide tools and methods for improving the specific area. The initial development of the improved Haldex Way focuses on developing approaches within the Operations module.

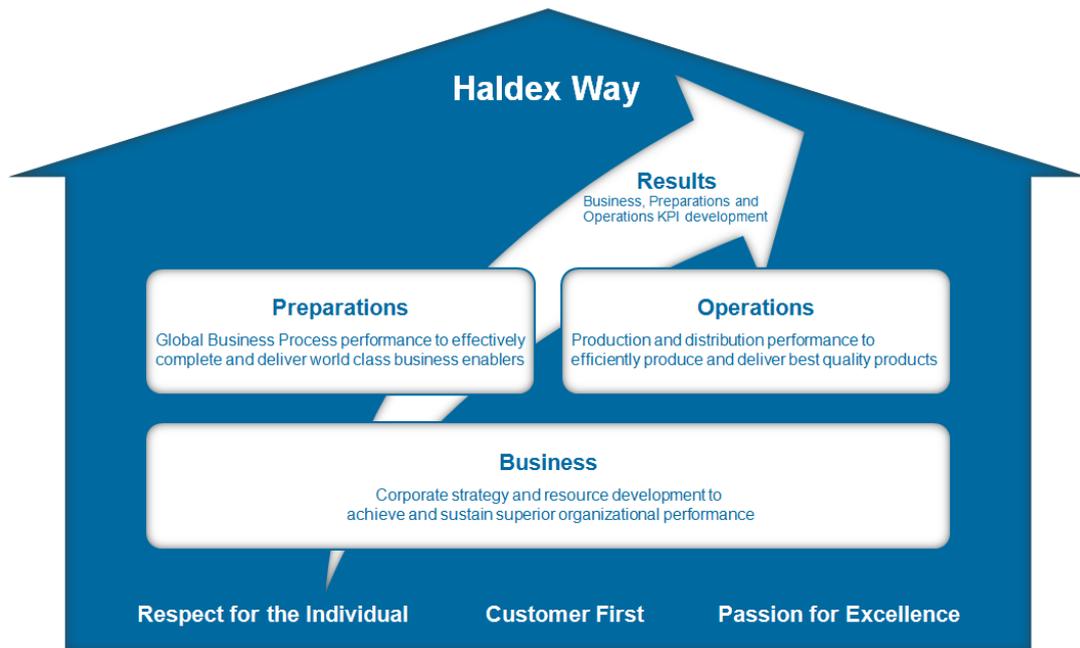


Figure 6.2; The Improved Haldex Way House

6.3.1 The Business Module

The Business module is developed to support the high level management processes. It includes an approach with guidelines on how to work with resource development and how to improve the efficiency and effectiveness of the corporate strategy to achieve superior organizational performance.

6.3.2 The Preparations Module

The Preparations module is developed and suitable for global business processes such as; Sales, Marketing, R&D, Sourcing, Quality and HR. The module contains an approach with the objective to support all operative processes and effectively complete and deliver world class business enablers.

6.3.3 The Operations Module

The Operations module is the heart of all the operative work processes within the organization. It focuses on providing approaches for efficient and effective production and distribution processes with high quality results. This will also be the module where most of the content from the current Haldex Way will be included.

6.3.4 The Results Module

The Results module is applicable for all areas of the organization but addresses issues on a corporate level. The objective is to align results of the different processes and parts of the organization by developing and improving the work with KPI's. The shape as an arrow symbolizes where Haldex is heading and the placement relates to the need of including the content of the module into every area of the organization.

6.4 Defining the Approaches for the Operations Module

The development of the approaches for the Operations module required compilation and selection of all relevant material from the current categories in the Tier model as well as additional areas appropriate for the improved Haldex Way. The developed module consists of five approaches; the *Results, People, Productivity, Quality* and *Value Stream Approach*. Each of the approaches is divided into a number of ways, describing the content in detail and functions as enablers for the results. The tools and methods of the different ways are overlapping to some extent, mainly because of two reasons;

- *There is a need for linkage between the ways to facilitate the recognition of tools and methods, and to create a holistic understanding of the structure.*
- *There are many different applications for the tools and methods.*

As previously mentioned, the focus for the thesis has been the development of the Value Stream Approach, whereas the content of the People, Productivity and Quality Approach were discussed and developed together with the Haldex Change Agent Team. At this point only an overall view of the other approaches, except the Value Stream Approach, is presented since the development of the approaches was initiated at a later stage and the involvement has been limited and focus has been put on the Value Stream Approach.

Each approach is linked to one or a few strategically important KPI's to reach the KPI targets set by the corporate management, and align the objectives of the approaches with both the corporate and site specific strategy. An overview of which KPI's are linked to the respectively approaches is shown in figure 6.3.

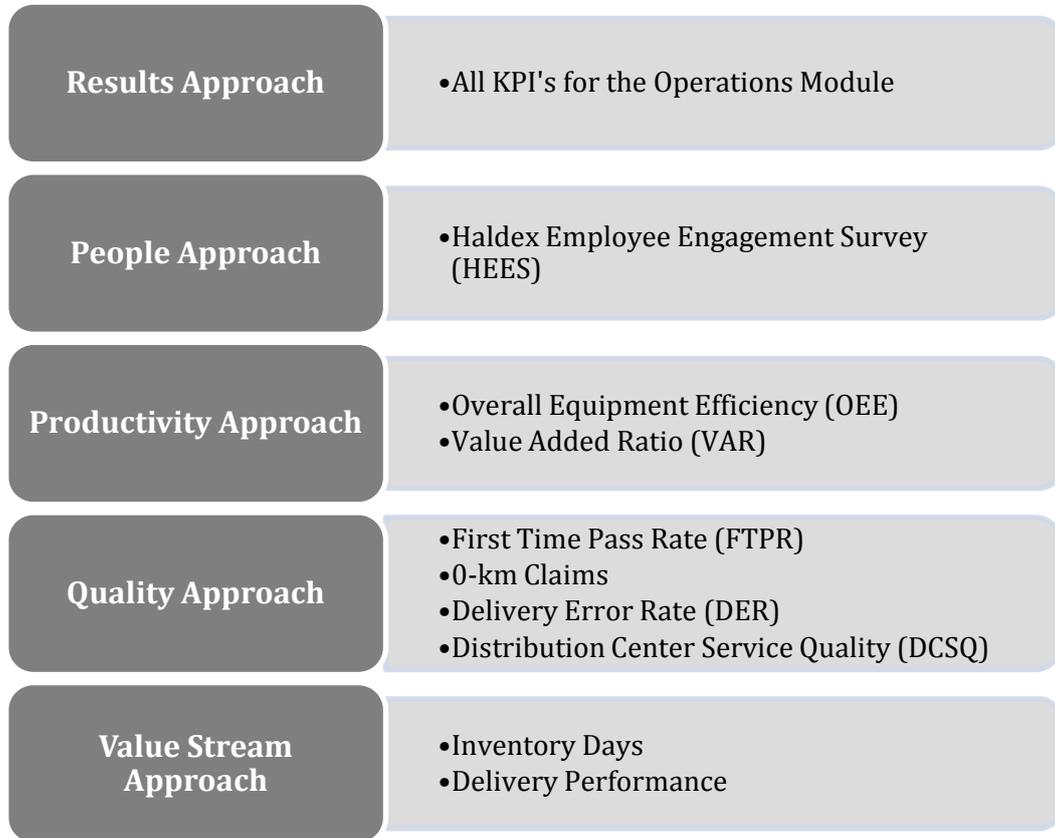


Figure 6.3; Approaches of the Operations Module and their Strategic KPI's

6.4.1 The Results Approach

The Results Approach, seen in figure 6.4, is specifically developed to provide guidelines and methods of how to achieve the desired outcome and addresses issues regarding the results for the Operations module. It is during the development phase divided into three descriptive ways; *Key Results*, *Strategy* and *Budget*.

