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Holistic perspective for enhancing the effectiveness of KPIs

A case of Volvo group

Master's thesis in Quality and Operations Management

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Abstract

Ways of measuring the performance in organizations have changed across the years adapting to the requirements of the industrial revolution. One tool that has proved to be efficient to measure business performance are the Key Performance Indicators (KPI). Academic authors mention that the management might know the ideal ways to frame their KPIs, but they fail to find out what is right for them due to practical constraints. Thus the effectiveness of these KPIs might fade.

To study this, a case study approach at Volvo Group is taken to enhance the effectiveness of present KPIs at powertrain engineering from a holistic perspective. Along with gathering related academic information, research methods like interviews, surveys etc, the empirical data was collected to get better understanding and tools like recursive abstraction, KANO and Analytical hierarchical process(AHP) were used to compare the data with literature to draw conclusions from the case.

Two major pillars that impact the effectiveness of KPIs are their characteristics and the support factors. This thesis work explicitly highlights the SMART model and Leading, lagging indicators for analyzing the characteristics of KPIs. For the support factors, the work focuses on Top management support, Strategic cascading, Visual communication and Performance measurement. From the analysis, impact score is calculated for each KPI, to find the ones that needed improvement, the characteristics that needed to be improved are explicitly mentioned and considering the support factors, a KPI board was suggested which is a combination of all four support factors. However, this board could be further tested and refined in the future to adapt to the culture within the organization.

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We would like to sincerely thank the Powertrain Engineering department at Volvo Group Trucks and Technology, for giving the opportunity to conduct this case study at their organization. Also, this work was conducted in collaboration with the Industrial Economy department at Chalmers University of technology.

We are greatly indebted to our supervisors at Volvo, Sören Hansen and Jonna Nygren for their continuous support, providing us direction with collecting the data, getting us in contact with the right people and similar needs. This also helped us channel our focus and scope the problem effectively.

From the academic perspective, we received guidance from Prof. Mats Winroth, Program Director for Master in Quality and Operations Management. He was the supervisor and examiner for this thesis from Chalmers University. He provided us knowledge about various literatures, frameworks and books that could help us connect the empirical findings with the literature facts and in end draw conclusions.

A Special thanks Mats Leijon, from Volvo Construction Equipment for evaluating us from time to time and providing different directions to think and structure this thesis work. This helped us use various frameworks and think from a holistic perspective.

As a part of this thesis, various interviews were conducted and we would like to thank all the interviewees for their time and valuable inputs.

A survey was also conducted where around twenty percent of the total employees in PE departments responded. This gave us more insights for conducting the thesis work, every response was valuable hence we would like to thank each employee for their inputs.

Deepak Balihalli, Nikhita Bhushi, Gothenburg, June 2019

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List of Abbreviations

DCN	Design Change Notice
GPOT	Gate Passed On Time
GTT	Group Trucks Technology
KPI	Key Performance Indicators
PE	Powertrain Engineering
PROTUS	PROTotype follow Up System
QDCF	Quality, Delivery, Cost and Feature
QJ	Quality Journal

1
Introduction

In this chapter, the main picture of the thesis is presented. It starts with the background section mentioning the context which laid the base for the work to be done. Then, the aim of the thesis is described which precisely presents the goals. Problem analysis and research questions further detail the aspects which are concentrated and the exact matter requiring resolution. The scope of the thesis is outlined in delimitation section describing the clear boundaries for the task.

1.1 Background

For any organization, there is a need to continuously analyze how their present business performance is correlating with the strategy. Key performance indicators (KPIs) are measures created at various hierarchical levels to record the performance and align it to the vision or goals of a company. The basis on what KPIs are created and what factors considered while creating them play a very prominent role in usefulness of KPIs.

"If you can't measure it, you can't improve it" says Peter Drucker (MacKenzie,2019) KPIs need to measure accurately how the day to day work is aligned to the company's business strategy. The measurement used should be feasible and correctly depict the ground situation. The next part after measuring is the analysis. The values measured from KPIs should be analysed periodically to see the trends and find the problem area to improve on. New age data analytics tools and software are available to perform this task.

The most important aspect is how KPIs are modelled into the performance measurement framework and to what extent an employee connects his/her targets to his team goals > departmental goals > business strategy. Successful technological firms like Google, precisely measure their progress of daily work and the targets/goals are spread accurately at all hierarchical levels using a particular framework which is improved continuously (Doerr,2019).

Therefore, it is evident that a lot of factors have to be considered to develop sustain a successful KPI culture. Many firms are not reaching/exceeding their potential due to not adhering to the above aspects of creating, measuring, analysing and developing support structure for the successful usage of KPIs. KPIs are seen just as targets

which top management enforces and employees strive to put up the required numbers. But as described above, there needs to be a better junction of many aspects for effective KPI usage.

Volvo Group is one of the world's leading manufacturers of trucks, buses, construction equipment, marine and industrial engines. The Group also provides complete solutions for financing and service. The Volvo Group, with its headquarters in Gothenburg, employs about 100 000 people, has production facilities in 18 countries and sells its products in more than 190 markets. (1). Further, Volvo Group has 3 main divisions. Group Trucks Technology (GTT), Group Trucks Operations (GTO) and Group Trucks Purchasing (GTP)

The professionals in GTT work in research development of vehicles, powertrain, components and service offering. One of the departments in GTT is Powertrain Engineering. Right now, the department is undergoing a reorganization in the last eight months which will continue further for almost a year. Therefore, both the top management and team at Powertrain department want to review to analyze KPIs driving their organization.

KPIs provide a measure of how day to day work of team members is serving the organizational strategy. Data regarding day to day developments are summarized, quantified and reported to top management who then decide upon further decisions based on priority and organizational strategy. Therefore, it is necessary that KPIs should be framed perfectly so as it is easy to measure and reflects reality for managers.

In order to measure business performance in the most effective way KPIs should be aligned with business goals and strategy. For a large organization with multiple units such as Volvo, each business unit of that organization is required to develop its own KPIs to meet its unique strategy, while it's also important to define the top KPIs used in common for all the business units, for the executives to make evaluations from a holistic perspective.

1.2 Aim

The aim of the thesis work is to analyse the effectiveness of present KPIs. Also, discuss factors to be considered to build the support infrastructure for effective use of KPIs. Based on the comprehensive analysis of both the aspects mentioned, the solution for successful usage of KPIs is suggested.

1.3 Problem Analysis and Research Questions

Powertrain Engineering (PE) department at Volvo Group presently has 23 KPIs to measure the operations. The KPIs are further grouped based on the 4 values;

Customer success, Trust and passion, Change and Performance.In the present KPI chart for 2018, numbers inform the monthly performance, trends indicate the cumulative results and red/green/yellow colors specify the scores achieved in relation to the targets. Many of these KPIs have been around for years and have been lacking the impact for effective driving of the business. The time has arrived to analyse their impact on present business scenario.

The present situation at PE-Sweden is very dynamic. The strategic priorities for Volvo GTT have been revised since last two years, the whole department is undergoing reorganization known as PE Next Gear where the organization structure, roles and responsibilities of employees has been changed. Agile transformation efforts are ongoing to bring in more flexibility. Due to all these reasons, the present KPIs designed in before need to be revised. Comprehensive analysis of the present KPIs is needed to understand the limitations and work on improvements in future. Also, the effect of all the organizational changes needs to be considered to provide a good structure and support infrastructure for KPIs.

Based on the problem scenario described, the following research questions are formulated.

1. **What is the impact of present PE Sweden KPIs?**
   The intention is to understand what results and behaviour do the present KPI´s drive on the business.Thorough reflection of present KPI´s is the first step to drive the improvements further and point out the shortcoming areas.

2. **What are the ideal characteristics of the KPIs, what improvements are needed in the existing KPIs?**
   The idea here is to study the ideal characteristics of KPIs as discussed in academics and reflect with the KPIs under study to identify the gap for improvements.

3. **What supporting factors are needed to increase the effectiveness of KPI's at Volvo?**
   Developing apt KPI´s with flawless characteristics is only one part of the issue. Effective support mechanisms are needed to make them more meaningful, effective and sustainable.

1.4 Delimitations

The duration of this thesis work is twenty weeks.Therefore, certain considerations need to be made to achieve the desired results.

The research only focuses on the KPIs used by Powertrain Engineering Sweden department. Although it contains the global powertrain engineering KPIs, the focus of improvement is only delimited to PE-Sweden site as the empirical data considered

only from here. Study of KPIs is conducted more from a business impact perspective, hence restricting the detailed study of technical aspects. The work aims to deliver proposals for changes in KPIs and support mechanisms to improve the efficacy of KPIs, which means the actual implementation of these changes will not be done.

2
Methodology

This section presents the research methodology followed to conduct this master thesis. It begins with the choice of research strategy, research design and the research methods. Finally, a brief description of how the whole thesis was conducted chronologically is mentioned.

2.1 Research Strategy

In the area of business research, two principal research strategies exist; qualitative and quantitative research. A qualitative research strategy emphasizes words rather than quantifications in the collection and analysis of data and implies an inductive approach where theory is an outcome of the performed research (Bryman and Bell,2011). In our thesis, we wish to examine the current KPIs and try to find improvements and plan to make them better. To achieve this a deep understanding of present KPI measurement systems, evaluation procedures and decision models are necessary to be studied. This level of comprehensive understanding and depth is best obtained by qualitative research methods. However, during some parts of the analysis few quantitative methods are used to calculate the impact of KPIs and also some quantitative analysis to translate the findings from survey.

2.2 Research Design

A choice of research design reflects decisions about the priority being given to a range of dimensions of the research process (Bryman and Bell,2011). For this thesis, the chosen research design is Case study approach which deals with complications and unique features present in the task. As a particular organization has a unique way of managing KPIs and the primary interest is in researching how KPIs are driving the business, case study approach is apt. Needless to say, a single case study is conducted here at only one company (Volvo Group) in one location (Lundby, Gothenburg)

2.3 Research Methods

The various research methods employed to perform this thesis are as follows:

1. **Literature Study:** A literature study is performed in order to acquire a greater knowledge of the topic. Mainly there are two kinds of literature which need to be studied. Firstly, it is essential to get more theoretical knowledge about KPI characteristics, measurement, evaluation and different support mechanisms needed to be used in conjunction with them. These works of literature can be found by searching various research articles in Chalmers Library Google scholar. On the other hand, the literature present in the Volvo Group about present management such as how each KPIs are measured, information flow map, decision making structures, communication patterns also need to be considered. Along with this, the literature needed to design semi-structured interviews and effective survey are also studied. After the completion of interviews and survey, sufficient literature is also reviewed to analyse the findings and convert the data into useful knowledge. Overall, this particular research method is employed at various phases of the research

2. **Semi-structured Interviews:** Semi-structured interviews have been employed to conduct the thesis work. This provides a perfect balance as compared to open ended interviews or pre-planned questionnaire. As Gill et. al (2008) opine, Semi-structured interviews consist of several key questions that help to define the areas to be explored, but also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail. This satisfies the main intention of letting respondents speak openly and provide more information within the scope of research.The interviewees are the KPI owners, each of the 7 directors of PE-Sweden, the Vice-President of PE-Sweden and Operation excellence team members. The comprehensive data obtained from all the interviews presents the view of KPIs from its owners who are responsible for measuring and analysing data, directors who act upon the KPI figures and the Vice-President who is in one way the end customer of these KPIs.

3. **Survey:** It is also important to consider the perspective of the employees who work on these KPIs on a daily basis. Therefore, an anonymous survey for all the employees at PE-Sweden is conducted. After developing a basic understanding of KPIs at Volvo and interviews of top management KPI owners, this survey is created and sent. The survey is designed using "Google forms" and is propagated using email as a medium. Survey is comprised of Yes/No questions, Multiple choice, short answers, Kano questionnaire etc. to bring in more variety and extract credible insights. At the end, by evaluating the results of survey true nature of employee perspective on present KPI management can be gained.

2.4 Phases

The thesis work was conducted in different phases. There were multiple phases with recurrence of the various research methods mentioned above. This section explains the journey traversed. The phases are explained below:

- **Phase 1**
  The work started with understanding the basic characteristics, how they make impact on organizations and what could go wrong while using them. After getting a general picture, the culture at Volvo GTT was studied.

- **Phase 2**
  This phase focused on taking up the KPIs at Volvo for 2018 and understanding the definitions of each. During this phase, empirical data was collected mainly from the internal website of Volvo. Data like strategic goals of the company, the definitions and owners of KPIs were gathered.

- **Phase3**
  To get more knowledge about how the KPIs were being measured and evaluated, first a set of semi structured interviews were conducted. Initially, a literature study on framing the interview was done. Then all the KPI owners and the owner of global KPIs were interviewed.

- **Phase 4**
  During this phase, it was necessary to get insights from the top management. From the knowledge from KPI owners, website and literature on how interviews should be structured, all the directors and the Vice President were interviewed. A literature study was also conducted on how this qualitative data could be analysed to draw conclusions. Methods like Recursive Abstraction, Coding were used to analyse this data.

- **Phase 5**
  After understanding the top management views, the next phase was to study the views of teams. There were around 800+ employees hence decision was made on conducting a survey. A literature study was done on conducting survey after which a survey was framed. After initial pilot testing the survey was sent out for all PE-Sweden employees.

- **Phase 6**
  In the last phase of the project, the focus here was to analyze the empirical data and draw conclusions by comparing this to literature.

3
Ethics

This chapter evokes the ethical concerns taken during this master thesis. Initially the steps taken to establish trustworthiness of the study is detailed. The last part describes all the ethical considerations taken while performing various research methods and analysis.

3.1 Trustworthiness

According to Bryman and Bell (2015), there are four criteria to ensure trustworthiness for a qualitative study and these are credibility, transferability, dependability, and confirmability.

To ensure credibility of the findings various measures are employed. Thorough literature study is done previously to ensure good practice before conducting interviews and the survey. Each of the interviews are recorded so as to compare and verify the transcription done of the interview. In case of further doubts, the interviewee is contacted for clarifications. For the survey, the pilot test and discussion with supervisors ensured that the points mentioned in the survey are in the scope for the thesis. As the respondents had sufficient time to reply to the survey (3 weeks) and it was comprised of simple questions which was improved after the pilot test, the resulting findings from both research methods are credible. Inturn, they also act as triangulation of facts as the input is taken from employees, managers, directors and vice-president.

As it is a single case study transferability is reduced. But, the resulting analysis can still be transferred easily to other global sites of Volvo - Powertrain engineering with little or no changes. The insights of improving the effectiveness of KPIs can be useful to other verticals of Volvo group such as complete vehicle, purchasing etc. as they are part of the same Volvo culture with supporting mechanisms being similar. Academically, some findings can be applied to multinational firms with large product development teams to increase the efficacy of KPI management.

To ensure dependability of data over the course of thesis, triangulation of data received from interviews and surveys which are done at different phases can prove to be one option. The transcripts of interviews and survey is coded twice, once by each of thesis students to ensure consistency of findings. External audit was not possible as the research deals with some confidential details.

As both of thesis students were not part of Volvo, this brings in the confirmability as it is analysed through the perspective of third person. The interview insights, data from Volvo website, survey findings etc. are reported by keeping maximum objectivity in mind. Although it is impossible to be utterly objective, the research has been conducted completely in good faith.

3.2 Ethical considerations

During the course of the thesis,various ethical considerations have been taken. The four main areas concerning ethical principles are: participant harm, lack of informed consent, privacy invasion and deception (Diener Crandall,1978). All of these principles are kept in mind throughout the duration of the thesis.

The interviews were conducted after informing the interviewees about the intention of questions and how the data will be handled. The duration of the interview was clearly mentioned priorly and was adhered, thus negating any chance of deception and lack of informed consent.Interviewees had option to not answer if they thought it would bring any harm upon them. The resulting transcripts and audio records are safely guarded and not shared with any personnel ensuring no participant harm.

The survey was sent out with clear description about the need, the format, appropriate amount of time taken to complete and data usage rules. As there was no personal demographic data collected in the survey and no emails collected from the replies, there was complete privacy of the respondents. The survey was verified by the top management and sent out through official PE-Sweden communication channels to bring in more credibility. The information uncovered from the survey was only accessible to both the research students ensuring complete protection.

Concerns regarding Data protection, reciprocity and trust were also considered. All the interview and survey data was stored safely in company provided laptops. The cloud data storage was verified to be GDPR compliant. Reciprocity and trust between researchers and respondents was the base for the whole thesis. Both acknowledged the advantages of participation and helped each other.

4

Theory

This chapter gives a detailed description of the theoretical concepts used to support the thesis work. The chapter begins with a brief description about Balanced Scorecard framework on which most of firms base their performance measurement. Then the theory about various aspects of KPIs such as principles, characteristics, frameworks and categorization are detailed. Thereafter, the four important support factors for KPIs are discussed one by one. In the penultimate subchapter, the theory related to conducting and analysing interviews is presented. The final part concerns the theory related to administering and investigating the survey.

4.1 Balanced scorecard

Performance measurement has been followed in the industries since old times. As the years passed the systems used to measure performance developed adapting to the requirements. Bourne et.al (2000) mention the criticisms made on the traditional measurement systems, such as short termism, lack of strategic connection, lack of continuous improvement etc. In order to overcome them and reconsider the methods of measuring performance, different authors have come up with different frameworks to encourage a balanced view.

Kennerley et al.(2003) mention that organizations have redesigned their current management systems to ensure that they reflect their current environment and strategies. One of the best known frameworks for multidimensional performance measurement was the Balanced Scorecard framework. It is aimed at being more proactive and emphasized on balancing financial, internal, nonfinancial and external measures. This framework has been explained in the next section.

Kaplan(1992) explains the Balanced Scorecard framework in detail, he mentions that it gives managers a way to look at the business from 4 different perspectives as mentioned above. It answers the following questions:

- How do the customer see us?
- What must we excel at ?
- Can we continue to improve and create value?
- How do we look to our shareholder?

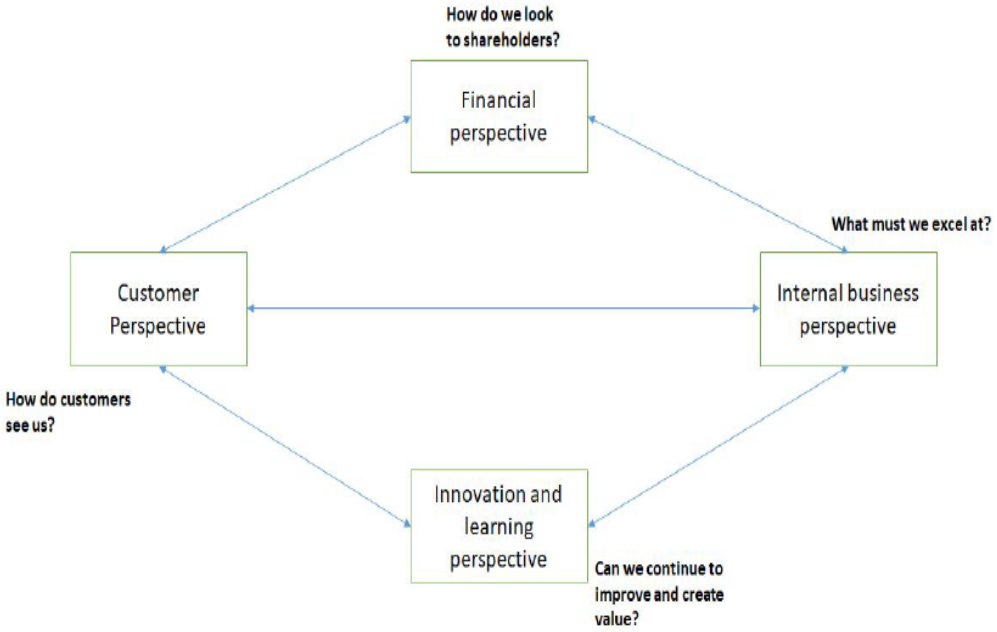

Figure 4.1: Adapted from Kaplan(1992), The balanced scorecard links Performance measures

In the article they represent this framework in figure 4.1:

1. **Customer Perspective:** Customer is the focus for every organization. Kaplan(1992) quotes that "To be number one in delivering value to customers is a typical mission statement" making it one of the top priorities for the top management. This dimension gives the company a view on how they satisfy their customers. Are they performing well enough to deliver their best. This framework demands the managers to translate their mission statement with respect to the customer into specific targets. He mentions the 4 categories in which a customer's concern would fall. They are time, quality, performance and service, cost. These 4 categories have been explained below:

   (a) **Time:** Customers value the lead time, which the time companies take to meet the needs of their customers. Depending on the situation the definition of the lead time is adapted. Kaplan (1992) exemplifies a few like, in manufacturing the products lead time is measured from the time the order is received until the product is delivered to the customer, whereas for new products the lead time is the time to market. Thus, time plays a major role in keeping the customers happy.

   (b) **Quality:** It is nothing but the defect level of the products delivered to customers.

(c) **Performance:** The combination of the performance and service, measuring how the products contribute value to the customers.

(d) **Costs:** Customers see price as one single component of cost they need to pay for while dealing with the supplier. Hence, the companies need to be sensitive to balancing the costs, various costs incurred like ordering cost, scrap cost etc need to be considered to reduce the non value added costs and hence making better profits.
These categories explain what factors need to be considered from a customer point of view while developing measures in the balanced scorecard.

2. **Internal business Perspective:** After having the customers perspectives the managers need to focus on the factors or operations that are critical to enable them to satisfy their customers. This could be done by starting off with the factors that affect the cycle time, employee skills, productivity etc which in-turn have an impact on the customers. The top management need to consider the competencies of the employees and have a judgement on key internal processes since most of the work that affects the critical factors like cycle time, happen on workstation level or team level. This framework lets the managers make targets which in turn ensures that the team members on lower levels have clear goals or action plans that contribute to the overall mission of the company

3. **Innovation and Learning perspective:** In the competitive environment the companies need to improvise on their existing products or services, which in turn affects the existing products and processes which make them capable to introduce entirely new products. Kaplan(1992) quotes that " A company's ability to innovate, improve and learn ties directly to the company's value". Hence, it is critical to consider and measure aspects like knowledge management, which keeps track of the innovation and learning in hand with the three other perspectives of the balanced scorecard

4. **Financial Perspective:** Kaplan(1992) quotes that "The disparity between the improved operational performance and disappointing financial measures creates frustration in top management". Though the market is developed and the financial measures no more lead to customer satisfaction, it is still necessary to keep track of the cash flows. He explains that the financial performance is an action of operational improvements. Apart from having the other three perspectives in the balanced scorecard, if the managers fail to convert their operational performance to the financial performance they need to rethink the strategy and implementation plans. Thus, it is necessary to directly or indirectly have financial measures in place to complete the balance scorecard.

4.2 KPI characteristics

Key Performance Indicators (KPIs) defined as the navigation instruments by Marr (2019) says that they are used by the managers to keep track of the business and know if it is on a successful voyage or veering off. Parmenter (2015) defines them as the indicators that focus on aspects of organizational performance that are critical for current and future success of the organization. Due to the dynamic environment, competition satisfying the needs of customers with a certain budget is not an easy task, hence Locke and Latham (2002) say that goal setting and feedback improve productivity.

They are not just followed by the managers, but they act as good compass for the teams says Petaschnick (2017). It gives them a way to visualize if they are on the right path towards the strategic goals of the organization. Zhang et al.(2017) allude that using KPIs have proved to improve quality and detect process faults and are closely related to measurable process variable which might be difficult. Choosing the right set of KPIs is challenging for the organization.

4.2.1 General principles

A certain set of general principles or guidelines have been put forward by Kerzner(2013) which are mentioned below:

- KPIs are agreed to beforehand and reflect the critical success factors on the project.
- KPIs indicate how much progress has been made toward the achievement of the project's targets, goals, and objectives.
- KPIs are not performance targets.
- The ultimate purposes of a KPI are the measurement of items directly relevant to performance and the provision of information on controllable factors appropriate for decision making that will lead to positive outcomes.
- Good KPIs drive change but do not prescribe a course of action. They indicate how close you are to a target but do not tell you what must be done to correct deviations from the target.
- KPIs assist in the establishment of objectives to be targeted with the ultimate purpose of either adding value to the project or achieving the prescribed value.
- KPIs force us to look at the future, whereas metrics alone may allow us to get bogged down looking at history.

4.2.2 Characteristics

The characteristics of good KPIs have been described by various authors in different ways. Though they have a similar basic concept, the characteristics might vary. Based on the literature study conducted, Kerzner(2013) mentions 12 characteristics

of a good KPI. This list of characteristics covers most of them and thus have been described below:

- **Aligned:** The KPIs need to be linked or must be in line with the corporate strategy of the company.
- **Owned:** They need to be owned by an individual or a group of people. This makes someone accountable to collect the data, analyze and keep track of that KPI.
- **Predictive:** This basically means the KPIs need to be leading in nature. The KPIs measure drivers of business value.
- **Actionable:** The KPIs need to be timely and with actionable data, which helps the users of those KPIs can intervene to improve the performance before it is too late.
- **Few in Number:** The KPIs need to focus on a very few high valued tasks, which means they must not scatter their attention on other tasks.
- **Easy to understand:** The KPIs should be clear and straightforward to understand. It must be easy for the influencers to easily judge on how they can impact the results and take necessary actions to perform better.
- **Balanced and linked:** The KPIs need to reinforce each other and not suboptimize each other.
- **Trigger changes:** Continuous improvement is one of the key for success, measuring these KPIs should trigger positive changes in the organizations.
- **Standardized:** It means that the KPIs must have a defined set of rules and standard definitions. Across the cross functional teams they need to have similar calculation and standard way to conclude the results.
- **Context driven:** KPIs put the performance in certain context by the use of targets so the users can gauge their progress over time.
- **Reinforced with incentives:** The impact of the KPIs can be magnified by attaching incentives to them. This keeps the employees motivated and follow the KPIs.
- **Relevant:** KPIs eventually loose their impact over time. As the time proceeds they need to reconsidered and refreshed periodically.

Apart from these characteristics, frameworks were proposed by authors to set goals and KPIs. One such framework is SMART, which has been described in the next

section.

4.2.3 SMART framework

"The establishment of objectives and the development of their respective action plans are the most critical steps in a company's management process," says Doran(1981). It is clear that objectives or goals are different from the action plans, and these actions plans act as the indicators to measure if the organization is moving towards the right goals. Shahin(2006) also gives examples of how the key performance indicators are different from the actual goals of the organization. He mentions that the indicators are used to measure the progress towards achieving the goals, and each of them must be based on criteria that make them easy for analysis. Most often used model which describes these criteria is the SMART(Specific, Measurable, Attainable, Realistic and Time Sensitive), which is represented in figure 4.2.

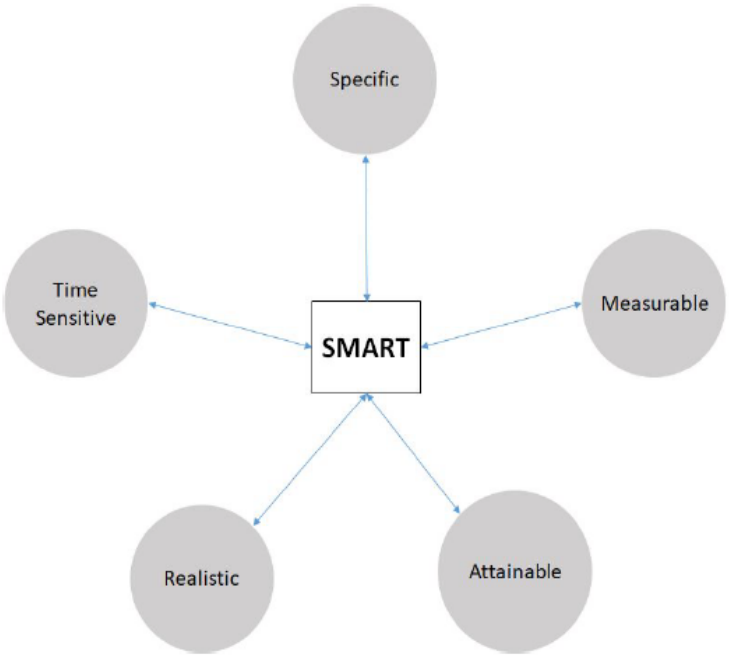

Figure 4.2: Adapted from Shahin(2006), SMART Model

Each of these criteria have been explained below:

- **Specific:** The measures need to be as distinct as possible and detailed enough. If the measures are broad and not desirable, it is difficult to analyze the root causes in case they are not met.

- **Measurable:** The KPIs need to be easily measurable and an indicator of progress, it is a way to ensure that the goal has been achieved or not. They could be qualitative or quantitative, but not ambiguous. It also helps to base

decisions on facts which are measured, clear and concrete. To do so, the measures need to be tallied against a certain standard of performance or expectation.

- **Attainable:** The set of measures should not be out of reach. They need to be practical, based on the resources and potential to achieve the targets.

- **Realistic:** Extending the concept of being attainable, they need to be realistic for the given working conditions. As Shahin (2016) quotes that "Being realistic in the choice of goals in helpful in examining the availability of resources and selecting KPIs..

- **Time sensitive:** For every measure there needs to be a certain time frame in which it needs to be successfully achieved. It is helpful to breakdown and plan the indicators or tasks and measure success along the path of reaching that particular goal. Toledo(2005) says that this assists in developing a realistic action plan.

Apart from these definitions of the SMART goals setting, a new acronym SMARTER has also been developed as described by Wade(2009). In this framework E represented evolving and R represented Recorded or reviewed which are described below:

- **Evolving:** Hersh(2012) mentions that the measures change with time. As the time progresses, the resources and capabilities change, the goals also must be re-tuned or reconsidered.

- **Recorded:** The measures need to be documented and updated from time to time

This framework was described differently in the distinct articles. Each letter was slightly adapted to the situations described in those papers. Hence, they were collected and adapted from Wade (2009) as follows

S- Specific, significant, stretching, simple, stimulating, straight forward, self owned, self managed, self controlled, strategic M- Measurable, meaningful, motivational, manageable, maintainable A- Attainable, agreed upon, actionable, ambitious, acceptable, aligned, accountable, achievable R- Realistic, relevant, reasonable, rewarding, robust reviewable T- Time sensitive, tangible, trackable, tactical, traceable E- Ethical, exciting, enjoyable, evaluated, engaging R- Recorded, reviewed, rewarded, resourced, research based etc.

4.2.4 Categorizing KPIs

Smith R(2001) defines KPIs as the indicators that combine several metrics to yield objective performance facts. Two such metrics are:

- Financial and non-financial KPIs
- Leading and Lagging Indicators

Such categorization is done based on what the KPIs intend to indicate. These have been explained in the section below:

4.2.4.1 Financial and Non-Financial KPIs

White(1996) mentions that historically the way used to measure a company‘s performance have been the financial measures. The indicators that represent the financial values are categorized as the financial KPIs. Kaplan(1992) describes the typical financial goals as the ones which have to do more with the profitability, growth and shareholder value. Parmenter (2009) in his book suggested cost of goods sold / sales, scrap cost as % age of total sales, A/c Receivable turnover, cash flows, days in inventory, days sales in receivables, net income, sales, number of profitable customers, return on equity, sales by product, sales growth rate, return on assets and return on capital employed as the measures of the financial performance of the organizations. Bhatti et al.(2014) also describes about the use of financial KPIs to measure the performance.
The other category of non-financial indicators are the ones which focus on other aspects for instance cycle time, customer satisfaction etc.

4.2.4.2 Leading and Lagging Indicators

Another set of a category that could be used is based on the values of them the KPIs, they can be classified into two different categories, leading and lagging indicators. Smith R(2001) explains the two categories with a live example. He gives an example of a person driving a car down a road. When a driver deviates from the driving lane and veers on the shoulder of the road the tires run over “out of lane” indicators. He correlates these lanes to KPIs which are approaching a critical condition. Such are the leading indicators which measure and track performance before problems arise.