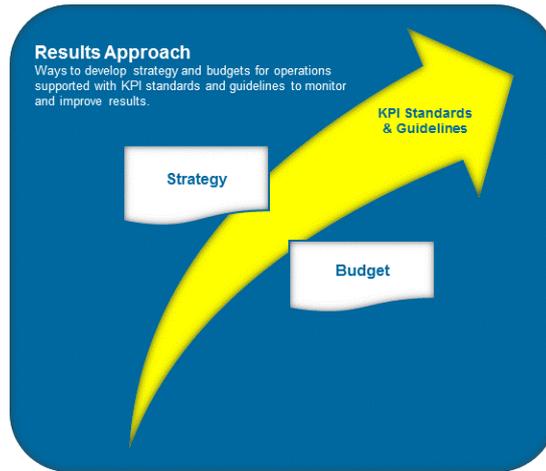


Figure 6.4; The Results Approach

Key results involve all KPI standards and guidelines in combination with instructions of how to visualize and communicate the results. The *Strategy* includes guidelines for developing, implementing, communicating and measuring a strategy. To involve a financial aspect *budget* is introduced, including the same parts as the Strategy.

6.4.2 The People Approach

The People Approach, shown in figure 6.5, relates to all employees within Haldex organization and especially to the core value of respect for the individual. It addresses important issues regarding the human resource and organizational development by introducing five descriptive ways; *People Results*, *Leadership and Competence Development*, *Communication and Recognition*, *Environment* and *Organization*.



Figure 6.5; The People Approach

The *People Results* includes Haldex Employee Engagement Survey (HEES) for the measurement of the employee satisfaction regarding the work environment. A competence gap analysis is introduced for the assessment of the current competence and future need. It also introduces a development plan ratio and a

retention ratio as means for assessing the development work and the company's level of attractiveness.

The main content of the *Leadership and Competence Development* is a leadership model containing both managerial and employee specific guidelines, techniques and methods for performance appraisals, 360 degree review, and development plans.

In the *Communication and Recognition*, Haldex vision, mission and values are included in combination with benchmarking procedures and guidelines for the Lean Daily Management System (LDMS) and Voice Of the Customer (VOC).

The *Environment* concerns both internal health and safety issues regarding the work place, people and products, and external Corporate Social Responsibility (CSR) issues such as the interaction with the society.

Within the *Organization* guidelines regarding the structure, teamwork, roles and responsibilities, recruitment and retention is included to improve the efficiency of the processes and not get stuck in old routines.

6.4.3 The Productivity Approach

To involve and preserve the core of the current Haldex Way the Productivity Approach, visualized in figure 6.6, is introduced. The approach relates to every producing and distributing process of the organization and includes seven descriptive ways; *Productivity Results*, *Clean*, *Environmental Care*, *Process Improvement*, *Maintenance Management*, and *TPM Operator and Specialist Maintenance*.

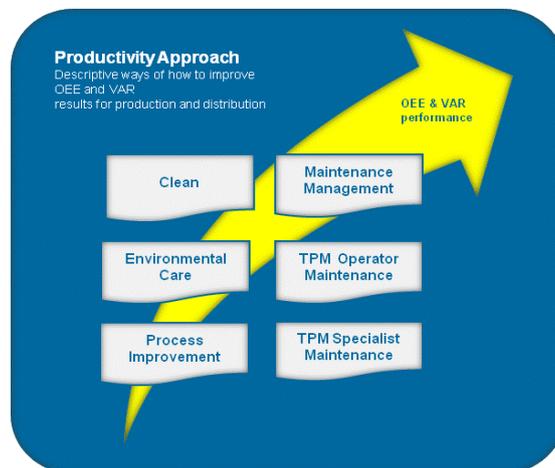


Figure 6.6; The Productivity Approach

In *Productivity Results* there are two main measurements, OEE and VAR. These are used for evaluating the efficiency of the processes, providing data for root cause analysis, and optimizing the work distribution and utilization of resources.

Clean includes guidelines for 5S, involves safety to minimize risks and introduces visualization as a tool to provide control and clarity.

To encompass and address the environmental aspects *Environmental Care* is developed. Recycling and impact identification are two important parts of this way.

The *Process Improvement* involves the concept of Kaizen and guidelines on how to map the processes and value streams. It also includes methods and techniques describing how to balance lines and flow, and how to work with set-up and change over's.

Maintenance is a crucial factor for all production processes and therefore the three remaining ways addresses issues linked to this. *Maintenance Management* includes guidelines on how to implement the seven-step Total Productive Maintenance (TPM) process together with techniques for process stability and planning methods to improve the Overall Equipment Effectiveness (OEE). The *TPM Operator Maintenance* and the *TPM Specialist Maintenance* encompasses complete guidelines of how to work with TPM for both operators and specialists.

6.4.4 The Quality Approach

Quality is an essential factor of every producing company. Haldex core value passion for excellence is directly linked to the quality of products and therefore the Quality Approach, shown in figure 6.7, is introduced. The Quality Approach consists of six descriptive ways; *Quality Results*, *Supplier Performance*, *Process Performance*, *Product Management*, *Customer Performance* and *Problem Solving*.



Figure 6.7; The Quality Approach

Quality Results is measured with three KPI's, the first one determining the first time pass rate which is a calculation of how many of the products that are produced right the first time without any deviations or need for corrective actions. The second is 0-KM which is used as a measure for the number of returns, and the third one is the cost of warranty claims.

The main content of the *Supplier Performance* is Haldex Supply Chain Improvement Program (SCIP), used to improve the quality and reliability of the incoming products.

The *Process Performance* is about understanding and controlling the variations of the processes to create stability. It also concerns the capability of the processes and the cost of producing products with poor quality.

Within *Product Management* quality assurance methods such as Failure Modes and Effects Analysis (FMEA) and Production Part Approval Process (PPAP) are included.

To ensure the right quality it is important to be aware of what the customer requires. Therefore *Customer Performance* includes guidelines for managing the customer requirements and managing of non-conformances.

Finally *Problem Solving* introduces techniques and methods of how to systematically address and resolve problems. This will be an important part of the Quality Approach for every area within the organization.

6.4.5 The Value Stream Approach

The development of the Value Stream Approach was the main objective of this Master Thesis and the idea was initiated by Haldex to align strategic objectives, as stated in section 1.5 and 1.6. The Value Stream Approach is currently the only approach that has been completed on a detailed level (spring 2013). Efficient and effective value stream processes all the way from the supplier to the end customer are essential to create an organization that can meet or exceed all of its customers' expectations.

The Value Stream Approach, depicted in figure 6.8, relates to every process linked to the value stream but emphasizes on the ones directly linked to the flow of information and material such as those handled by the logistic operations.

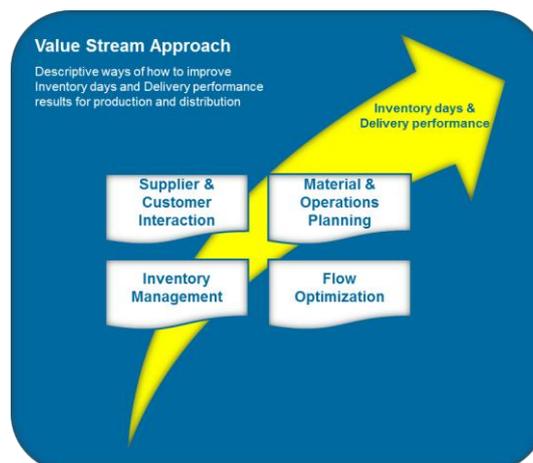


Figure 6.8; The Value Stream Approach

6.4.5.1 Introducing the Five Ways of the Value Stream Approach

From the identified requirements, presented in section 5.5, five descriptive ways of improving the value stream results inventory days and delivery performance have been developed during the thesis, together forming the essential components of the Value Stream Approach. The ways, visualized in figure 5.8, are *Value Stream Results*, *Supplier and Customer Interaction*, *Material and Operations Planning*, *Inventory Management* and *Flow Optimization*.

The Value Stream Approach follows the structure of the RADAR logic for each way with an initial introduction of the results, then the approaches of how to reach the desired results, the deployment of the approach and finally the assessment and refinement of the tools and methods.

In appendix B an example of an entire way, in form of the Flow Optimization Way, is displayed to visualize the structure and content.



Figure 6.9; Haldex Ways of Improving The Value Stream Results

Figure 6.9 displays the main content of the Value Stream Approach which also is the deployment part of each way. The deployment contains detailed descriptions, explanations and guidelines for how to work with the tools and methods. A consistent theme throughout the Value Stream Approach is to define the roles and responsibilities and provide the means necessary to limiting the variations within the processes.

Since the deployment is built on the required result and approach of each way, these parts will be presented in more detail below.

Value Stream Results

The aim for the Value Stream Results way is to establish and present the overall objectives for the Value Stream Approach and to provide guidance on what factors being important to successfully reach and sustain the value stream results. The two main measurements for the performance within the Value Steam Approach are the strategic KPI's inventory days and delivery performance. These KPI's are used to measure the number of days the material remains in inventory before being sold and determine the ability to deliver products to the customers on time and without deviations.

In order to achieve the required result an approach is developed within the way. The main idea is to involve the management for support in every process. A site specific strategy needs to be developed with clear links to the desired result and strategic KPI's. Appropriate measurements, such as process KPI's, must be established and utilized.

Supplier and Customer Interaction

The Supplier and Customer Interaction way is divided into two parts, focusing respectively on supplier interaction and customer interaction.

The required results from the interaction with the suppliers are both an improved level of supplier delivery performance and integration of supplier processes, as well as increased level of reliability, control of incoming flow of material and improved communication and information exchange. The required results for the development of customer interaction are to increase the understanding for the customer needs and improve the information sharing. Another desired outcome is to improve the delivery performance and increase the overall level of satisfaction.

To achieve these results two approaches consisting of a number of key success factors has been developed. Summarizing these briefly the main factors are to establish clear and structured roles and responsibilities for the supplier and customer interaction. Ensure well-functioning supplier and customer communication and willingness of information sharing regarding forecasts and firm orders. Implement the Supply Chain Improvement Program (SCIP) to improve supplier delivery performance. Utilize appropriate measurement for evaluation of customer satisfaction.

Material and Operations Planning

The main result required for the Material and Operations Planning way is to create a smoother and more streamlined organization with increased interaction and improved understanding for the material and operations planning processes.

In order to achieve these results a number of important factors must be established, worked with and continuously improved. There must be clearly defined and structured roles and responsibilities for material and operations planning processes. Accurate and structured communication and calculation of forecasts and firm orders is essential for effective planning. The inventory control parameters must be

appropriately and correctly calculated for efficient management of the inventory. Shortage lists must be developed and used throughout the organization for visualization of the need and interrelation between the processes.

Inventory Management

When focusing on the Inventory Management way the required results are improved inventory control, increased material and product knowledge, and increased inventory accuracy. All these aspects contribute to improvements of the number of inventory days. A number of key factors form the approach for the way and must be established and implemented in order to reach the targeted objectives.

It is of important to establish roles and responsibilities for the inventory management. A categorization of material according to ABC classification will facilitate the prioritizing on the right products and make the inventory processes more efficient. By establishing appropriate procedures for the handling of obsolete material the inventory holding costs will decrease and the space availability will increase. A final factor is to develop standardized methods for cycle counting to accurately keep track of the inventory in stock.

Flow Optimization

The main results required when working with the Flow Optimization way are to reduce the amount of inventory on hand, amount of work in progress, improve the delivery performance and increase the available space. The approach of the way consists of a number of factors identified as critical for achieving the desired result, which are briefly explained.

A fundamental understanding of the value stream and the material and information flow is essential for efficient and effective management of the flow. The concept Takt must be understood, integrated and visualized in order to accurately manage the capacity and meet the demands of the customers. Consumption control mechanisms must be understood, evaluated to create a smooth and even flow.

Assess and Refinements of the Ways

All the tools and methods within the ways must be continuously assessed and refined to establish an effective and lasting work with improvements. By adding the assess and refinement part to each way, the employees are encouraged and empowered to challenge their work methods and result. In this way linkage between the tools or methods and the overall business strategy and challenge template for the Value Stream Approach will be established. Typical tools and methods for the assess and refinement are the utilization of appropriate process KPI's, visualization of the processes by conducting value stream mapping and introduction and usage of improvement journals.

6.5 The Redesigned Tier Model

As seen in figure 6.10 the Haldex Way Tier model is very similar to the current one; in fact the only differences are that the platinum level is taken away since business excellence is incorporated into the improved Haldex Way, and the added arrow, replacing the platinum level and that can be seen as the journey towards excellence.

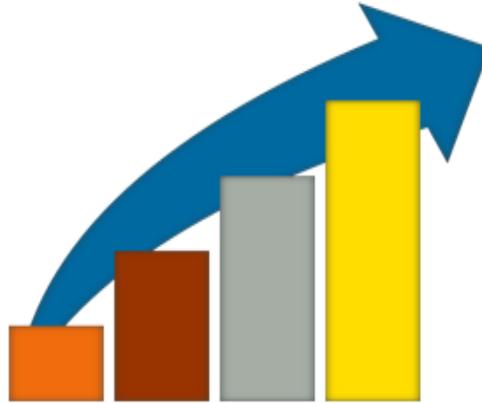


Figure 6.10; The Improved Haldex Way Tier Model

6.5.1 The New Way of Challenge

A new challenge will be introduced in the improved Haldex Way. It will not be based on Tier level progression in the same way as the previous one. Instead, an assessment template, based on the EFQM assessment template, has been developed for identical challenges for all Tier levels.

There are two types of assessment templates for each Haldex Way approach, shown in Appendix C. The first one focuses on the results, KPI performance, and relevance and usability of the KPI's. The other one focuses on enablers of the results, including the approach, deployment, and assessment and refinement of the different ways of the Value Stream Approach. In the enabler template the approach and assess and refinement sections are generic for all Haldex Way approaches, whereas the deployment part includes questions relating specifically to the content of the ways for the different Haldex Way approaches.

The overall scoring of the templates for all Haldex Way approaches results in a mean value representing the final score for the local site. All the Tier levels are linked to a certain level of performance and scoring in the challenge will enable each sites' performance to be presented both as a Tier level status and in Haldex excellence points.

7 Conclusion

In the previous chapter the overall content of the improved Haldex Way was presented. To create an understanding for the improvements with the new concept and tie the different parts of the thesis together a discussion is developed. The discussion includes explanation and reasoning behind the improved structure and how the content should be communicated. In addition, the linkage between the improved Haldex Way and the theory initially presented is given.

7.1 The Need for a Change

The development of the improved Haldex Way was initiated due to several reasons; one of them being that Haldex Way is currently not integrated and utilized the way it is supposed to. A major issue in some areas is that Haldex Way has become a tool box, required to use, but without clear links to the strategic KPI's, actual working methods and Haldex' overall strategy. Another issue is that Haldex Way is seen as applicable only for certain processes and areas of the organization. These issues have, as stated in section 1.4, together created an absence of ownership and low general level of buy-in of the current model, as well as slow improvements of the result.

The main purpose and objective of the improved Haldex Way concept has been to address these issues and create a framework for improvements changing the mindset and involving all employees within the Haldex organization in order to achieve superior results.