In the same driving situation, in case there was no “out of lane” indicator the car would go offroad when a reactive approach would be needed to fix issues. This is correlated to a lagging indicator where the problem can be approached of solved only after damage has been caused. Based on this understanding the two categories have been elaborated below:

- **Lagging indicator:** These are the indicators which depict measured which could be used to analyze only after the results are obtained. Manuele(2009) mentions that it is defined as a measure that only changes after the changes are done and such indicators are helpful in confirming the trends. Mannick et al. (2019) name them as the “after-the-fact” indicators, measuring the events that have already happened. He states that they are reactive in nature, since the data from the past periods could be used for future developments and

organizational responses often occur in reaction to such measurements

- **Leading indicator:** The indicators under this category are the ones which present or depict a trend which could be used to predict the future. Manuele(2009) describes them as it is a measurable factor that changes before the results follow a particular pattern or trend. The changes in these indicators may foresee the results, although not with great accuracy. These are typically input oriented indicators which concern with the efficiency of analyzing if the work is done in the right direction.

4.3 Support factors for KPI´s

Choosing the right KPIs is a very important aspect to drive the business, apart from that it is also important to ensure few soft aspects which trigger the successful implementation of those KPIs. Kerzner(2013) in his book states several reasons for failure of KPIs like people believing it was the task of line managers, employees believing that their actions do not contribute to the KPIs etc. This proves that these soft aspects need to be taken care of while implementing the KPIs. Few of them used in this thesis work have been elaborated below.

4.3.1 Top management interest/vigour

Cox et al.(2003) proves in his research that based on the level of experience and position of the stakeholders in an organization, the level of interest and involvement for using the KPIs varies. Young et al.(2008) assert that 'when a senior management project sponsor/champion, the CEO and other senior managers devote time to review plans, follow up on results and facilitate management problems'. They also added that the time spent must be proportional to the cost and be aware of the updates. As the teams follow their leaders, it is very important that the top management should follow the KPIs.

4.3.2 OKR - Objective and Key Results

The author of the book "Measure what matters" (Doerr, 2019) defines the OKR model as a collaborative goal setting protocol for companies, teams and individuals. An "Objective" is simply what is to be achieved. Nothing more or less. Therefore, they need to be concretely defined, action oriented and provide inspiration to people.
"Key Results" are used to monitor how the objectives are achieved. Therefore, the period should be defined, they should be aggressive in nature and feasible to achieve. The author also suggests that there should not be more than 5 objectives and each objective should have 3-5 key results associated with it.

Basically, OKR is a framework which provides a lot of freedom for the employees to set their targets and encourage them on specifically how they want to measure the progress. It combines responsibility and challenges which in turn makes the employees to be more organized in their goal setting. Using this method, it will be easy for top management as well to clearly measure the performance of employees.

The 4 OKR superpowers mentioned by Doerr (2018) are:

- **Focus and commit to priorities:** OKRs push the leaders to make fixed decisions thus increasing the focus area and removing any ambiguity. Also, they act as a precise communication tool for teams and the individual employees.

- **Align and connect for teamwork:** With OKR transparency, the goals from CEO till Interns are available to everyone. This enables individuals to link their objectives to the top management strategy and coordinate horizontally with other team members.

- **Track for accountability:** As OKRs are constantly checked with the progress discussed frequently, the accountability increases as individuals measure their progress with hard data. But it is important to conduct it in no judgment accountability.

- **Stretch for amazing:** OKRs motivate the people to work hard and achieve their objectives by constantly monitoring their key results. It provides the freedom to fail and be creative.

Until now, the theory and benefits of OKR mentioned by the author is discussed. In the next part, the adaptation of OKRs by Volvo Group is presented. Volvo wishes to employ this idea of OKR in their tool to measure the performance. The tool is named as “Performance touchpoint”.

Here the main focus is how Volvo encourages it employees to set the goals, format for breaking down the goals and the guidelines presented. All the data is obtained from the Performance touchpoint page (2019) available from the intranet website Violin..

1. **Setting the goals:** The three main questions to be asked here are.

    - Where do you want to go? (The objectives)
    - How you will know that you are getting there? (Key results)
    - What will you do to get there? (Key actions)
      Based on the idea behind the three questions the employees are guided to set their goals.

2. The breakdown of the top level objectives into daily tasks is neatly described in the figure 4.3

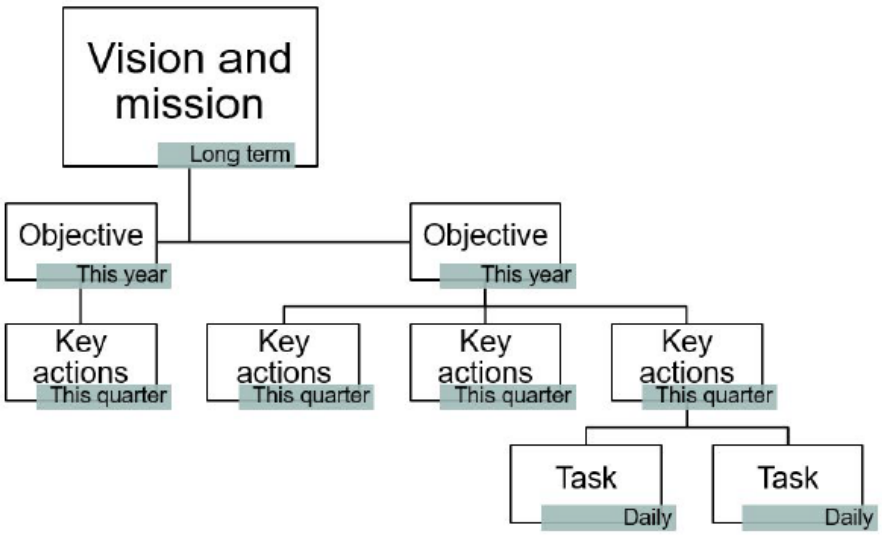

Figure 4.3: Breakdown of the top level objectives into daily tasks

If all employees follow the model, their daily tasks will be automatically aligned to the vision of the company. The intervals of key actions and objectives which are refreshed quarterly and annually respectively, provide appropriate time for employees to change the focus areas and work on new found problem sector.

3. **Guidelines:** Some of the guidelines to create the OKRs are:

   - **Set them annually and quarterly:** This provides adequate time to achieve something in a business context and also feasibility to judge the achievements.

   - **Do not have too many:** 5 objectives with less than 4 key results each per quarter should be the limit. This is in accordance with the suggestion given by Doerr.

   - **Make the priorities challenging:** As the goals become more challenging, it encourages the employees to strive hard and innovate.

   - **A key result must be defined:** A learning process needs to be created.

Overall,the discussion above combines the descriptions about OKR from both the Original author John Doerr and the adaptations of how it will be used in Volvo.

4.3.3 Strategy Cascading

Initially the definition of strategic cascading is provided along with the true nature of cascading and what it should consider. Later the need for cascading is described and this section is completed with briefly presenting the benefits of strategic cascading.

Strategy cascading plays an important role in aligning all the engineers/employees towards the generic goal of the company. Decoene (2006) defines cascading as "The cascading process is a systematic approach to align the strategic business objectives to the operational performance measures and actions"

Usually, based on personal experience this cascading is considered wholly as a top management affair. But Loch (2008) argues that "the key benefit from cascading lies not in top-down control, but in clarity for the technical personnel about what they can contribute, in the motivation that stems from being able to voice their views and concerns, and in the dialogue between senior management and the RD organization". Employees who are not aware of the strategy will not be in a position to take better decisions which are aligned to the objectives. This in turn may reduce the motivation level and interest of employees causing them to pull the rope in the opposite direction. Therefore, establishing effective connection between the technical work of engineers and the overall business strategy is a major challenge for the top management.

Schlickel et. al (2013) in their research describe the need for efficient strategy cascading. After detailed research on 9 firms, they conclude that increase in the quality of strategic cascading is associated with increased performance of the firm. Therefore, focus should be given to better quality cascading of strategic goals into functional targets.

Benefits of strategic cascading: Loch (2008) lists the 3 important benefits of strategic cascading.

- **Clarity of what the organization is going to achieve:** When the middle management and the end employees are clear about the organization goals designed by senior management, why they are present and what role they should play to make it possible, it creates the road for success.

- **Ability to negotiate and involvement of people in their own measure:** This freedom will result in efficient cross-functional activities where people come together to create own measures and negotiate the end result with the authorities.

- **Ensures fair process:** Fair process refers to the observation that if decisions are made with transparency , engagement , and clarity about the effects, then people feel better about the decisions and are more motivated to comply and actively contribute (Loch, 2008).

Overall, it is evident from the literature that importance needs to be given to strategic cascading considering the long lasting and extended benefits from it.

4.3.4 Visual Communication

Communication is the key to success in organizations. Griffith (2002) mentions in his article that, "communication underlies the effectiveness of coordinating exchange activities, developing strong relationships which in turn results in improved performance." As coordination forms a major part to get alignment, much attention has to be given to communication. Kernbach (2015) also quotes that "One key for the better execution of strategies is to engage employees through a better way of communicating the strategy". One of the effective ways is to communicate visually. Horn (1998); Huff (1990); Kosslyn (2007); Lehtonen (2011); Tversky (2004) and several authors explain how visualization is an efficient way to communicate in business. If an employee is not able to picture the progress of what is being done, the goals or objectives which are not documented and visualized, then there is a fear of employees losing focus on the targets.

Kernbach(2015) based on an experiment proves that visual communication of the strategic goals was very much necessary for the employees to connect to them. Toyota is a wonderful example, where Hoshin kanri boards are placed at each levels of hierarchy breaking down the goals and measuring the progress continuously. Quantitatively, Kaplan (2008) in his study proves that 73% of the companies showed outstanding performance just by clearly communicating their strategy. Whereas only such actions were taken by only 28% of the underperformers.

4.4 Theory on research methods

This segment presents the theory behind the usage of two prominent empirical data collection methods. Namely, Interviews and Survey.

4.4.1 Interviews

The section begins with defining a qualitative interview with brief description of face to face interviews. Then various suggestions provided by academics on things to be done before, during and after the interviews are described. In the next part, the information about the thought process about interview questions is presented. The latter part of the section describes the two analysis methods used to investigate the interview data.

As the research was qualitative in nature, interviews were primary method to gather empirical data. Kvale (1983, p.174) defines a qualitative research interview as "an interview, whose purpose is to gather descriptions of the life-world of the interviewee

with respect to interpretation of the meaning of the described phenomena".

After consideration of the advantages and possibility, option of face to face interview was finalized. According to Opdenakker(2008) Face to Face interviews are characterised by synchronous communication in time and place. Also, in FtF interviews there is no significant time delay between question and answer; the interviewer and interviewee can directly react on what the other says or does. Thus, considering the advantages of this type of interview method, we conducted all our interviews for this research using face to face direct interviews.

Later, after zeroing in on face-to-face semi structured interviews to suit our study, the next step was to take the considerations to be taken during the whole interview process. The process is divided into three steps and discussed briefly.

4.4.1.1 Before interview

As Knox et, al (2009) describe in their article, semi structured interviews, in which a protocol using open-ended questions based on the study's central focus is developed before data collection to obtain specific information and enable comparison across cases. This provided the interviewees to be flexible in their answers and also the possibility for the interviewers to delve more into specific. Now, as the idea behind the interview is fixed, the next part is to think about the procedures. As Scheinberg (2018) recounts in her lecture, the steps to be taken before the interview are consider what you want to observe during the interview, need to know how you will record the information and how the results are analysed with the decision to handle the data collected. This provides a clear direction for the interviewees. Along with this, the basic gesture of informing the interviewees about the intention of interviews, the date and duration of the interview was also discussed.

4.4.1.2 During interview

Scheinberg (2018) informs in her lecture that the following steps need to be taken during the interview.

- State the purpose and intention of the interview clearly
- Explain the background context of the questions
- Clearly inform what is important for you and what do you want to learn from the interview
- Indicate the flow of the interview
- Give permission for the interviewee to stop if needed
- Inform what will happen with the information after the interview
- Ask permission to record/transcript the interview before start
- Be alert to make basic observations such as eye contact, questions answered or not, quality of the answers, energy level, concentration etc.
- Ask supporting or follow up questions if answer is not seemed complete

- Keep track of time
- Ask if possible to extend the interview if it gets more detailed

4.4.1.3 After interview

Scheinberg (2018) guides the following steps to be taken after the interview. Immediately after the interview write down the impressions of the interviews such as, what did we learn, what insights we received, what did we miss, did we get answer for all questions. Together with your partner review the interview transcript.

Other than the procedure to follow during the various phases of the interview process, other interview techniques should also be thought of.

Leech (2002) writes that, The interviewer should seem professional and generally knowledgeable, but less knowledgeable than the respondent on the particular topic of the interview. This provides a sense of learning for the interviewers and encourages the interviewees to be more open.

4.4.2 Crafting research questions

Turner III (2010) stresses the fact that, Creating effective research questions for the interview process is one of the most crucial components to interview design. Academic theory by (McNamara. 2009) also gives some suggestions with respect to forming the research questions. They are:

- Wording should be open-ended
- Questions should be as neutral as possible
- Questions should be asked one at a time
- Questions should be worded clearly
- Be careful asking "why" questions

4.4.3 Order of questions

Opdenakker (2006) suggests that, when semi structured interview list is used, and the interviewer has to formulate questions as a result of the interactive nature of communication. The flow of questions should have a logic and connected to each other to provide easy interaction between the interviewer and interviewee. Leech (2002) also emphasises on the order of questions. He describes that Question order is important for substantive reasons (order effects occur in interviews, just as they do in surveys), but order is also important as a means of gaining rapport. Basically, this also ensures the interviewee that sufficient effort has been put by the interviewers for the interview.

Another aspect of interview is the follow up questions. Creswell (2007) makes an assertion that, respondents in an interview will not necessarily answer the question being asked by the researcher and, in fact, may answer a question that is asked in another question later in the interview. Some participants do not answer the question put forth, or deviate from the main focus topic or the discussions sounds interesting where much more data is needed. In these cases proper follow up or guiding questions must be asked to get the required response.

4.4.4 Data interpretation

Wengraf (2001, p.194) speaks of "double attention", which means "that you must be both listening to the informant's responses to understand what he or she is trying to get at and, at the same time, you must be bearing in mind your needs to ensure that all your questions are liable to get answered within the fixed time at the level of depth and detail that you need". This constant interpretation is needed for the interviewers while doing the interview.

The final constituent in the interview design process is that of interpreting the data that was gathered during the interview process. Turner III (2010) proclaims that, during this phase, the researcher must make "sense" out of what was just uncovered and compile the data into sections or groups of information, also known as themes or codes.

4.4.5 Recursive abstraction - interview data analysis

One of the qualitative analysis methods chosen to analyse the interview data was Recursive abstraction. Polkinghorne et. al (2014) describe the process of recursive abstraction as, By compacting the data using themes and codes, it becomes possible to identify patterns within the data that otherwise are not apparent. This technique was used to evaluate the interview data of the Directors. The following steps described in the article (Polkinghorne et.al, 2014) is used:

- **Step 1:** A set of interview questions are developed, which are applied to each interviewee. The answers are recorded and transcripted. Everything of interest is highlighted.

- **Step 2:** The highlighted data is transferred with questions on the left and answers of each interviewee on the right in parallel columns.

- **Step 3:** Data is paraphrased to make concise and manageable

- **Step 4:** Questions on similar topics are combined to form themes

- **Step 5:** Responses of each interviewee are coded in single or multiple words. Step 4 5 are reiterated to get concise and clear data codes.

- **Step 6:** Using control data, the patterns among the responses are noted.

Employing the methodology described above, the interviews of Directors were conducted and then analyzed.

4.4.6 Coding

Data analysis is the crucial part of qualitative research. Coding is one of the significant steps taken during analysis to organize and make sense of textual data (Basit, 2003). In this part, the coding methodology used for interviews is discussed briefly. As described by Bernard (1991), the various stages of coding for interview transcripts is discussed here.

- **Step 1:** The notes made during the interviews are converted into memos, where the data is categorized.
- **Step 2:** Immerse yourself in the transcripts to get the whole picture.
- **Step 3:** Transcripts are re-read and headings are written down as much as possible.
- **Step 4:** List of categories from transcripts is made and grouped in higher headings
- **Step 5:** A new list of headings is generated
- **Step 6:** Each transcript is worked through with the list of categories and sub-headings and coded accordingly. Here color coding can be used.
- **Step 7:** Each coded section of interviews is cut out and all the items of each code are collected together.
- **Step 8:** The cut out sections are given appropriate headings and subheadings
- **Step 9:** If possible, respondents are called to verify the categorization made.
- **Step 10:** All the collected and structured data is verified once again with the audio recordings
- **Step 11:** Each section is coded and described and if applicable, various sections which are interdependent are related and discussed.