7.2 The Improved Structure

The improved Haldex Way will result in a paradigm change for Haldex organization, see figure 7.1. To address the issue with applicability in all parts of the organization the framework has been completely redesigned with the introduction of interlinked modules and approaches. The approaches have incorporated both tools and methods from the current Haldex Way categories as well as areas from the EFQM business excellence model. The framework will facilitate the visualization of how the different parts and processes depend on each other and how they together form the means to achieve the required result.

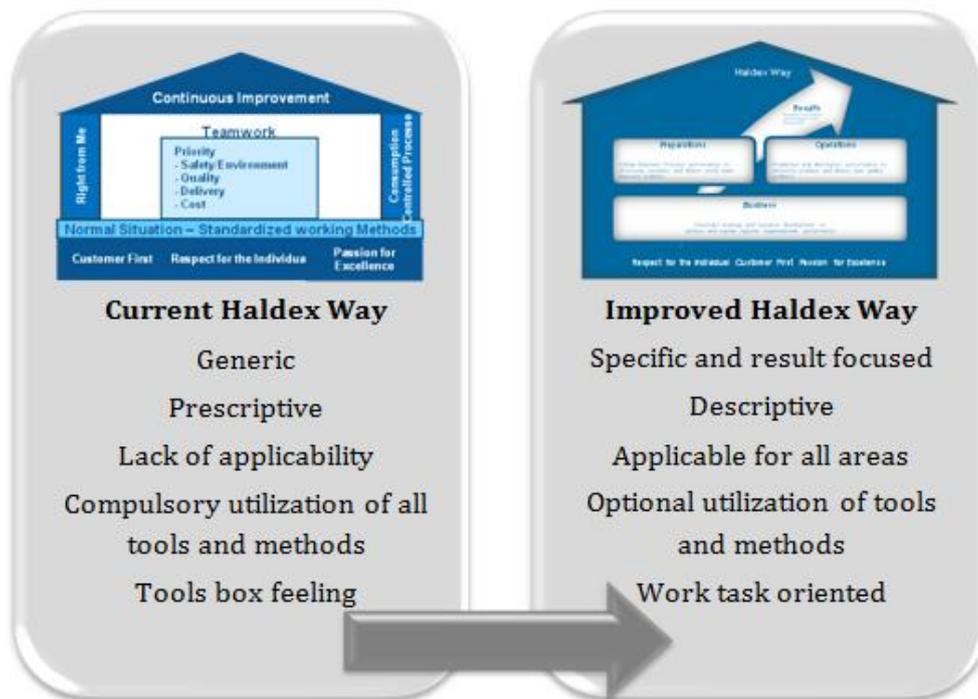


Figure 7.1. Haldex Way comparison

A difference between the current Haldex Way and the improved Haldex Way is that the Tier model is not incorporated to the same extent as before. The Tier level will be kept as an incentive and a good tool for recognition, although since the challenges will look the same every time the focus on progression through the specific Tier levels will be reduced. The intention with conducting the challenges this way is to keep the momentum of the improvement work continuously and not only before a scheduled challenge. It will also provide a more flexible challenge structure since it is not required in the same way to only challenge a site when they are ready for progression in the Tier level.

7.2.1 Aligning the Structure

The introduction of the new generic RADAR logic has made the improved Haldex Way structure more consistent. By aligning the structure in every plane, the links between the core values and the objectives will be clarified.

The vertical structure is very evident in the improved Haldex Way. Although the logic is visualized in every parts of the structure, there are no requirements on learning it as a specific method. Instead, the idea is to build everything in an easy comprehensible way to provide the users with an immediate insight of how the improved Haldex Way is structured. A positive side effect with this underpinning logic is that the continuous work with it will provide the employees with an approach applicable for every problem and situation.

All relevant tools and methods identified in the Empirics and Requirements Analysis chapter are now included in the different ways in the Value Stream Approach. They have clear connections between each other and the desired outcome, such as the KPI results. This provides a greater understanding and a far more intuitive feeling for the value of each suggested action. Even though the improved Haldex Way will include a lot more content than the current version, the grouping of the tools and methods into approaches which pursue improvements of specific strategically important KPI's, forms more applicable structure. When developing the Value Stream approach, as much as possible of the definitions and standards for the already existing tools and methods have been kept. By preserving and keeping as much as possible the level of buy-in for the new improved Haldex Way structure will increase as well the support for the already existing standards and definitions. This will also help minimizing the confusion of the new concept.

7.3 The Descriptive Path towards Excellence

At the initial stage of development of the improved Haldex Way there were many thorough discussions about how the content in the best way should be communicated. The current Haldex Way categories range from fairly prescriptive to non-prescriptive as progression from the copper to gold level is achieved. The reasoning behind this is fundamentally not wrong, however, the improved Haldex Way has taken a different approach to this issue by developing and adding a descriptive part into the concept. It might seem complicated to develop a descriptive path towards excellence without being very prescriptive. In some sense the deployment of the ways can be seen as rather prescriptive since they include recommendation for how the performance can be improved. However, they are also to a large extent descriptive though they are explaining and motivating the suggested path. In the improved Haldex Way the purpose of every action is of great importance. There should always be an underlying thought related to the well-being of the employees, value to the customer or improvement of efficiency and effectiveness in the processes. From a pure result oriented view this could instead be stated as; the improvement activities clearly relating to the performance of the strategic KPI's fundamental for the future success of Haldex organization.

As presented in the chapter of Empirics and Requirements Analysis, the current Haldex Way put a large focus on implementing the tools and methods by providing guidelines and standard documents supporting the implementation and answering the question about how the actions should be performed. However, an aspect missed in the current Haldex Way is the explanations of the context and reasoning behind the use. By addressing this aspect a more aligned structure within each way is created.

In order to solve this problem three questions were continuously asked and answered during the development of each part of the ways. The questions, displayed in figure 7.2, are *why*, *what* and *how*.

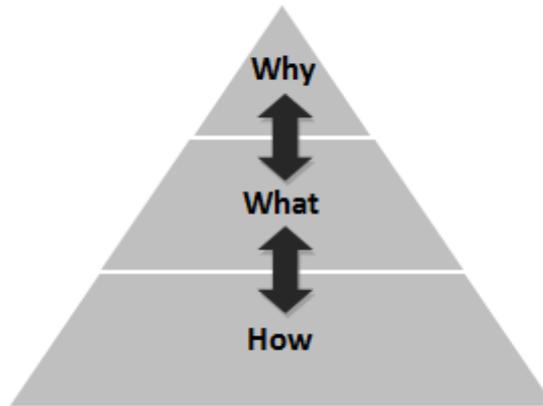


Figure 7.1. The Structural Questions for Each Tool or Method

The answers to these questions create an understanding, reasoning and guideline for each tool and method, together explaining how they are linked to the result. By adding the double-headed arrows, the mutual need and interdependence between all of them is visualized. All questions play an equal importance for the understanding but the order in the figure can be seen as a good way of approaching them to gain the entire picture.

What makes the improved concept even more interesting and less prescriptive is the ability to choose from the content what is relevant to the process the local site is working with. Each approach and way consists of explanations and recommendations for how to improve a specific number of strategically important KPI's. If some of the approaches or ways are not applicable to a specific process, the employees are not required to work with these. As long as perfectly reasonable and sound motivations for the choices exist, it will not affect the result and challenge negatively. On the contrary, good motivations only show that the specific way, tool or method has been considered and evaluated, and then removed because it did not create value to the process.

7.4 Generic or Specific

One of the main outcomes from the last redesign of Haldex Way in 2010 were the change to a more generic design of the criteria and evidence in the challenge documents, with reduced and aligned numbers of criteria in the tier levels. In the efforts to try to make the Tier model more applicable for other areas than the production and distribution sites there were losses in form of clear statements of what actually was required. The improved Haldex Way will change the direction into a more specific approach.