These steps described above were used to analyze the data gathered by interviewing KPI owners.The next part details how the interview data was used to analyse the KPI characteristics.

4.4.7 Analytical Hierarchy process(AHP)

In order to make multi-criteria decisions, it is necessary to have the right tool. Madu C.(1991) in his article explains that one such tool for multicriteria decision making is the Analytical hierarchy process(AHP).it measures the consistency and stability of decisions made. From the interviews, it is necessary to make conclusions by evaluating the various criteria. This tool was used in combination with SMART to draw conclusions on the KPIs by Shahin(2007). Based on the priority of goals he compare the KPIs using SMART. He explains the process of AHP-SMART step by step as follows:

- **Step 1:** Define the list of KPIs that need to be analyzed
- **Step 2:** Build an AHP hierarchy in which, the goal is to prioritize KPI alternatives with respect to SMART criteria.
- **Step 3:** A pairwise comparison of the KPIs needs to be conducted to compare the alternatives
- **Step 4:** Calculate the priority, with the help of the weights.The weights of comparing the importance are depicted in Fig 4.4.

Ratings	Definition	Intensity of importance
1	Equal importance	Two criteria/alternatives contribute equally to the objective
2	Weak	Experience and judgement slightly favour one
3	Moderate importance	criterion/alternative over another
4	Moderate plus	Experience and judgement strongly favour one
5	Strong importance	criterion/alternative over another
6	Strong plus	A criterion/alternative is favoured very strong over another
7	Very strong importance	
8	Very, very strong	The evidence favouring one criterion/alternative over another
9	Extreme importance	is of the highest possible order of affirmation

Figure 4.4: Weights to compare importance, used from Shahin(2007)

- **Step 5:** Selection of KPIs that are more relevant to organizational goal.

Following this process will help making decisions, which provide clear hierarchy and importance levels of the KPIs.

4.5 Survey Design and Structure

In this section ,the theory behind how the survey was designed and structured is discussed. Initially, the steps to conduct a business survey is described. Then the various scales used to measure the responses are mentioned. In the later stages, the analysis methods used to scrutinize the recorded survey data is presented.

What is a survey?
A survey can be defined as a process of asking questions to respondents to gain information. But as Church et, al (2017, page 4) define survey with the focus on organization development as "A systematic process of data collection designed to quantitatively measure specific aspects of organizational members' experience as they relate to work".

4.5.1 Forms of survey

Mathers et. al (2007) mention in their article that, mostly the surveys take 2 of the forms.

- **Cross- sectional surveys:** Surveys that are carried out at a just one point in time are known as a cross-sectional in design. They usually take a descriptive or exploratory form that simply sets out to describe behaviour or attitude.

- **Longitudinal surveys:** A longitudinal survey rather than taking a snapshot, paints a picture of events or attitudes over time.

For this research due to time constraints and the intent being to collect insights from employees which are etched from their overall experience at Volvo group, cross sectional surveys was employed.

4.5.2 Methods of data collection in surveys

Blair et. al (2013) describe the following methods of data collection:

- **Mail survey:** Here a brief letter of request, a detailed cover letter and the questionnaire is sent to the respondents via mail to respond and then send us back. This procedure consumes a lot of time and resources.

- **Telephone survey:** The selected respondents are dialled and contacted on telephone to discuss the questions and get their answers. This method is applicable when the information to be given by respondents is not easily expressible and the time is feasible.

- **Face to face survey:** This is similar to structured interviews. The respondents are questioned based on the list of questionnaire prepared and the answers are recorded.

- **Online/Internet survey:** Here the questionnaire along with the introduction, instructions and the intent of survey is sent using the Internet. This method ensures that the speed of data collection is high with the lowest cost possible.

For this thesis, the Online survey method was chosen using Google forms as the medium. This ensured the data collected to be grouped and analysed easily in the future. Also, it was easily possible to spread the survey to hundreds of intended respondents.

4.5.3 Stages of survey design

Church et, al (2017) describe the following 7 step process to design an organizational survey:

All the 7 steps are briefly described below:

- **Pooling resources:** Church et al (2017) detail this step as, Gaining substantive input and co-operation from all key parties in the organization to get appropriate support to have a survey with good impact.

- **Designing and developing:** In this step we will look at characteristics of the questions themselves, the content, the response options and scales, the layout or presentation and the formal instructions, to name a few.

- **Communicating objectives:** Here the focus is on communicating the purpose, objectives and content of the survey initiative clearly and effectively to those involved in the data collection effort.

- **Administering and improving:** This step includes everything from establishing a clear project plan with appropriate milestones, release the survey and solve the inevitable glitches that occur. Also, based on the preliminary pilot test of the survey, the improvements are done

- **Analysis and interpreting:** Interpreting results is one of the most potentially complex and subsequently misunderstood aspects of survey work. It requires the practitioner to identify the main issues and important relationships among a mass of data in what is also often the shortest time frame of the entire survey effort.

- **Delivering results:** This step is concerned with the actual delivery of the survey results to organizational members both in various forms and throughout different levels. In 'Delivering the findings' the emphasis is on picking a strategy for delivering the feedback to all those involved in the organization.

- **Transferring and action planning:** This step focuses on 'Learning into action'. The data should be used to drive change and improvements in the system or in people's day-to-day behaviours. The issues of action planning, identifying areas for intervention and improvement, enlisting and involving others in the process, measuring progress over time through resurvey efforts and linking survey results to other key measures of organizational performance

must be performed here.

After describing the various stages to deliver an effective organizational survey, the main focus in the next phase is how to design the questionnaire. The considerations to be taken and the different types of scales used are discussed ahead.

4.5.4 Guidelines for Survey questionnaire

Questionnaire can be described is the heart of survey research. Structure of survey and the way the questions are presented play an important role in the quality of responses received. Questions can be asked in many different ways, some factual questions to directly comprehend or some opinion based questions which makes the respondents think. Yet, the perception of the survey producer and respondents should match to get effective survey results. Clifford et. al (2016) in their book describe the guidelines to make effective survey questionnaire. They propose three basic principles and five things to avoid.

Three basic principles are:

- **Keep it simple:** This is to avoid complex phrases and long words that might confuse the respondents.

- **Define terms clearly:** Don't assume that respondents are familiar with the terms used. Therefore, define the terms as clear as possible to avoid vague concepts.

- **Use simplest possible wording:** So that every respondent irrespective of their command on the language concept can provide their opinions.

Five things to avoid:

- **Long complex questions:** These type of questions can confuse the respondents resulting in ineffective responses.

- **Two or more questions in one:** The answers received will be too complex which will be tough to analyze further.

- **Jargon:** The usage special words or expressions should be avoided as much as possible. If necessity arises, then they should be defined clearly.

- **Biased or emotionally charged terms:** These should be reduced to avoid bad responses.

- **Negative words:** Usually, the usage of negations tends to confuse the respondents.

4.5.5 Scales used in survey

Krosnick et. al (1997) mention that, Rating scales are omnipresent in contemporary surveys measuring subjective phenomena such as attitudes and beliefs. Therefore, appropriate development of scales is very important to capture the insights of respondents. In another book on Psychology research, the authors (Fredrick et, al. 2005) proclaim that, It is important to distinguish among the various types of response scales in order to properly code responses and to facilitate the application of statistical analyses.

Lets begin with the various types of scales which can be used in surveys as mentioned in Fredrick et. al (2005).

- **Nominal scales:** Here the variables are categorical in nature. This means that the numerical values assigned to the variables have no real numerical value, but just describe categories. Usually, these are used to measure the factual information such as demographics.

- **Ordinal scales:** They are used to rank the survey items. One thing to note is, there is a difference between the various choices available, but the magnitude of difference is not indicated. For example, How was the service? The ordinal scales could be Best > Good > Worst.

- **Interval scales:** The most common interval scale used is the likert scale. It is usually used to measure the satisfaction or dissatisfaction in the opinion oriented surveys. Here the respondents are allowed to choose only one option.

- **Multiple choice:** This kind of scale is used when there are multiple feasible options a respondent can connect to. Here they have the option to choose one or more options to indicate their preference.

- **Close ended questions:** These are more specific in nature and easy to interpret. Normally, both the survey creator and respondents perceive these questions in the same way resulting in effective responses.

- **Open ended questions:** These questions provide more freedom to the respondents to express their views. These are useful when the knowledge about the concept is not available for survey creators before and they are seeking detailed responses to gain understanding.

Knowledge and proper usage of all these scales accordingly will result in a successful survey questionnaire. But, some considerations must be taken in the usage of these scales.Krosnick et. al (1997) speak about 3 important factors to consider in this regard.

- **Number of scale points:** When using ordinal or interval scales, the question arises of how many scales should be used. Krosnick et, al (1997) in their

research conclude that the scale should be around 5-7 points as it will be more reliable and valid than shorter or longer scales.
Also, the usage of even number of scales avoids the possibility of neutral selection.

- **Labeling the scale points:** The conundrum always arises whether to label all the scale points or only the extreme ones. Krosnick et. al (1997) conclude in their research that, responding to scales with only the endpoints verbally labeled may be less cognitively demanding than scales that are fully labeled.

- **Inclusion of no-opinion options:** Usually when we probe attitude questions in the survey, we assume that the respondents align to the opinions listed in the survey. But, there might be some cases where the respondent perceives the question in different way and is not clearly inclined or not selecting the clear opinion. Therefore, the opportunity to express his/her views to be neutral or write their thinking in detail should be given.

4.5.6 Kano theory and questionnaire

All the scales mentioned above can be used to capture the attitudes, insights and facts about the data. But to elicit future needs we need a different method. Sauerwein et. al (1996) describe that using Kano's model of customer satisfaction, a methodology can be introduced which determines the influence of the components of products and services have on customer satisfaction. In our case, this idea will be used the capture the customer (PE-employees) needs about KPIs, strategy and performance measurement.

Kano theory:

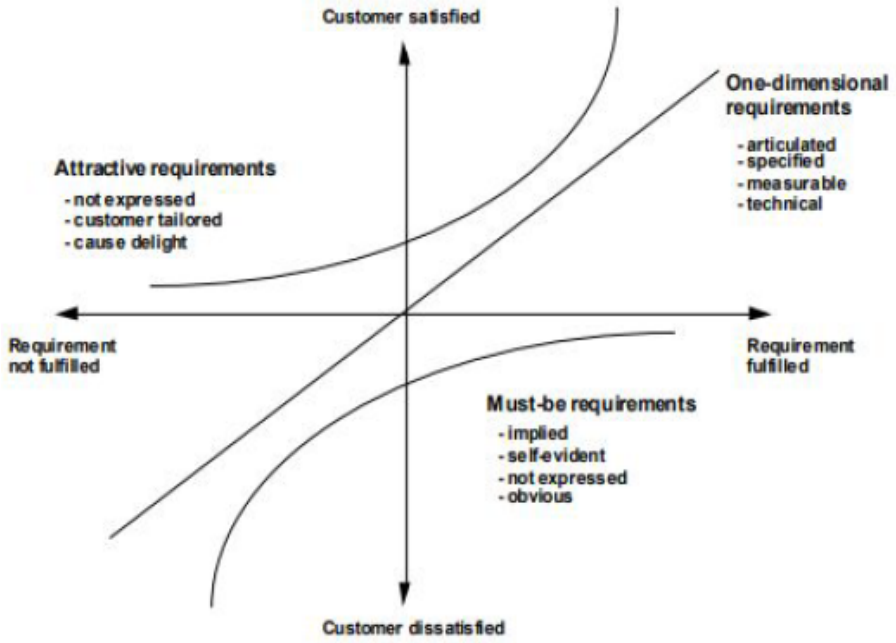

Figure 4.5: Kano Model

As presented in the figure 4.5 and further described by Berger et. al. (1993), Kano model classifies the needs of customers majorly into 3 different aspects.

- **Must be requirements:** As the name signifies, the customer expects these requirements to be fulfilled, else he will be dissatisfied. On the other hand, it does not increase the satisfaction as the customer takes it to be granted.

- **One dimensional requirements:** These are explicitly informed by the customer. As visible from the graph above, the customer satisfaction is directly proportional to the requirements fulfilled.

- **Attractive requirements:** These have a prominent influence on customer satisfaction. These are hard to elicit because they are not stated explicitly by the customer. But, if these are not fulfilled, it will not lead to any dissatisfaction.

4.5.6.1 Construction of Kano Questionnaire

Using the kano questionnaire, the requirements of customer can be classified into must-be, one dimensional, attractive or indifferent (where customer satisfaction does not matter to requirement).

For each product feature a pair of questions is formulated to which the customer

can answer in one of five different ways (Kano, 1984). The five different ways are:

- I like it that way
- It must be that way
- I am neutral
- I can live with it that way
- I dislike it that way

First question captures the reaction of the customer if the feature is present and the second question if the feature is not present. Basically, one positive and one negative question is asked about the same requirement. One more point to note is, voice of the customer is the focal point. The "voice of the customer" is a description of the problem to be solved from the customer's viewpoint" (Sauerwein, 1996)

Further steps of the Kano survey is described in the Kano analysis section.

4.5.6.2 Survey analysis

In this section, the theory behind the analysis of the data collected during the survey is described.

The numerical, quantifiable and demographic data does not need any extensive analysis. As the numerical values/graphs themselves provide the insights to the questions asked. The sections which need analysis are the Kano questionnaire and the open ended questions were coding has to be done.

4.5.7 Kano analysis

The answers to two kano questions answered forms the basis for the analysis to conclude the requirement. The figure 4.6 below helps to classify the response of one respondent on both the kano questions into must-be, one dimensional, attractive, indifferent and reversible.

For example, if one respondent had chosen 'Like' for positive question and 'must be' for negative question, then his requirement is classified as "attractive". Similarly, the responses of each respondent for each requirement is noted down and classified.

As mustbe, one dimensional and attractive was explained before. The other 3 aspects are briefly described here:

- **Indifferent:** It means that the respondent has no preference in this matter. They are not unsatisfied if absent or satisfied if the measure is present.

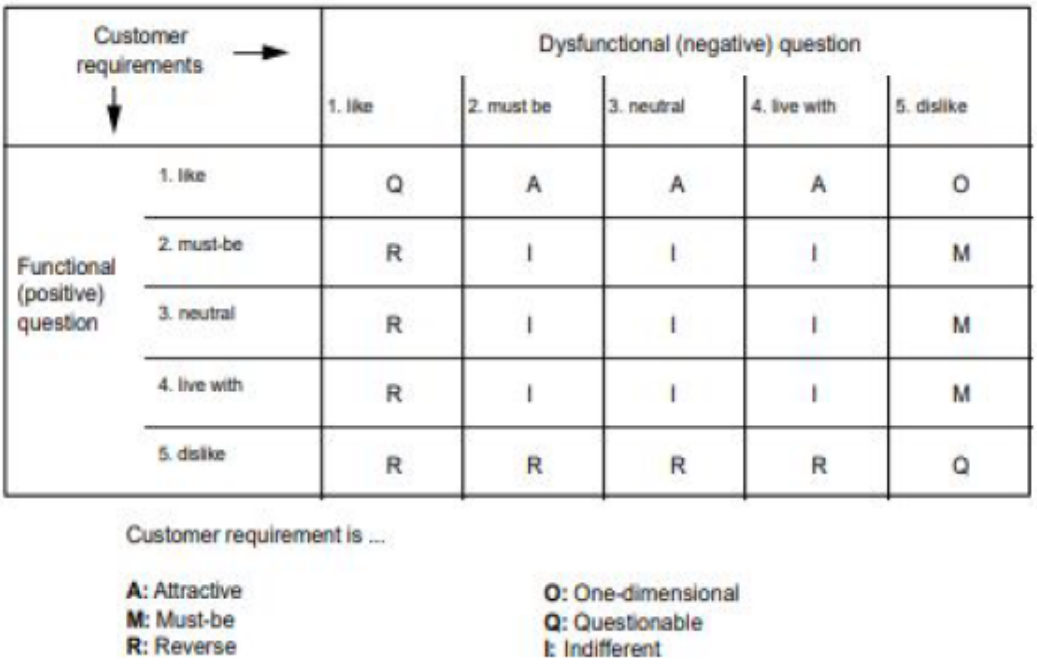

Figure 4.6: Classification of responses for Kano questionnaire

- **Reverse:** TIt is the opposite of attractive. The fulfilment of attribute will lead to dissatisfaction

- **Questionable:** This means that the respondent has not understood or unwilling to give a clear preference, but instead has opted for confusing result.

4.5.7.1 Evaluation of kano results

After the individual responses are noted down, it will be the time to interpret the kano results.
As per (Sauerwein, 1996) Majorly it can be done in 3 ways:

- **Evaluation according to frequencies:** It is one of the easiest methods to analyze the results. It is evaluated based on the frequencies of the answers. Suppose among the 3 requirements asked, the requirement gaining maximum frequency of must-be, one dimensional or attractive are calculated directly. Thus, the nature of each requirement is clear.

- **Evaluation rule M>O>A>I:** (Must Be, One dimensional, Attractive, Indifferent) If the individual product requirements cannot be unambiguously assigned to the various categories, the evaluation rule "M>O>A>I" is very useful (Sauerwein, 1996). For example, if all the 3 requirements asked are in-

dividual to each other, then this method helps to qualify the importance levels needed. Therefore, the requirements are classified based on the M>O>A>I rule, as it is very important to provide must be requirements as compared to others.

- **Customer satisfaction coefficient:** Berger et al. (1993) define that, The customer satisfaction coefficient states whether satisfaction can be increased by meeting a product requirement, or whether fulfilling this product requirement merely prevents the customer from being dissatisfied.

Extent of satisfaction: (A+O) / (A+O+M+I)
Extent of dissatisfaction: -(minus) (O+M) / (A+O+M+I)

4.5.8 Coding

In this section, the various academic theories behind coding is discussed. The previous section on coding focussed only on qualitative interviews. Whereas, this part discusses in detail starting from definition of coding, approaches to creation of codes, different types of coding and the content analysis which is the focal part of the survey.

Coding is one of the important steps in qualitative research. Ely et al. (1991) opine that we come to qualitative research with whatever understanding of analysis we bring from previous work, the conventions of our respective disciplines and professions, the advice of our mentors and the models we have internalized from whatever we have read. But to effectively transfer our internal tacit knowledge for other people, a definitive method is needed to categorise our findings. Here is where the codes come into picture.Basit (2003) describes that this process of coding is dynamic, intuitive and creative process of inductive reasoning, thinking and theorizing.

4.5.8.1 Definition of coding

Saldana (2015, page 4) defines that "A code in qualitative inquiry is most often a word or a short phrase that symbolically assigns a summative, salient, essence capturing and evocative attribute for a portion of language-based or visual data."

4.5.8.2 Approach to creation of codes

Miles and Huberman (1994) mention two approaches to create the codes.

- The first one is used by the inductive researcher, where there are pre-codes created. This is in conjunction to the grounded theory approach mentioned by Glaser and Strauss. The codes are thought of only after thee data is collected and variety of codes are designed.

- The second approach is to create a initial start list of codes before the empirical data is collected. These initial codes come from the research questions, hypothesis or the key variables of the study undertaken.

In this study as we are using the approach with inductive thinking, the codes which come under this are discussed.

4.5.8.3 Types of coding

The two types of coding under the grounded theory study are substantive coding and theoretical coding.

- **Substantive coding:** Here the researcher works with the data directly, fracturing and analyzing it, initially through open coding for emergence of code category and subsequently through selective coding to theoretically saturate the core and related concepts. This type of coding is used mostly in our study here.

- **Theoretical coding:** This is achieved by constantly comparing the indicators in the data to elicit the properties and dimensions of each category. (Bryant Charmaz, 2007, page 265)

These 2 types of coding types help to effectively use the academic research in this study and employ the correct approach before start of coding.

4.5.8.4 Content analysis

To analyse the various open ended questions in our survey, the understanding is needed how to look through the content available and then come to conclusions. In their article on qualitative content analysis, Hsieh Shannon (2005) discuss three different approaches:

- **Conventional:** Here the coding categories are directly defined from the collected empirical

- **Directed:** In this case, the analysis begins with theory as a guiding factor to generate initial codes

- **Summative:** A summative content analysis involves counting and comparisons, usually of keywords or content, followed by the interpretation of the underlying context.

As far as the survey analysis is concerned, conventional approach to content analysis was employed most of the times. Only once or twice for specific survey questions summative approach was used.

5
Empirical Data

For a successful case study based research, it is critical to collect the right type of data. Guest(2013) quotes in his book "Given our working definition of qualitative research, you can begin to imagine the range of possible data types that qualitative research might generate", he describes various types of qualitative data that could be collected. Hence keeping those tips in mind the empirical data for this case was collected. This chapter focuses on consolidating all the empirical data that was gathered at Volvo GTT.

Initially, the KPIs under study are listed along with their definitions. Then the Strategy of the business unit in focus is described. The next part contains the data from KPI owners, Directors and the Vice-president of PE-Sweden. Here the insights of all these employees about KPIs is presented. The last part details the survey which was propagated to all PE-Sweden employees.

5.1 PE Sweden KPI´s

The fulcrum point of the whole thesis are the PE-Sweden KPIs. For this study, the KPIs used for financial year 2018 has been considered. In this section, the list of KPIs is presented with the area and the value in the figure 5.1. Later the definition of each KPI is written.
Some definitions are directly taken from the internal website, whereas some of them have been defined based on the study by research students and inputs from the KPI owners.

5.1.1 KPIs on Customer success

- **QJ lead time:** QJ refers to "Quality Journal". It is the report used to manage the field quality solving process. This KPI directly relates to the value of customer success, as it is important that any field issues are solved soon.

- **New to Market ready (no. of open days):** This KPI refers to the time taken from a QJ is opened until it is completely solved and the product/system is ready to be used in market again. This process has multiple steps which may involve some changes in production and requiring complete testing again

- **New to containment action (no. of open days):** This KPI refers to the time taken since a QJ is opened and the problem is contained. This provides relief for the customer from the problem. This is different from the first one, as tested solution is not employed in the original product for all other customers.

Value	Area	Definition
Customer Success	QJ lead time	NEW to Market Ready (open) [days]
		NEW to Containment Action (open) [days]
	PROTUS	Inflow vs. solved (status 10 / status 8), 3m rolling
		PROTUS age in status 10 - 3 [days]
Trust & Passion	Accident / incident reports	Reports older than 3 months w/o planned closure date
	Individual feedback	1:1 meetings on a monthly basis
	Wellbeing	No of activities within Enjoy
	Diversity & Inclusion	D&I training for all employees (to be completed 2018)
Change	Knowledge Management	DVG Certified Knowledge
	Patents	No. of ideas
	Continuous Improvement	No. of closed Kanban initiatives (incl VGAS actions)
Performance	DCN releases	Engineering Direct Runners
		DCN released on time
	Project deliveries	Projects with fulfilled need maturity
		QDCCF fulfilment
		GPOT - Gates Passed On Time
	Test cell delivery precision	Engine Performance test cells, GOT + MLM
		Engine Durability test cells, GOT + MLM
		Transmission & Electromobility test cells
	Engineering hours	Total time reported in SCORE
		Hourly rate [SEK]
		Chargeability
	Net prototype material cost	% of gross expenses
	Net Operational Expenses	% of latest decided budget CAP

Figure 5.1: PE Sweden KPI List

- **PROTUS:** PROTUS is an acronym for PROTotype follow-Up System. PROTUS is a vital tool that allows to specify a test prototype, support the building of the prototype and to report assembly problems or deviations, support the testing of the prototype and to report problems linked with the production process (Volvo teamplace,2019)

- **Inflow vs solved (Status 10 / status 8), 3month rolling:** This KPI measures the ratio of incoming and solved PROTUS issues with 3 month rolling time. Status 10 refers when the PROTUS report is drafted and distributed. Status 8 is when the issue is completely solved. Overall, this KPI presents the whole picture of PROTUS process.

- **PROTUS age in status 10-3 (No. of days):** This KPI measures the time taken in days for a PROTUS report since it is distributed, reaches the responsible design department and the root cause analysis has begun. This KPI focuses on the initial process of PROTUS handling.

5.1.2 KPIs on Trust and Passion

- **Accident/Incident reports:** This KPI keeps tab on the number of accident reports. The number of reports older than 3 months without planned closure date are listed..

- **Individual feedback:** This KPI measures whether the monthly 1:1 meetings are done by a manager with his/her team members. This was to ensure sufficient communication and personal development.

- **Wellbeing:** This KPI measures the number of activities done within the "Enjoy" program. This is to build employee engagement and help employees to build better relationships.

- **Diversity Inclusion:** This KPI measured the number of employees who participated in the DI training delivered by the company. The aim was to increase the awareness of employees regarding DI in this new era of globalization.

5.1.3 KPIs on Change

- **Knowledge management:** This KPI keeps tab on the number of employees completing DVG training. Design verification guidelines (DVG) is a tool used in powertrain which supports knowledge management.

- **Patents:** This KPI counts the number of ideas developed to apply for a patent. It does not indicate the number of patents actually awarded, as it takes a long time.

- **Continuous improvement:** This KPI measures the continuous improvement activities/ideas by counting the number of closed Kanban initiatives. Basically, ideas provided by employees to improve a process/product was verified by a team of experts and feasible ideas were converted into Kanban initiatives.

5.1.4 KPIs on Performance

- **DCN Releases:** DCN refers to Design Change Notice.The DCN is used to approve and publish changes in the product documentation (in KOLA). After approval, the DCN is an order to start up production preparation, purchasing and other downstream activities. (Volvo teamplace,2019)
- **Engineering direct runners:** This KPI is defined as the percentage of new parts which are not changed within 12 months Basically, it signifies how good the design was and the efficiency of product portfolio development process.

- **DCN released on time:** This is relatively a simple KPI which measures the delivery precision. It is the ratio of number of DCNs released on time by the total number of DCNs released.
- **Project Deliveries:** The KPIs under this area measure the progress and effectiveness of projects. As visible from the table, it has 3 KPIs.
- **Projects with fulfilled need maturity:** It is defined as the number of projects which prove maturity at a given gate at prerequisite and/or attribute level. Maturity here means the ratio of agreed requirements regarding the product under development. It is a tricky KPI to define and objectively measure.
- **QDCF fulfilment:** QDCF is acronym for Quality, Delivery, Cost and Feature. Quality refers to project quality, delivery indicates delivery precision, cost is both project and product cost and feature is a customer expectation. The KPI is measured by the percentage of projects which fulfil all the QDCF criteria among the overall projects.
- **Gates passed on time (GPOT):** This KPI measures the flow of projects, with the aim to reduce RD cost. It is defined as the percentage of gates opened out of the total number of gates scheduled during the month.
- **Test cell delivery precision:** All the three KPIs under this area measure the utilization of the test cells. There are three kinds of test cells namely, Performance, durability electromobility. The KPI is measured as the ratio of actual/planned tests. But also the utilization of each test cell is also mentioned.

5.1.5 Financial KPIs

All the KPI´s listed below are hereby referred together as financial KPI´s as the main focus is on the cost.

- **Engineering Hours:** This area has 3 KPIs under it. They are described below
- **Total time reported in SCORE:** This KPI measures the total project working time which is reported by employees in the IT tool SCORE. In simple terms it indicates time reporting.
- **Hourly rate:** It is calculated by dividing the OPEX (operating expense) cost by total billable man hours with 6 months rolling. The usual OPEX costs such as employee salaries, consumables, fuel etc. is considered.
- **Chargeability:** It is measured as the ratio of billable hours/total available hours. It simply defines the amount of time spent on working on actual projects.
- **Net prototype material cost % of gross expenses:**
  Net operational expenses % of latest decided budget CAP: Both these KPI describe themselves. These KPI´s are used by top management and finance department to calculate the cost deviations.

5.2 Volvo GTT Strategy

The strategic priorities of the mother department leads the way for objectives and then KPIs for the teams under its umbrella. As PE-Sweden comes under GTT, the goals are translated from the strategic priorities. The 5 strategic priorities are presented in the figure 5.2 and then the major objectives are discussed.

Figure 5.2: 5 Strategic goals of Volvo GTT

- **Quality:** The main aim is to produce best quality products for the end customer in the market. The important objectives here are: - Stable pre production drawing releases - Improved ways of working with PROTUS (fault reporting system) - Improved software and data quality - Product oriented quality action group.
- **Mastering new technologies:** To reach product leadership for all the brands within their competitive sets there is a need to master well-known as well as new technology. The plans are. - An organizational model, ways of working, processes and governance for major new technologies - New partnerships giving access to new technologies, input to more agile ways of working and speed up the work on existing technologies.
- **CAST (Common architecture and shared technology):** Focus going forward: scalable affordable EE architecture allowing for rapid development of new functionality. Some of the most important goals are: - Optimized modular architecture prepared for new technologies - Full implementation of Agile and Lean - Scalable and affordable to roll out in steps.
- **Product ownership over time:** To reach product leadership and increase customer satisfaction a clear product ownership over time should be estab-

lished. This includes: - Appointing product owners for components and systems as well as for services, features and complete vehicles - Clear product owner accountability for product evolution through the complete life cycle - Chosen product owners with the business understanding, product knowledge, skills and means to secure product leadership, acting cross-functionally with the end customer in mind.

- **Great place to grow:** GTT is regarded as the most sought after employer for both freshly graduated and experienced talents in selected competence areas. The objectives are: - Proactive work with employer branding attractiveness to secure employee retention and a steady supply of talents - In-depth product, customer and automotive industry knowledge among Volvo employees

5.3 Data from KPI Owners

It is important to have a clear picture on precise definition of each KPI, how they are being measured, how are the employees perceiving the KPIs and the top management's interest in each KPI. Hence, to gain this knowledge, the documents on the website were studied in the second phase of thesis and in the third phase the KPI owners were interviewed. The positives, drawbacks, issues and the suggestions mentioned by the KPI owners for each KPI have been consolidated in the section below based on the Values.

5.3.1 Value-Customer success

There are 2 areas of KPIs under this value. They are QJ lead time and PROTUS.

- **QJ lead time:** This area has 2 different KPIs, which measures the number of days from the start of the QJ till market ready and containment actions.They are as follows: NEW to Market ready and NEW to containment action

  As mentioned by the interviewees, the positive factor about this KPI was that it is being used by various teams to make improvement actions. The drawbacks were, firstly, it measured only the number of days, but the magnitude of the QJ problem was not considered. To improve this the owners suggest to focus on speed of solving the QJ. Another drawback mentioned by KPI owner is the KPI needs to focus on measuring the performance and if the customer is satisfied with the solutions. The field failure frequency(FFF) also needed to be considered.

  Apart from these issues, the problem with measuring this KPI was that the process and IT tools were complex and the focus from all the engineers in all departments to work on QJs was necessary. Suggestions on how the KPI could be improved was also given the interview which is to alter the focus area frequently, in order to concentrate on the various issues in each phase.
- **PROTUS:** This area has 2 KPIs which are as follows:: Inflow vs. solved (Status 10/status 8), 3 month rolling and PROTUS Age in status 10-3.

The interviewees quote the following Positives, drawbacks and suggestions for improvement in regard to this KPI:

Positives:The data regarding this KPI is being updated on a daily basis, and is being followed by the top management. It is also used by the teams to make improvements. Drawbacks: This KPI has a complex process to collect data, also there was no clear accountability of PROTUS.The focus of the present KPI is on the time, instead of the quality of solution. Also, updation of the KPI needed to be done on a regular basis. Suggestions: The major suggestion for improving this KPI was to reconsider measuring Inflow vs. solved PROTUS and the efficiency of solving them.

5.3.2 Value-Trust and Passion

This value includes 4 different KPIs as mentioned below:
Accident/Incident report reports, Individual feedback, Wellbeing and Diversity and Inclusion:

The inputs regarding these KPIs in general were that they could be measured or handled by supporting departments, instead of the engineers in PE. Interviewees mention that the KPIs like Wellbeing, individual feedback were needed previously to develop a culture, but now they are obsolete. Hence, such KPIs could be deleted or could be handled by other departments which focus more on work environment.