By developing approaches with the focused objective of improving Haldex strategic KPI's have made Haldex Way more specific. This will also be reflected in the design of the challenge templates for the approaches. There will be a specific template for each approach and the main content of the deployment parts of each way will be addressed in detail. The generic aspect of the improved Haldex Way lies in how the tools and methods are used. Since the tools and methods can be used for several purposes it has been an aim to incorporate them in several ways. In this way a sense of recognition and alignment between the ways and approaches is created.

7.5 Sequence or Not

Another important topic managed during the development was whether there should be any kind of sequence in the approaches and the ways. This is closely linked to the issue with introducing the different tools and methods in the appropriate Tier level, which was discussed in the previous Master Thesis¹⁶¹. This has been a very sensitive topic when developing the improved Haldex Way since the introduction of a sequence will add the prescriptive feeling and inevitably limit the ability to choose for the employees. However, in some cases there must be a sequence when introducing tools and methods to create an understanding for the purpose and objective, but also to get some value out of the use.

These factors make the issue a bit complicated. However, to solve it, a decision was taken not to make each way more prescriptive by adding a fixed sequence determining how to work. In those areas where certain tools and methods must be established sequentially the deployment part should be built in a way making this appearing naturally. This could be made both with a creative layout and by linking the explanations of the tools and methods in a way directing the utilization.

7.6 Returning to the Theory

The improved Haldex Way is still a management framework for improvements heavily influenced by the lean concept. Three of Womack and Jones five lean principles, see section 3.1 about Lean, highlights the objective with the thesis; the efficient and effective value stream, a customer initiated production flow, free from interruptions. All the main lean tools and principles will be incorporated in the improved Haldex Way, but unlike the current Haldex Way this will not be the only parts involved. The EFQM business excellence model has provided a lot of guidance and inspiration for new areas as well as provided the fundamental logic, on which the entire improved concept is based upon.

If the continuously changing environment and market of the vehicle industry is taken into consideration the need of change management is increasingly important. A suggested approach to change is a combination of both the planned and emergent theory. It is important to plan a change like the introduction of the improved Haldex Way very carefully. Both Lewin's model (section 3.3.3 about Planned and Emerged Change), describing the move from one state to another and the identification of

¹⁶¹ Eckersten & Hörberg, 2010

driving versus restraining forces, and Kotter's eight step process (same section) for successful changes, are very useful tools when implementing new concepts. To face the future and successfully adapt the organization to the market requirements the emergent perspective is important to be aware of and have in mind. An active work with the five factors described in section 3.3.3 about Planned and Emerged Change, increases the competitiveness of the organization.

The specific theory linked to value stream improvements, displayed in section 3.4 Theory for Supply Chain Improvements, has been particularly useful for the development of the Value Stream Approach. By combining the theory with real life experiences have created the opportunity of adjusting and adapting the content in the Value Stream Approach to a good blend of best practice theory and real life pessimism.

8 Reflections and Future Work

This chapter includes the final comments on the thesis, and will discuss the credibility and chosen methodology. The academic contribution is stated and future recommendations for continuous improvements of Haldex Way are discussed. Finally some personal reflections of the thesis will sum up the thesis work and the development of the framework and Value Stream Approach at Haldex in Landskrona.

8.1 Comments on Methodology and Credibility

8.1.1 Methodologies of the Thesis

The methodology has followed the developed research process presented in section 2.6 about the Research Process. During the initial weeks of the thesis a lot of effort was spent on formulating the problem description and understanding the objective to enable the development of the framework and the Value Stream Approach. Looking back at this part of the research, the start-up phase could have been done more efficiently by starting the interviews at an earlier stage. However, it is always easy to diminish difficulties afterwards. If the authors had not had enough understanding of the issues and which parts to focus on, the interviews would have been pointless.

Longitudinal studies were not possible to perform during the research process because of the lack of documentation supporting historical decisions. Instead the documents found closest to longitudinal studies were improvement journals frequently used in Landskrona as a meeting- and follow-up tool. Even though it might had been useful to conduct longitudinal studies to better understand how the improvement work developed over time the intranet combined with interviews and observation proved to be a really effective way of gathering the requested information. This combination of material gathering formed the foundation for the development of the Value Stream Approach.

8.1.2 Reliability of the Thesis

It is important to ensure the reliability of the developed framework and Value Stream Approach since the final product must be reliable to create a positive mindset about the forthcoming change. To secure the reliability views from all parts and areas of the organization have been captured, and people in various positions have been involved. In-depth interviews, discussions and collaborations have been conducted with a number of the employees and continuously with the Change Agent Team at Haldex. They have provided invaluable knowledge about Haldex value stream in general and feedback on the development of the improved Haldex Way in specific. The knowledge and experiences within the Change Agent Team have also improved and shaped the language and expressions used in the in the Value Stream Approach, to ensure recognition within the Haldex organization.

The possibility of applying, transferring and generalizing the developed Value Stream Approach has been essential during the development process. The study visit at Weyersheim, France, created an understanding for how a Haldex distribution site operates and how they are working with Haldex Way. This expanded the knowledge and experiences outside the production which were very helpful when developing the applicability for the Value Stream Approach. In addition to the study visit a lot of additional perspectives were captured through the change agents that have knowledge and experience from the organization world-wide.

8.1.3 Validity of the Thesis

Validity has been secured by establishing good contact and communication with the interviewees. Enabling a climate open for questions and reconnection have facilitated the assurance of validity. The areas of concern have been discussed in collaboration with the employees responsible for specific work tasks to understand the interviewees' contribution to and impact on the value stream. The validity has also been investigated through the steering committee to ensure that the obtained information has been trustworthy and established within the organization.

8.1.4 Transferability of the Thesis

Transferability of the thesis can be connected to the applicability of the improved Haldex Way for other companies. Lean is today a very common trend in industries world-wide and especially in the automotive industry, the improvements of Haldex Way can be applied to other companies as well since the connection to strategic objectives and results is a way to facilitate the understanding and usage of production philosophies such as lean and Haldex Way. The thesis have been limited to Haldex and therefore transferability of the improved Haldex Way to other companies have not been an initial purpose or objective.

8.2 Academic Contribution

The increased competition in the vehicle industry has put pressure and focus on cost reduction and efficiency improvements. One way of reducing costs and improve efficiency is to focus on the improvement of the strategic KPI's inventory days and delivery performance. The main deliverable of this thesis is a Value Stream Approach aimed at continuously improving two of strategically important KPI's.

The majority of the excellence models are built in a prescriptive manner. By developing a concept, that in a descriptive manner shows the path towards organizational excellence, a new approach to the improvement arena has been introduced. It is the authors' belief that a cleverly designed descriptive way without too much prescriptive limits creates an efficient path towards excellence.

8.3 Future Recommendations

During the development of the framework and the Value Stream Approach other areas to investigate and examine have been visualized. The content for the other approaches within the Operations module have been discussed and aligned during meetings with the Change Agent Team and will be the next step in the development of the improved Haldex Way. The Operations module has a clear focus on the production and distribution sites and therefore these are most appropriate to develop and roll out first.

The other modules are applicable for global business process and focuses on the corporate strategy and resource development. These modules and approaches will therefore demand a completely new perspective and substance. Especially the Preparations module, which will be applicable for the global business processes and administrative processes, have been an interesting topic during the development of the improved framework. The importance of incorporating these areas and processes into Haldex Way has been more and more evident as time passed. Since the development of the entire Haldex Way will take a lot of time it is also important to continuously improve and update the Value Stream approach.

Even though the plan is for the entire Operations module to be completed in the end of 2013, the momentum of the currently existing Haldex Way needs to be maintained. This means that Tier level challenges must be conducted accordingly to schedule and that all sites must commit to improving their operations.

8.3.1 Implementation plan

An implementation of the improved Haldex Way should be conducted gradually and initially start with a few sites in order to align, adapt and ensure applicability of new concept.

Releasing the improved Haldex Way demands a well-structured implementation plan that defined how to communicate the new improved concept. The authors' have during the interviews with the employees and discussions with the supervisor at Haldex recognized three key success factors for the implementation of the improved concept:

- *Recognition from the currently existing Haldex Way.*
- *An aligned perception about applicability of the improved Haldex Way.*
- *The communication of the more pragmatic approach in the improved Haldex Way – what value is the processes creating and what result are we seeking.*

The other parts of the improved Haldex Way, including all modules and within the closest time frame the approaches within the Operations module will be developed and are during development by the Change Agent Team at Haldex. The Change Agents have been a part of the steering committee and will also be the owners of the improved Haldex Way. It is therefore important to anchor the framework and structure of the improved Haldex Way to ensure continuity by the Change Agent Team.

A perception that was discovered during the interviews and observation were that people referred to having scheduled specified Haldex Way time. Since Haldex Way should be the way of working at Haldex it is important that the improved Haldex Way change this mindset. The work of involving all employees within Haldex Way is a great challenge and demands that all parts of Haldex is incorporated and continuously reviewed in the improved Haldex Way.

8.4 Personal Reflections

A lot of experiences have been gained through the possibility to conduct this Master Thesis at Haldex in Landskrona. Being a part of the development of the work with continuous improvements has been very interesting and motivating. It has been a great opportunity to be located in the production site in Landskrona and daily feel the pulse of the production.

During the study visit in Weyersheim the atmosphere and the reception was very welcoming. The greatest experience from the study visit was the realization that the similarities are larger than the differences between Haldex distribution and production sites. Even though a lot seems different at a first glance, the similarities in the different working areas and processes are limited.

We appreciate all the help and support received during the thesis from all involved, and a special thanks to our supervisors at Haldex and the Faculty of Engineering, Lund University.

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Pia Hellgren-Johnsson, *Dispatch*, Landskrona, 4 April 2013

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Martin Tegnér, *Manager Customer Service/Logistics*, Landskrona, 21 March 2013

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Eline Van den Molengraft, *Sales Assistant*, Weyersheim, 24 April 2013

Jonas Österberg, *Manager Machining*, Landskrona, 19 March 2013

Appendices

Appendix A, Haldex Dashboard

Gold Tier Challenge

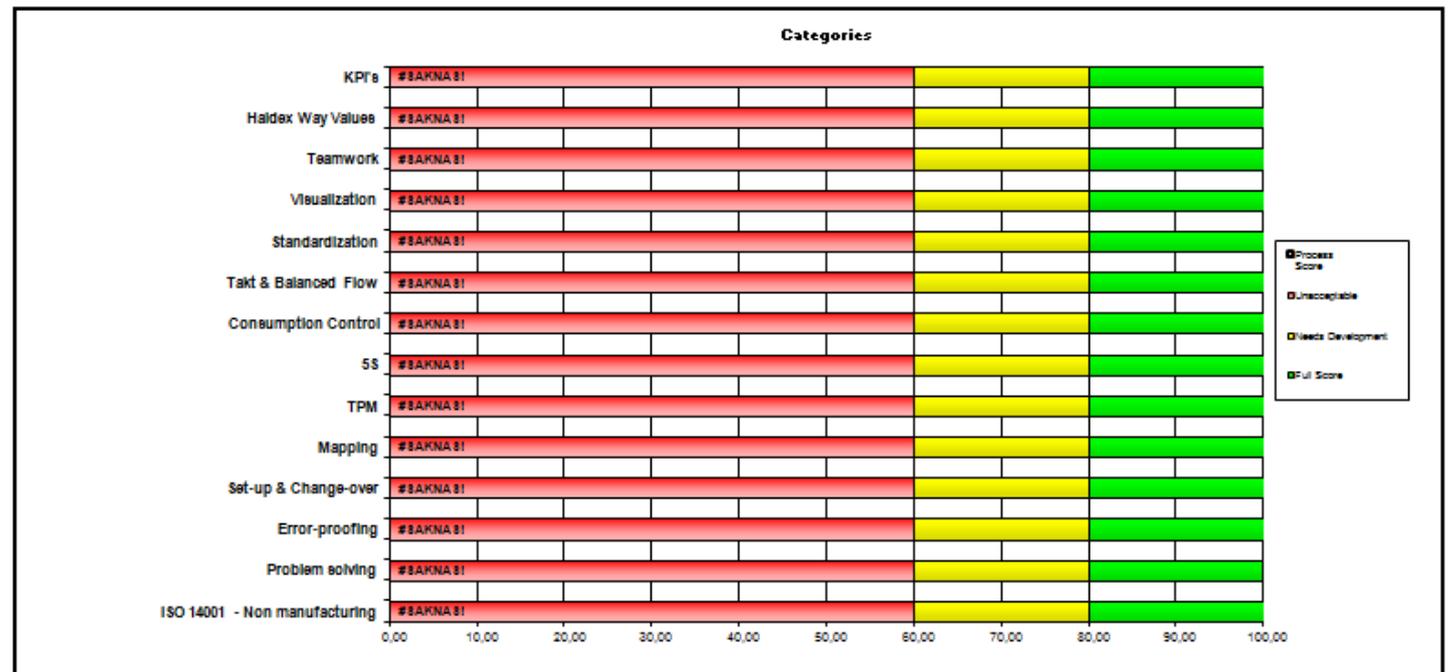
Location:

Conducted by:

Date:



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Appendix B, the Flow Optimization Way

Results: Flow Optimization



Reduced work in process and buffer stocks as well as improved estimation of service delivery process and process outcome

- Improved control and optimization of the flow will improve the **inventory days** because an efficient flow has the knowledge of what is needed and can limit the amount of unnecessary material in the inventory.
- Improved optimization of the flow means that the internal processes from incoming of material to sent to customer can be reduced and the **delivery performance**, delivering what the customer wants on-time, can be improved because of the reduced period of time material needs to spend on the sites when optimizing the flow and controlling and managing the operations.



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Approach: Flow Optimization



Creating efficient and effective flow optimization

- Three key factors must be in place and well-functioning to ensure accurate and successful flow optimization, enabling world-class value stream performance:
 - An understanding of the concept of takt time, awareness of what and how to measure. Calculation of takt time as the effective working time available per shift divided by the customer demand per shift. Visualization of takt time to ensure that the numbers calculated are embraced, understood and used in the daily work.
 - Overview and understanding of the currently existing consumption control methods. Evaluation of different consumption control mechanisms such as kanban, min/max levels and two-bin system.
 - Definition and understanding of the concept of standardization as a working method to limit the variations when optimizing the flow. Establishment of standardization, such as standardized work methods and standardized formats and templates with methods on how to perform the specific process. A standardized normal state needs to be established to enable continuous improvements.



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Deployment: Flow Optimization – Roles & Responsibilities



Understanding the flow by conducting Value Stream Mapping

- To create a common and generally accepted understanding of the entire value stream of material and information flow. Value Stream Mapping based on the value created towards the customer can be used.
 - It is important to understand that Value Stream Mapping is a tool to visualize the value stream flow of material and information, even if the value stream can be known for some people, conducting Value Stream Mapping will facilitate the overall understanding and can for example be used in training sessions for explaining the flow from supplier to customer.
 - Value Stream Mapping is a regular activity used for improvements, to continually identify improvement opportunities. The Value Stream Mapping needs to be documented with maps, activity lists, meeting minutes, time lines and responsibilities. The current and future state maps are created within days of each other and one individual is responsible for continually developing and improving the total value stream with activity lists visualized with scope and title.