5.3.3 Value-Change

There are 3 KPIs under this value. The opinions of KPI owner is described one by one in detail.

- **Knowledge Management:** The KPI for this area is measuring the "DVG Certified knowledge". A good thing the KPI owner mentions about this KPI is that it has high focus from the top management as it is the only way to build and reuse the knowledge in teams and it is also a part of global KPIs. During the interview the owner pointed out a drawback about this KPI that it is difficult to measure and quantify the knowledge in general. There is a system for DVG certification and collection of that data, but that is not the only knowledge. To improve those drawbacks interviewee also provides a suggestion that the new reorganization is in place, the new agile way of working might change the way knowledge is being measured based on the cycles of working. Hence this KPI needs to be adapted accordingly and redefined.
- **Patents:** This KPI measures the "number of ideas" per month.The owner says that it is a good measure as it indicates the amount of innovation done or the ideas generated in the organization.
- **Continuous Improvement:** As per the definition this KPI measures the "number of closed Kanban initiatives (including VGAS actions)" The positive aspect of this KPI was mentioned that every employee is interested in continuous improvement, they strive to make improvements on a daily basis.

Hence the objective behind the KPI to measure CI is good. But the drawback stated was that number of Kanbans is not the right measure, though it is being removed now.

5.3.4 Value-Performance

This value contains 4 areas of KPIs. They are DCN Releases, Project deliveries, Test cell delivery precision and all financial KPIs. The thoughts of KPI owners on each area of KPIs are discussed below.

- **DCN Releases:** This Area measure 2 KPIs which are Engineering direct runners (EDR) and DCN released on time

  Engineering Direct runners is a KPI which indicates design effectiveness and efficiency. But there are a few drawbacks to this KPI. As stated by the interviewee this KPI belonged to a certain department, but was being handled by someone else. The major drawback of this KPI is that it is not helpful to drive or change behavior Hence driving a wrong behaviour, says the owner. Due to lack of top management interest in this KPI, it is not being utilized efficiently. Root cause analysis in case of bad result is not done to fix the issues. In order to improve this KPI, the owner says that iit needs to be handled by the right department. Also, conducting pulse queries and updates would be more effective than monthly updates.

  DCN released on time is another KPI which is simple to measure. The interviewee states a few issues with this KPI, which are, firstly it drives the wrong behaviour in teams. Secondly, the agreed completion date is not lined to the project progress. Lastly, no periodic review or learning in the team happens related to DCN releases. To improve this the suggestion given was "to communicate with the PMEs for exact required date of release and ensure the KPI reflects the reasons for delay i.e the K-DCN cases."

- **Project deliveries:** Project deliveries are being measured with the help of 3 different KPIs which are as follows: Projects with fulfilled need maturity, QDCF fulfilment and GPOT- Gates passed on time

  The first KPI indicates the maturity of projects with respect to gates. The owner of this KPI provides the description that, when a project is initiated, certain number of prerequisites are mentioned, and the main design requirements are connected to the gates. Hence, the ratio of agreed requirements to the total requirements is the maturity of the project. A positive about this KPI is that it is discussed with the steering committee. But drawback of this KPI, as mentioned by the interviewee was that the definition of this KPI was abstract, making it difficult for others to understand the aim of the KPI. Another drawback is that, the values are technical and hence hard to understand. The value could also be misleading in case the requirements are not agreed.

The second KPI was “QDCF fulfilment” The owner provides the following positives and drawbacks on this KPI as follows: Positives: It is a widely established KPI. Drawbacks: It has a very complicated to measure and it is seldom updated in a year. Major drawback with this KPI is that, in order to fulfil the deadlines it creates a wrong behaviour in employees.

The third KPI is the Gates Passed on Time(GPOT), which measures the delivery rate of the projects which had drawback as quoted by the owner. This KPI is very subjective in nature, which does not consider the project size and complexity. It drives the wrong behaviour in the employees, as the PROTUS are closed in order to pass the gate, in turn reducing the quality of the work. The progress of work, between the gates is missed out. The suggestion given by the interviewee to improve this KPI was to reconsider by keeping the progress of the project in mind.

- **Test cell delivery precision:** This area is measured with 3 different KPIs, which are as follows: Engine performance test cells, Engine durability test cells and Transmission and Electromobility test cells. All the 3 KPIs measure the resource utilization, and the following drawbacks suggestions were stated by the owner during the interview:

  Drawbacks: The departments handling the testing, do not know if it the right test that is being conducted, which is not reflected in the KPI. These KPIs also do not depict the quality of the tests conducted, which is more important, than the utilization of the test cells. Based on similar requirements the following suggestions were given for improvement of these KPIs Suggestions: Factors like utilization of the test data, the quality of the test results need to be considered. The focus needs to be given on delivery precision of the test cells. The efficiency of planning and prioritizations methods need to be increased and proactive testing needs to be given a thought in order to find faults.

- **Financial KPIs:**
  There is a set of 5 KPIs under the financial KPIs. There were general comments on each of these KPIs were given during the interviewees as follows:

  Total time reported in SCORE - This KPI is not truly owned. The purpose of this KPI was to make the employees report time. It is not needed to be measured anymore as it becomes a routine, hence can be removed as a KPI.

  Hourly rate [SEK] - This KPI is a quick indicator can be used to depict the engineering hours. But it it not efficiently utilized. But it merges the working hours and cost into one measure. Some values of the KPI are crossing 100 percent which signifies there may be some improvements needed in definition.

  Chargeability - The owner mentions that this KPI drives wrong behaviour and

hence can be deleted. In context of Sweden not so useful as people are more honest in time reporting. Often not a true figure of reality.

Percentage of gross expenses - It focuses mainly on the material cost, hence it can be improved such that based on the phase of the projects in PE ,the gross expenses can be kept track of. Also longer stretches like 3 months rolling can be used for such KPI.

Percentage of latest decided budget CAP - This is a good KPI and could be retained.

Concluding these views, the following picture was made figure 5.3. Where the red depicts the KPIs that must be removed, the green represents the KPIs that could be kept as they are and the yellow are the KPIs that could be improved.

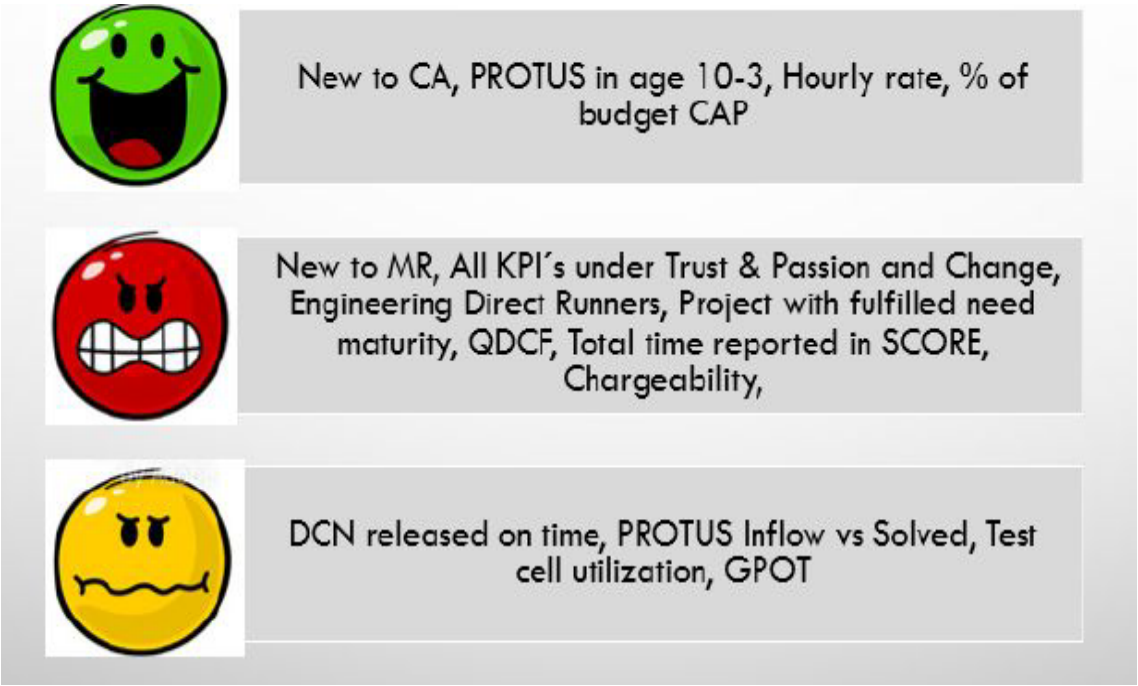

Figure 5.3: KPIs categorized based on interview inputs

5.4 Data from Directors and VP Interview

After the interviews of KPI Owners, it was important to know the intuition of the Directors who lead the 7 departments at PE-Sweden. As these directors are responsible to guide the engineers towards strategically urgent tasks, take decisions based on monthly KPI figures and provide the necessary support to resources. The top management perspective on KPI usage at PE -Sweden was prominent in order to

understand the KPI governance structure.

Directors of PE-Sweden act as a link between the top management and the engineers. Their tasks include, monitoring the progress of projects in their department, analysing the monthly KPI figures in management meetings, monitor the performance etc. The main intention of these interviews was to know their way of working, insights on KPIs, strategy, performance measurement and future needs. The questions were formulated keeping in mind the following dimensions as seen in the figure 5.4. The X-axis represents the time period, whether the intention was to gather information about the present or the future. Y-axis indicates the aspect whether the question was more on day to day operative side or on the broad strategic side. The idea behind each question and the combined insights are presented individually.

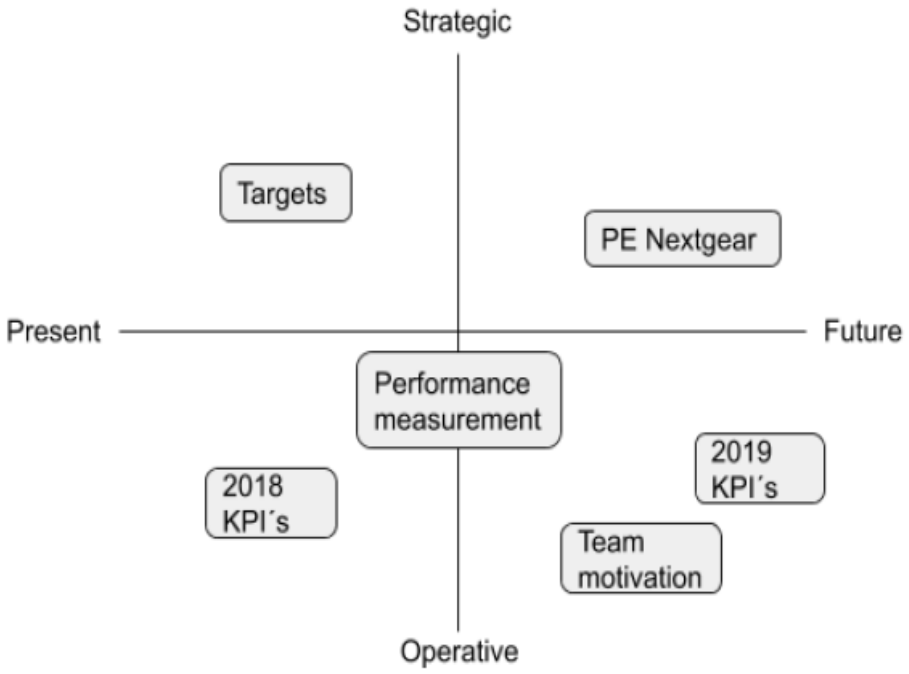

Figure 5.4: Discussion topics with directors

1. **How intensely do you follow the PE-Sweden KPIs?**

   The intent here is to understand how the present KPIs elicited the behaviour of directors and their individual way of dealing with these KPIs. The answers provided by all the directors are coded and the key words are described here. To respect the privacy of the individuals, the insights are combined and presented.

   Keywords Do not follow KPIs much, Do not follow KPIs at all, Focus on some important KPIs

The PE-Sweden KPIs as such did not provide much value to the directors. Some of them followed it monthly to check the numbers, some focussed on the most important KPIs which mattered to their daily work and almost everyone agreed that each of the 23 KPIs did not provide much value to focus their attention on them. Overall, there was clearly a lack of intent to follow up and work with these KPIs.

This lack of intent was created due to these prominent reasons: Too many KPIs, some KPIs do not drive the right behaviour, less visibility of KPIs down the line, unclear objective behind some KPIs. These reasons coupled together with other factors made them to not work intensively with the present 2018 PE-Sweden KPIs.

2. **Views about present PE-Sweden KPIs.**

The directors were asked to comment on individual KPIs to get their views on them. The purpose here was to know what they felt about the KPIs at the first moment. The answers are more general and do not delve into the technicalities of each measure. In addition to whether they thought the KPI was good/bad, additional comments on the problem area and solutions were elicited. Table 5.1 displays with keywords gathered by coding the interviews and discussed in brief detail later.

QJ lead time All the directors thought that this is one of the most important KPI which is discussed in meetings. The specific KPI of "New to Containment action" was preferred as compared to "New to Market ready". But almost all of them agreed that a new way of defining customer success using QJs is needed. They felt the present way of measuring QJ lead time does not consider the magnitude of the problem at hand. Also, as the process of solving issues has many steps the focus area need to be defined. Based on the focus area the solutions can be developed on which each department can contribute. One of the clear suggestion was to concentrate on duration of First known failure till the corrective action which perfectly describes the transition from unhappy to happy customers.

PROTUS Along with QJ lead time, PROTUS is one of the most important KPI which cuts across almost all departments. The protus data sheet is updated daily and any employee can view the progress of each issue. The directors seem to be divided on the favour of one of 2 specific KPIs. Some prefer "Inflow vs solved" should be focussed as it presents the whole picture. Whereas, some prefer "Protus age 10-3" would give better focus. But the terms of agreement among all directors are the speed of solving PROTUS issues should be important rather than the number of PROTUS and the present communication/discussion in meetings is very good which reiterates the importance of this KPI.

Accident/Incident reports This measure indicates the safety of employees. PE-Sweden comprising mostly product development engineers, many feel this KPI does not take much importance. However, in testing department this KPI does matter as there is risk of injuries. The directors agree that although the safety of employees is paramount and steps are taken to ensure no accidents, this should not be measured as a KPI. Accident reports can be just informed to top management and published monthly in website, but no need to keep this as KPI.

KPIs	**Keywords described**
QJ lead time	Very important, not good results, badly measured, define focus area, focus on the magnitude of problem, focus on unhappy to happy customers
PROTUS	Spontaneously followed, good, focus on the whole process, focus on stage 10-3, dynamic KPI, speed is important
Accident/Incident reports	Legal requirement, important, just present in list, not meaningful as a KPI
Individual feedback 1:1 meetings	Not good as a KPI, depends on individual, obsolete with new way of working
Well being	Not good as a KPI, events are more important, drives good behaviour
Diversity and Inclusion	Not good as a KPI, no need, not valid, more of how you act
Knowledge	Is it really needed as KPI?, not sure what it gives , need to rethink way
Management	of defining it
Patents	Good measure, indicates innovation
Continuous improvement	Debatable definition, need to redefine, scrap it
DCN releases	Okay KPI, reduce late DCN, rethink how the numbers are perceived, matters a lot, Good KPI, need to rework
Project Deliveries	NGood, well established, fairly okay, complicated, possibility of manipulation, too many of them, need only one KPI
Test cell delivery precision	Measures only utilization of resources, quality of testing is not measured, not good, concentrate on activities after test
Financial KPI´s	Reduce the number of financial KPIs, not discussed or reviewed

Table 5.1: Inputs from Directors on each KPI

Individual feedback This measures the 1:1 monthly meetings. Every director feels that this should not be a KPI, but rather infused as a company

culture. The new setup of being more Agile automatically brings in more communication making the 1:1 meetings obsolete. As the engineers work on a variety of tasks, the frequency of meetings is more situational and dependent on the job profile. Overall, everyone agrees to scrap it as a KPI.