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How to conduct Value Stream Mapping
-Value Stream Mapping Guidelines

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Deployment: Flow Optimization – Roles & Responsibilities

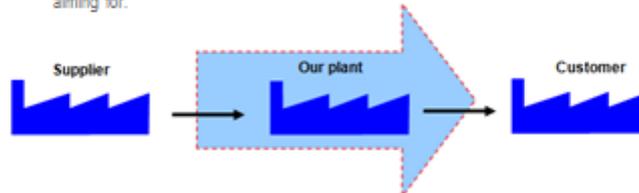


Visualizing completed Value Stream Maps to communicate the information

- Completed value stream maps should be visualized on boards close to the value stream and used as input in continuous improvement.
 - Knowing and understanding the value stream and the influence upstream and downstream in the material and information flow will enable increased understanding of the impact on the final product and create an opportunity for potential improvement.
 - Understanding how each and every employee contributes to the finished product will increase the motivation and willingness to improve as a part of the total value stream.
 - Being able to visualize the value stream map performed for the material and information flow will explain how the flow currently looks like and where the desired future state is aiming for.



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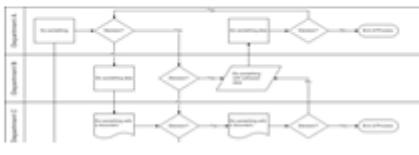
Deployment: Flow Optimization – Roles & Responsibilities



Establishing methods for managing material

- To bring transparency to the process, combined with clarifying the activities, process mapping with swim lanes is conducted in teams. Other tools and methods that can be used are organizational chart, responsibility matrix and available escalation structure.
- Working methods for managing material need to be established to understand what affects the inventory levels and to visualize the errors that the inventory is hiding.





How to visualize roles and responsibilities for flow optimization
-Process Mapping Guidelines

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Deployment: Flow Optimization – Roles & Responsibilities

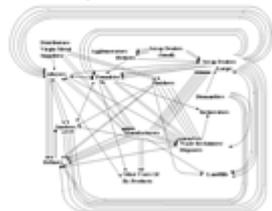


Establishing methods for managing material determined by the physical layout

- There are different methods and tools for improving the managing of material. Analyzing and improving the physical layout of material on the different sites can improve the managing of material. Different methods for analyzing and improving the physical layout of material on the sites are for example:
 - Spaghetti diagram, used to visualize and analyze the movement between the locations of material. The result is used to visualize improvement opportunities of material locations to improve the managing of material.
 - Heat map, used to visualize the most frequently visited material locations. Maps of the locations and frequencies can be used to analyze and improve the locations to be most frequently picked from.







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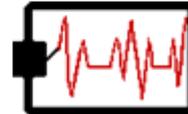
Deployment: Flow Optimization

- Takt



Understanding takt time

- Ensure that the definition of takt time is clearly communicated and well-known and established throughout the organization.
 - Establish the concept of takt time as the initial step for implementing takt time on the local site.
 - The concept can be introduced through train-the-trainer practice, which means that when the managers at the local site are educated in takt time they can spread it downstream in the hierarchy. When the person performing the process that directly affects the takt time is aware of the performance's impact on the final results it will enable for increased participation and monitoring of the takt time.
 - When the reasoning and purpose of takt time is understood, the numbers for the takt time calculation can be gathered.
 - Since takt time is calculated as the effective working time available per shift divided by the customer demand per shift those two parameters need to be found and an effective way of continuously gathering the specific data needs to be in place. Preferably, if the numbers can be automatically found in the ERP- or MRP-system, and generate the takt time so it continuously can be up to date and changes can be visualized in real time. Volumes and daily orders should be controlled by the takt time.



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Deployment: Flow Optimization

- Takt



Understanding takt time

- The takt time for a specific line is a part of the company's overall takt time. Each cell-team is responsible for their individual part of the deliveries towards customers through the utilization of the available time.
- The takt time is kept constant until a new balancing of the input data is performed. Calculation of takt time is done according to customer requirements with appropriate changes and adjustments.
- Frequently reviewing the takt time and customer orders will indicate spikes and declines and can therefore be adjusted accordingly. Documentation is available for review.



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Deployment: Flow Optimization

– Takt



Visualizing takt time

- If the takt time numbers are understood, then large benefits can be gained by visualizing the takt time.
 - By visualizing the takt time numbers, both positive and negative trends can be identified. By identifying these trends in cause and effect diagrams opportunities and suggestions for improvements will develop and reasons for the trend can be explained.
 - Understanding the current situation and receiving continuous updated information facilitates the decision making and provides a guideline on how to work with the available work time for improved performance that meet or exceeds the customer requirements.
 - Process KPI's can visualize if the trend is positive or negative.
- The takt time can be visualized on electronic display boards or manual boards which clearly shows how far ahead or behind the customer demand the production currently is, and where operators write information to manage the resources.



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Deployment: Flow Optimization

– Limiting Variations



Evaluating and investigating different consumption control methods

- When introducing different consumption control methods such as; pull, kanban, min/max levels and two-bin systems, a number of key components are identified, documented and analyzed. Improvements and development of consumption control can have the following sequencing:
 1. Identified key components, e.g. A and B classified products in ABC classification, vendor managed items and bulky items for internal warehousing, and external processes should have pull signals.
 2. As the knowledge of consumption control increases so should the knowledge and intuition about key critical components and no distinction can any longer be done between A, B or C classified products. Pull, kanban, min/max levels and/or two-bin system are used for minor components.
 3. To enable continuous improvements of consumption control methods, detailed descriptions and analyses of the internal flow combined with systematic implementation of pull systems on all key components are required. This enables the inventory to be well controlled by both consumption control and a pull system.



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Deployment: Flow Optimization – Limiting Variations



Evaluating kanban

- When process stability has been initiated and the value stream is identified, kanban can be evaluated whether it is suited for the specific line and/or site. Kanban cards are not easy to implement or integrate into a system, but if it is suitable it can bring significant benefits to the processes.
- Different actions can be taken for the people responsible for kanban depending of if the material to replenish is available in the warehouse or not:
 - If the material is not available at the local site, the material planner needs to be informed, if not already done, to update delivery performance and other appropriate KPI's.
 - The shortage can then be signaled to ensure that the department responsible for receiving incoming goods is aware of the need for this specific material and can inform the people responsible for kanban when the material has arrived.
 - If the material is available a journal is used for withdrawal of the location and the material is picked. The journal is booked, signed and archived in electronically. The kanban card is then placed on the pallet and placed on the marked spot initiating the kanban activity.



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Deployment: Flow Optimization – Limiting Variations

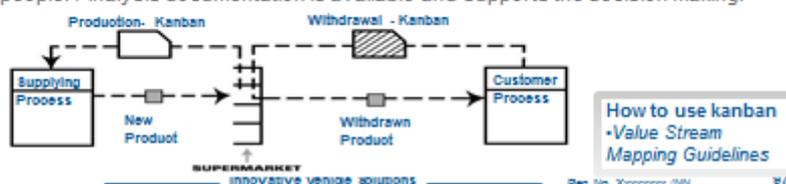


Implementing kanban

- The kanban process is documented with who does what and when etc. for example by flow charts, swim lanes, process maps, etc.
- The operators have good knowledge of the kanban method and can easily see the status of the system and that it is working well with the inventory being maintained. The operators are also able to explain or show how kanban works in their area and explain their role in the process.
- The kanban work tasks are reviewed with evidence of on-going analysis, documentation of any necessary changes and communication to appropriate people. Analysis documentation is available and supports the decision making.



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Deployment: Flow Optimization – Limiting Variations



Investigating min/max levels as a consumption control method

- People responsible for inventory control and material planning establish two levels of stock, maximum and minimum level.
- Setting min/max levels should be carefully considered, and there are some constraints that need to be taken into consideration:
 - The min/max levels method assumes steady and constant demand.
 - The method often fails when the customer order sizes are large compared to monthly demand.
 - Manual intervention is necessary to respond to variability in replenishment time.
 - Encourages people to place orders that are larger and less frequent to reduce purchasing cost.
- By being aware of the drawbacks of the method for setting min/max levels precautions can be taken, and diligence is required to maintain the correct stocking levels.