Wellbeing This is measured by the number of activities within Enjoy. Almost every director opines that is should not be a KPI. Although, it drives good employee behaviour everyone feels that the quality/theme of events is more important than to count the number of events. It is one of the KPIs which is overlooked in the list.

Diversity Inclusion A training was given to employees regarding the topic during 2018. Every director feels that this should not be used as a KPI. They feel that diversity inclusion is more about behaviour and awareness.

Knowledge management Similar to diversity inclusion, a training is given and measured to visualize this KPI. Although the aspect of knowledge management is very important for any firm, the way of defining plays a prominent role. Some directors notice that the KPI in present form does not clearly say what value it provides. Therefore, it needs to be rethought to define knowledge management and implement it to be a true learning organization. But, everyone agrees that this need not be a KPI, rather than an action plan or included in way of working.

Patents This KPI measures the number of patents filed. By definition, it clearly indicates the innovation happening in the firm and promotes idea generation. But, most directors were not clearly onboard to follow or scrap the KPI, but rather talked about it as a good measure and we need to keep it.

Continuous Improvement Every organisation needs to focus on continuous improvement. Here in PE-Sweden, improvement ideas are presented which are then evaluated after translating them into Kanban initiatives. It is not entirely clear for all the directors. Many of them feel to redefine the KPI to make it more effective. Some directors who are more connected to this KPI, inform that it has been scrapped for usage in future.

Engineering direct runners Almost every director identify it as a “Ok” KPI. Directors who work with more detail on this topic opine that there needs to be more loops in early phase of DCNs to reduce chances of late changes. But everyone subtly agree that some improvements are definitely possible.

DCN released on time Directors agree that a DCN released on time matters a lot. The KPI also sounds good with respect to how it is defined in a simple manner. Most directors discern that it is a good KPI and need to be kept. But, some directors who work more hands on feel it should be slightly modified to drive right behaviour. One suggestion was to perform FMEA on

DCNs to improve.

Project Deliveries The project deliveries are represented by 3 different KPI´s. Almost all the directors feel that they are too many and create confusion. Everyone agrees to reduce the number of KPIs measuring project delivery to only one. The views on the two important KPI´s are described below.

QDCF fulfilment The opinions are divided about this KPI. Some directors feel that it is well established and okay to use. Whereas, directors keenly working on QDCF opine that it is too complicated to propagate the true intention and evaluation. Also, it does not add much value to the notion of project deliveries and hence can be scrapped.

GPOT Most of the directors feel that this KPI is fairly okay. It is not complicated as QDCCF. But, there is a possibility of rushing some tasks to achieve the target thus driving wrong behaviour. Integrity of leaders plays an important part in order to trust the numbers. The directors agree that this could be the one KPI defining project deliveries with some modifications.

Test cell delivery precision As mentioned in previous sections, this section is made up of 3 KPIs which measure the utilization of the test cells. Every director agrees that the quality of tests should be of primary focus and not the number of hours. The present KPIs does not provide much value rather than presenting resource utilization. Director responsible for this KPI opined that the actual need of the tests, how the test reports are used after the testing should also be considered. Overall, the directors feel that the present test cell KPIs are not good and need to be redefined with quality of testing as cornerstone.

Financial KPIs Most of the directors had no specific comments to make on the 5 financial KPI´s. They felt that it is not their forte to look and contribute for it, rather than just view the numbers once in a while. Some directors observed to reduce the number from 5 to 2 and expressed discontent with some KPIs such as total time reported in SCORE. One of the suggestions was to use Chargeability KPI and forego the other 2 engineering hours KPI´s. Overall, these were of not much interest to directors to comment on.

3. **How the company goals are allocated to you?** The main intention was to gather how directors receive the strategic goals, yearly objectives or quarterly targets. As reflected in the fig, this lies in the quadrant of strategic and present. Intentionally, the question was not too specific so as to elicit broad range of answers according to their perception.

   Keywords Top management meeting, soft targets, discussion, dialogue.

   The company goals were communicated and discussed with all the directors

during extended top management meeting. The directors clearly mentioned how the goals were allocated to them previously and now. Previously, there was much more hard targets presented to them with strict deployment of business strategy. It provided much focus for the task at hand. But now, there are more soft targets which are discussed during meetings. This presents more flexibility to the directors to decide themselves about the course of action. Also, one factor to be noted is that the discussions during the directors and top management are frequent and often in the form of dialogues.

4. **How do you deploy the strategy to your department?** This question acts as the next step for the previous question. After receiving or discussing the goals allocated to them, it was important to know how directors go ahead with deploying the targets to their respective departments.

   Keywords Meetings and follow-up, set targets to team, action log, PI planning, break down goals and allocate task.

   Each director had his/her unique way of deploying the strategy. Some directors preferred to further breakdown the goals into targets and follow them with weekly meetings or action logs. Some directors preferred to have more constant communication with their teams and be updated about the proceedings. The intention was to realize the goals rather than focusing on the way of working. But every director was eager to work systematically in this regard and have an improved approach.

5. **How do you measure the performance of your teams?** Performance measurement aspect plays an important part for directors to visualize how far they have achieved their targets. The insights of PE-Sweden directors are discussed below.

   Keywords Drive team focus on deliverables, speed of achieving goals, PBT tool, ad-hoc, dialogues, concentrate on daily tasks.

   As expected, there was different ways how directors went about measuring performance of their teams. Most of the directors concentrated on their meetings with various group managers, follow up of daily tasks and constant dialogues to be appraised about the teams performance. Some preferred to use PBP tool and follow up on the mentioned targets. Overall, the style followed by Directors was more ad-hoc and dependent on the functions of their department. But most of them felt the need to have a better IT tool where they could set up developmental plans and follow up on them periodically to have a clear idea about the set targets.

6. **How would you motivate your team to work with KPIs?** This question is more into the future. As PE-Sweden was undergoing changes during Nov 2018 until April-2019, directors were unsure about the goals and KPIs.

By answering this question, directors have described their plans to work with future KPIs in PE Nextgear.

Keywords Clear and right KPIs, be a role model, focus on daily tasks, visual communication of KPIs.

As there were too many KPIs with some unclear definitions, many directors felt a set of few precise KPIs would itself motivate and help them motivate their teams to work with them. Some directors pointed out the lack of visual communication regarding KPIs which is hindering the engineers to see them. Some directors opined the need to be a role model and inspire their teams to put effort on KPIs. Most of the directors prefer to concentrate on daily tasks through KPIs which will automatically bring in the acceptance and motivation for their teams.

7. **On what should future KPIs be built on?** This was the last question for the directors. After presenting their views on strategy, KPIs, performance measurement, this question provided them the opportunity to combine all their thoughts and inform us what do they want in the future KPIs.

   Keywords few KPIs, measure the flow of tasks, focus on culture, trust, mindset and customer, drive right behaviour.

   The needs for perfect KPIs could go on forever. But, the directors aptly presented their thoughts on future KPIs with some real life examples of work conditions and the way of working at Volvo. Everyone wanted to work with handful of KPIs focusing on the flow of daily tasks, in accordance with the Volvo culture, driving right employee behaviour and concentrating on product performance.

5.5 Contents of the survey

Once the KPI owners and directors were interviewed, a top management perspective was understood. The next phase was to perceive the mindset of the employees or the teams. In one of the books, Robinson, S.(2012) mentions that to get successful pursuit of this performance improvement, it is necessary to have everyone on board, like the management, employees etc. Hence, to study what the employees think about the KPIs and their needs regarding the same, a survey was conducted.

The survey was the result of extensive academic research on various aspects such as Survey design, different stages of conducting survey, the analysis methods etc. which are described in the theory section. Inculcating all the factors mentioned in the academics, all the available scales of measurement such as Nominal, ordinal, multiple choice, open and close ended questions and Kano questionnaire were employed.

A pilot test was conducted with the product documentation team, based on the feedback and results improvements were before sending out to the target group. This survey was sent out to all the employees under PE sweden, which consisted of 7 different departments and around 800+ people in total. The target was to get responses from approximately 20% of the target population, and this was successfully achieved

The survey was structured in a way that it could match the way interviews were conducted previously. It had 6 sections, which are described below:

- The first section was framed to understand the demographics of the employee answering the survey. In order to keep the identity of the person anonymous, basic questions like their department and experience were asked.
- The second section had an objective to find the employee's understanding of KPIs. What they think about KPIs, do they follow them etc
- The next section focused on their broader understanding or awareness of the strategic goals. The 5 strategic goals were presented and their knowledge towards them was found.
- The fourth section was on their view about performance measurement. How do they measure if they are performing better and their thoughts about the performance management tool.
- Section five was designed and analyzed to find the needs of the employees. Based on the theoretical study and present conditions, the questions were made according to the KANO framework. Major conditions covered in this section were Strategic cascading, Documentation, Buy-in from teams and visualization.
- The last section was open ended questions about the new organizational change and future KPIs.

Now the gathered empirical data will be described briefly section wise. The purpose of the questions in each section along with the graphs or qualitative short answers are presented. The detailed survey questionnaire has been attached as Appendix (2) in the end of the report for further reference.

5.5.1 Demographics

As the purpose of the survey was to just gather the insights of employees, more personal details were not needed. Only 2 kinds of demographic data was collected for the survey. The first one is the departments. It was important to know that there is sufficient representation from engineers belonging to all the 7 departments at PE-Sweden.As visible from the fig 5.5, The response rate varied between 8 - 23%.

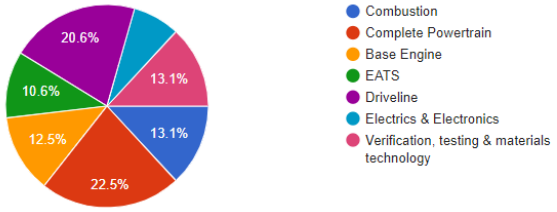

Figure 5.5: Demographics results from survey

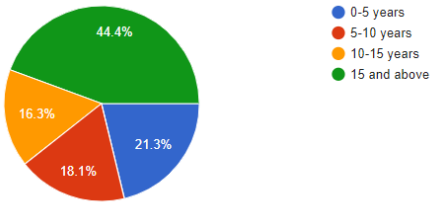

Figure 5.6: Demographics results from survey

The second demographic data was about the experience of employees. Idea was to receive responses from new employees as well as experienced Volvo veterans to gather various perspectives. The final data showed an impressive 44% responses from employees with >15 years of experience. The second highest response rate was from the newbees with 0-5 years experience presenting their thoughts as well. Overall, the responses covered the whole spectrum fulfilling our intention

5.5.2 About KPI´s in general

It was essential to understand how employees perceive KPIs. Unless the understanding and the feelings from employees are not understood, any steps taken to improve KPIs would not bear fruit. This section presented them with simple but thoughtful questions eliciting their interpretation of KPIs. Most of the questions were multiple choice or yes/no type, along with option to write their own answer as well.

1. **"What do you feel about KPI´s in general?**
   As shown in Fig 5.7 the majority of the response was that it is a top management thing. Only around 30 employees believed that it was their progress chart as well. 13% of them informed they did not have any idea about the significance of PE-Sweden KPIs.

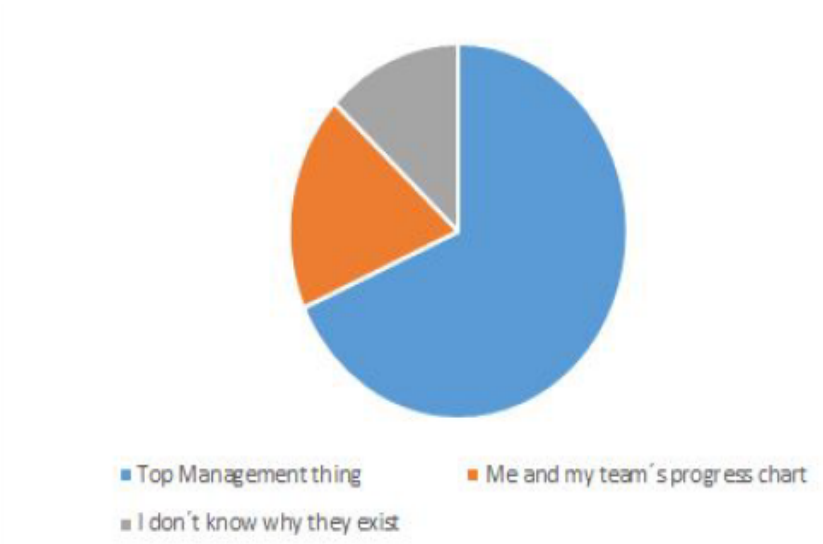

Figure 5.7: What do employees feel about KPI in general?

2. The second question probed the frequency of using KPI´s in day to day work and meetings. 60% respondents mentioned that they sometimes discussed KPI´s in their teams with 37% mentioning they never do it. Only a minority of employees informed that they often discuss the KPI´s with their teams.

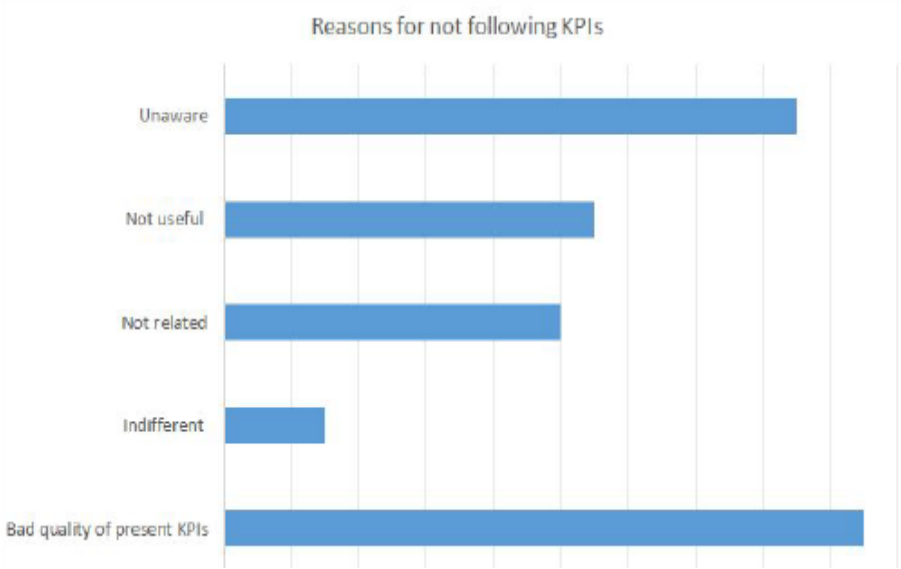

Figure 5.8: Reasons for why employees did not follow the KPIs according to survey

3. The third question was to know if they followed the KPI´s or no. Around 70% majority voted that they do not follow the KPI´s with the reasons to do so.

The reasons mentioned are coded into various groups and presented briefly in the figure 5.8
The reasons were coded in various categories, out of which 5 major categories are represented in the graph above. Each of the category has been described below:

(a) **Unaware:** This group has second largest count. The people under this group are not aware either about KPIs or where to find them.

(b) **Not useful:** The respondants under this group have an opinions that KPIs are not an efficient method or tool to measure performance. This view is not specific to Volvo KPI, but it is generally about using KPI as a tool. This also includes people who thought they did not have time to use or look at the KPIs.

(c) **Not related:** This set of responses consists people who think their work cannot be measured, or the KPIs are not related to their work at all.

(d) **Indifferent:** The respondents under this category were indifferent about using the KPIs, they followed them if shown in the meetings, but did not follow the KPIs personally to manage tasks or meet target

(e) **Bad quality of present KPIs:** The last group of people showed interest in the present KPIs, they did not follow them due to the quality of the present KPIs. Various suggestions on how they could be reconsidered were mentioned such that it could satisfy their needs, or make them feel motivated to use the KPIs.

4. The last question in this section was to know which KPI´s are important and are mostly followed by employees. Option was given to choose multiple KPI´s which they work on. Based on the responses received the top 5 most followed KPI´s are as follows. PROTUS, Project Deliveries, QJ lead time, DCN Releases, Test cell performance.

Therefore, the data gathered in this section clearly presents the general sentiment of employees regarding KPIs and further helps in suggesting future improvements.

5.5.3 Strategy

For the success of any business strategy, it is important that it penetrates at all employee levels. The intention in this section is to know the level of awareness among employees about the strategic goals of GTT, value of the present communication channels used to broadcast the strategy and how the strategic goals are translated to targets for employees by their immediate manager.