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Deployment: Flow Optimization – Limiting Variations



Evaluating different min/max levels

- Although initial inventory levels should be set using the maximum expected consumption over the average replenishment period, subsequent ongoing replenishment should be based upon actual consumption.
- Any decision to order less frequently should be reversed. Higher frequency of order and delivery reduces order lead times and, therefore, reduces the level of inventory, which must be on hand to protect sales.
- Continuous improvement of the min/max levels can be obtained by:
 - Assessing the current situation, investigating immediate threats and long-term needs.
 - Building knowledge and understanding across the supply chain, at all levels.
 - Utilizing systems that deliver actionable information, integrated with the ERP- or MRP-system.
 - Working on refining the levels until the expected results are achieved.
 - Providing updated data to continually improve the results.



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Deployment: Flow Optimization – Limiting Variations



Considering two-bin system

- A two-bin system is usually used for small or low value components.
- It typically consists of two bins placed sequentially in-front of each other.
 - When the front bin becomes empty, the bin behind is pulled forward.
 - The empty bin is collected by a person responsible for managing the material for replenishment and enables the operator to continue picking components from the bin.
 - The empty bin is filled or replaced with a new one and placed behind the existing bin.



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Deployment: Flow Optimization – Limiting Variations



Introducing and establishing operations status visualization

- Communication boards need to be introduced in each operations area with specific information. A primary visual display board keeps employees focused on the key issues or KPIs that the employees are tracking and evaluating.
 - Digital boards for each production line can communicate real time information to cell teams, technicians, managers and other people involved that have established the lines' production takt time.
 - Communication boards should be standardized with what information to include and requirements of the layout.



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How to establish operations status visualization
-Main Communication Board Standard
-LDMS Guidelines

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Value Stream Mapping as a tool to visualize improvement opportunities

- Value Stream Mapping is a regular activity used for improvements, to continually identify improvement opportunities. The Value Stream Mapping needs to be documented with maps, activity lists, meeting minutes, time lines and responsibilities. The current and future state maps are created within days of each other and one individual is responsible for continually developing and improving the total value stream with activity lists visualized with scope and title.
- Conducting the future state map will visualize the business objective and be in close connection to the targets that are set, since the future state is the desired outcome and the numbers of the targets set should act as a way of how to improve the current state and a guidance of why to improve.



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How to assess and refine flow optimization

- *Value Stream Mapping Guidelines*
- *Challenge Template*

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Appendix C, The New Haldex Way Challenge Template

Approach:		0%			25%					50%					75%					100%		
Sound: - Prioritization and selection of appropriate value stream ways. - Definition of stakeholders. - Refinements have been embedded in the approach over time.	No evidence or anecdotal	Some evidence					Evidence					Clear evidence					Comprehensive evidence					
Integrated: - Appropriate links to other ways and approaches. - Choice of approach and ways is motivated and supports strategy.	No evidence or anecdotal	Some evidence					Evidence					Clear evidence					Comprehensive evidence					
TOTAL for Approach	Write score	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Deployment of Haldex way for Supplier & Customer Interaction:		0%			25%					50%					75%					100%		
Implemented: - Clear and structured roles and responsibilities for supplier and customer interaction, established through process mapping with swim lanes or other appropriate tool. - Well established supplier and customer communication about forecasts and firm orders, and willingness of information sharing. - Deployment of Supply Chain Improvement Program (SCIP) to improve supplier delivery performance. - Measurement and evaluation of customer satisfaction by survey, dialogue, customer classification of Haldex as a supplier or other tools.	No evidence or anecdotal	Implemented in 1/4 of relevant areas					Implemented in 2/4 of relevant areas					Implemented in 3/4 of relevant areas					Implemented in all relevant areas					
Systematic: - the way is deployed in a timely and structured manner with the ability to make appropriate adaptations to environmental and performance related issues	No evidence or anecdotal	Some evidence					Evidence					Clear evidence					Comprehensive evidence					
TOTAL for Deployment	Write score	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

		0%					25%					50%					75%					100%				
		No evidence or anecdotal					Implemented in 1/4 of relevant areas					Implemented in 2/4 of relevant areas					Implemented in 3/4 of relevant areas					Implemented in all relevant areas				
Deployment of Haldex way for Material & Operations Planning:																										
<p>Implemented:</p> <ul style="list-style-type: none"> - Clear and structured roles and responsibilities for material and operations planning, established through process mapping with swim lanes or other appropriate tool. - Accurate and structured communication about forecasts and firm orders for effective planning processes Appropriate and correctly calculated inventory control parameters for efficient management of the inventory Development and usage of shortage lists for visualization of the need and interrelation between the processes 		No evidence or anecdotal					Implemented in 1/4 of relevant areas					Implemented in 2/4 of relevant areas					Implemented in 3/4 of relevant areas					Implemented in all relevant areas				
<p>Systematic:</p> <ul style="list-style-type: none"> - the way is deployed in a timely and structured manner with the ability to make appropriate adaptations to environmental and performance related issues 		No evidence or anecdotal					Some evidence					Evidence					Clear evidence					Comprehensive evidence				
TOTAL for Deployment		Write score	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100			
Deployment of Haldex way for Inventory Management:																										
<p>Implemented:</p> <ul style="list-style-type: none"> - Clear and structured roles and responsibilities for inventory management, established through process mapping with swim lanes or other appropriate tool. - Categorization of material according to ABC classification for efficient inventory processes - Appropriate procedures for handling obsolete material - Accurate and standardized methods for cycle count 		No evidence or anecdotal					Implemented in 1/4 of relevant areas					Implemented in 2/4 of relevant areas					Implemented in 3/4 of relevant areas					Implemented in all relevant areas				
<p>Systematic:</p> <ul style="list-style-type: none"> - the way is deployed in a timely and structured manner with the ability to make appropriate adaptations to environmental and performance related issues 		No evidence or anecdotal					Some evidence					Evidence					Clear evidence					Comprehensive evidence				
TOTAL for Deployment		Write score	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100			

Deployment of Haldex way for Flow Optimization:

	0%			25%					50%					75%					100%				
Implemented: - Clear and structured roles and responsibilities for flow optimization, established through process mapping with swim lanes or other appropriate tool. - Understanding the value stream and the material and information flow for efficient and effective management of the flow - Understanding, implementing, integrating and visualizing Takt time to accurately manage the capacity and meet the expectations of the customers. - Understanding and evaluation consumption control mechanisms for a streamlined and smooth flow	No evidence or anecdotal			Implemented in 1/4 of relevant areas					Implemented in 2/4 of relevant areas					Implemented in 3/4 of relevant areas					Implemented in all relevant areas				
Systematic: - the way is deployed in a timely and structured manner with the ability to make appropriate adaptations to environmental and performance related issues	No evidence or anecdotal			Some evidence					Evidence					Clear evidence					Comprehensive evidence				
TOTAL for Deployment	Write score	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	

Assessment and Refinement:

	0%			25%					50%					75%					100%				
Measurement: - Use of appropriate process KPI's. - Use of Haldex strategic KPI's. - Measurements are conducted on a regular basis. - Clear and structured ways on measuring planning performance.	No evidence or anecdotal			Some evidence					Evidence					Clear evidence					Comprehensive evidence				
Learning and Creativity: - Learning is gained from internal and external good practices and used to identify improvement opportunities. - Creativity is used to challenge and improve procedures.	No evidence or anecdotal			Some evidence					Evidence					Clear evidence					Comprehensive evidence				
Improvement and Innovation: - Output from measurement and learning is used in improvement journals to identify, prioritize, plan and implement improvements. - Output from creativity is evaluated, prioritized and used.																							
TOTAL for Assessment and Refinement	Write score	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	

OVERALL TOTAL	#####	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100		
		###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	###	##	####	