1. The first question checked the level of awareness of the strategy among Power-

train engineers. The Volvo GTT strategy was presented and employees voted their knowledge about them using 4 levels, 1 being the lowest and 4 being the highest. As visible in figure 5.9, most employees felt that they were aware of the strategy as approximately 80% settled with level 3 or 4 with 47% mentioning that they were very well aware.

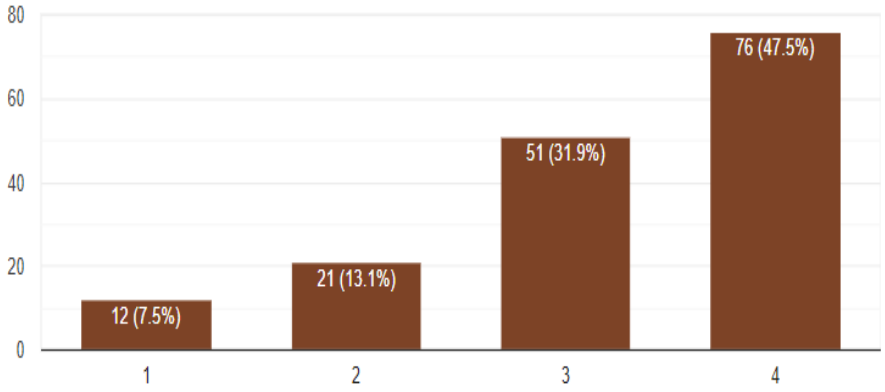

Figure 5.9: How well were the employees aware about strategy

2. The second question was to quantify which communication methods were used by employees to read about the strategy. Again, this was a multiple choice question where they could choose from many options. The most popular tool was "Violin" the internal website of Volvo Group. Other options selected can be seen in the figure 5.10 5.9

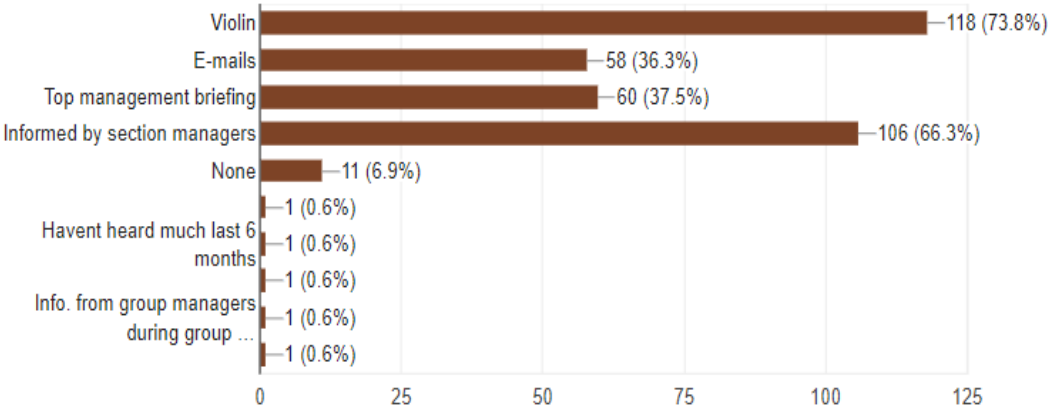

Figure 5.10: Communication ways used to propagate strategy

3. The third question probed how their managers translated the higher level goals to them. This was a subjective answer where they could provide their insights briefly. The various replies are grouped together based on the similarities and the coded data is presented below in the figure 5.11.
Keywords:
Unclear/No idea, Not done at all, In group meetings, Reorganization, Good. The number of opinions for each of the keyword used is shown below.

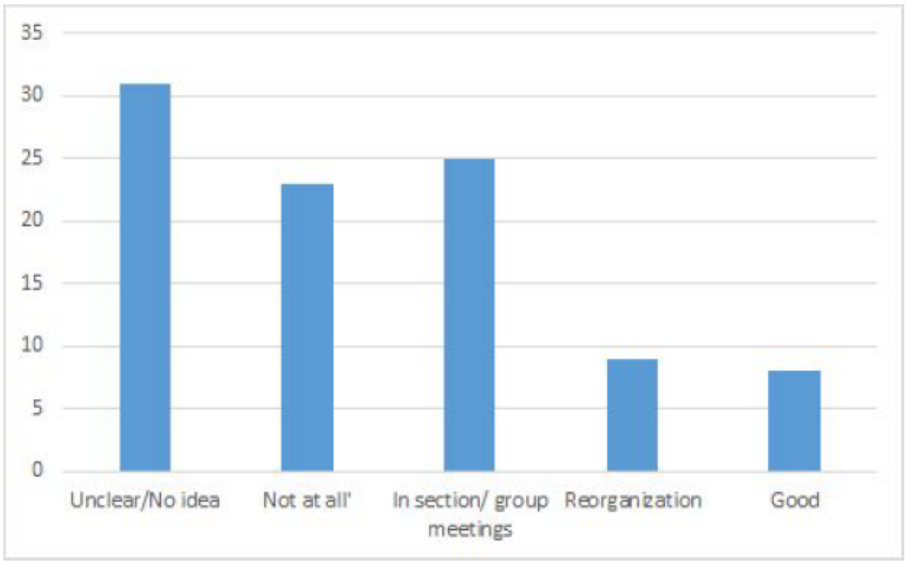

Figure 5.11: How are the goals translated to employees?

(a) **Unclear/No idea:** Most of the people opined this. They were unclear about how the strategic goals are translated to them by their managers.

(b) **Not done at all:** Around 23 respondents clearly informed that the translating or cascading of goals was not done at all.

(c) **In section/group meetings:** Around 25 employees agreed that they discuss the top level goals during their meetings and gain the information from their managers.

(d) **Reorganization:** Some employees inferred that due to the reorganization this might be stopped or changed and hoped that they would receive the goals once it is complete.

(e) **Good:** Very few employees opined that their managers did a good job in translating the higher level goals to team targets.

5.5.4 Performance measurement

This section was rather small with only 2 questions. The intention here was to gather how employees measured their performance and how the previous performance management tool aided them to achieve their targets.

The first question was a multiple choice probing "how do you know that you are performing well?". The most preferred option was through feedback from manager/teammates, followed by I meet deadlines set for my team. This clearly reflects the impact of team meetings on the individuals. The various responses can be seen in the figure 5.12

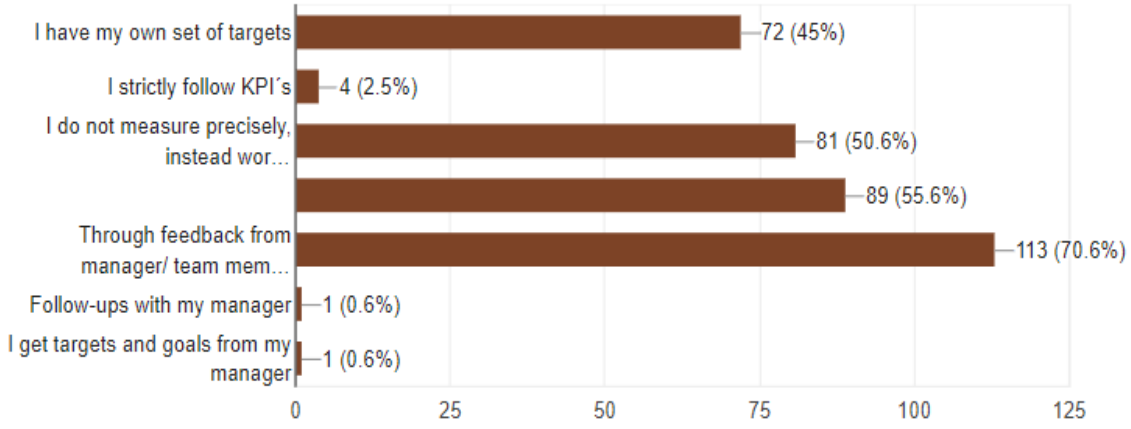

Figure 5.12: How did the employees know they are performing well?

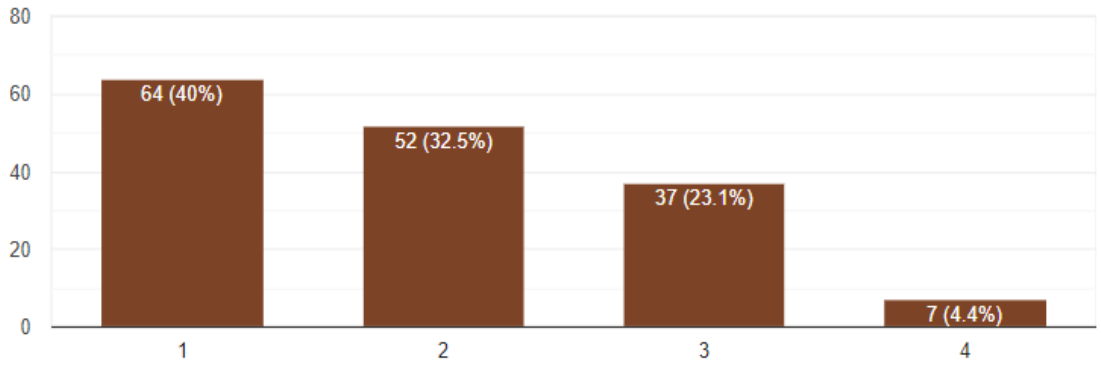

Figure 5.13: Employee preference on PBP tool

The second question elicited the opinion of employees on previous performance measurement tool. They expressed how helpful was the tool by scoring 1-4, with 1 being the lowest and 4 being the highest. As visible from the figure 5.13, around 70% of responses were in the first half clearly mentioning that it was not so helpful.

5.5.5 Future KPI´s

This section was interesting because it elicited the needs of the employees. As mentioned before, this section focussed on 4 aspects, namely Strategic cascading, Documentation, Buy-in from teams and visualization. Kano questionnaire was used to get the needs of people without asking directly what they wanted.

Based on the Kano theory mentioned before and the analysis method used. The following results can be obtained from the data.

1. **Q1: How would you feel if strategic goals were/were not broken down and communicated to you ?**

   The intention was to quantify and gather employees perception about the need for clear strategic cascading. As this was identified as an important area to increase the usefulness of KPIs.

Need Characteristics	Number of responses
Must be	70
One dimensional	30
Attractive	11
Indifferent	36
Reverse	4
Questionable	9

Table 5.2: KANO analysis for Question 1

2. **Q2: How would you feel if a document of objectives/targets is/is not shared with you by your Group Manager?**

   The intention was to elicit if the documentation of the objectives was necessary for employees. As most of these targets are discussed during team meetings and not documented, some directors felt the need to have clear documentation to verify later and at same time increase the awareness among employees.

Need Characteristics	Number of responses
Must be	52
One dimensional	30
Attractive	18
Indifferent	47
Reverse	5
Questionable	8

Table 5.3: KANO analysis for Question 2

3. **Question 3: How would you feel if the KPI´s were/were not clearly defined and communicated visually?**

   After the initial interviews with KPI owners and directors, there were some comments describing the vagueness of KPI´s and the aspect of KPI´s not being visible to most of employees. This question was asked what employees really wanted in this regard.

Need Characteristics	Number of responses
Must be	39
One dimensional	326
Attractive	13
Indifferent	71
Reverse	3
Questionable	8

Table 5.4: KANO analysis for Question 3

4. **Question 4: How would you feel if you could/could not contribute to develop and follow the KPI´s?**

   Employee interest and contribution plays a paramount role in success/failure of any initiatives. Therefore, our idea was to understand how employees feel if they could contribute to work on the KPI´s rather than just following them.

Need Characteristics	Number of responses
Must be	31
One dimensional	27
Attractive	16
Indifferent	72
Reverse	7
Questionable	7

Table 5.5: KANO analysis for Question 4

Overall, these 4 questions clearly combined the needs of employees with regard to how future KPIs should be developed.

5.5.6 Overall inputs

This section presented an opportunity for all the respondents to combine their thoughts on KPIs, strategy, performance measurement and express their views on future KPIs and the new organizational changes.

1. **Q1:"How should your teams performance be measured?"**.
   As Volvo is gearing up for new performance measurement tool, this data will help the team to implement it even better. The responses were varied and are coded as represented below in the figure 5.14

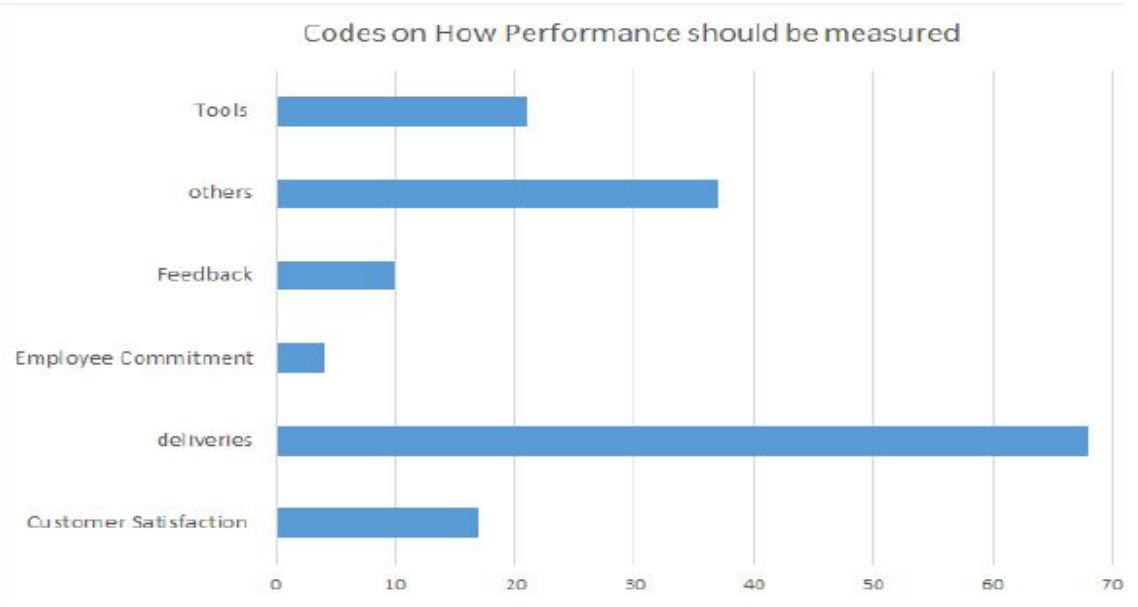

Figure 5.14: How the performance should be measured in future?

As mentioned before the responses were qualitative, hence it was coded by categorizing the similar responses. The respondents had different views on how their performance could be measured, for instance through feedback or end results of projects. The views had 5 major categories as explained below:

(a) **Tools:** This category includes views on various tools that could be used to measure performance, like PI planning, KPIs or the PBP tool. They mentioned if the tools were used correctly, by setting right targets and deadlines they would be efficient.

(b) **Feedback:** The respondents in this category believed that getting or giving feedback on their work would help them improve performance. These feedbacks could be from the managers or team members

(c) **Employee commitment:** People under this category feel that if the employees are well committed or satisfied with their work, the company is performing well. This could also be judged based on the workload on each employee and their health.

(d) **Deliveries:** As seen in the fig 5.13, most responses fall under this category. It includes responses which claimed that good performance is visible with good deliveries. These could be product delivered, quality, project deliverables, and meeting the goals set by teams or managers.

(e) **Customer Satisfaction:** This set of respondents believed that based on customer satisfaction, the performance of teams could be assessed. It can either be internal or external customer.

The last category in the graph is "others", which has responses of people who were unsure how their performance could be measured.

2. **"Your concluding views about present and future KPI".**
This question provided respondents a perfect opportunity to present their insights about the KPIs. The responses were subjective and based on observation the following views were majorly encountered. These were categorized into 3 groups as follows:

(a) First set of employees thought that KPIs were not a good tool, and they were not needed at all. Few comments such as " KPIs are dull way of measuring performance", "They do not reflect the work done, hence a bad tool" depicted that they were not needed at all. Though there were very few who mentioned this, their input is also important to understand why they thought so and what could be improved. This set of members also includes people who thought the KPIs were nowhere related to them and they were not the right way to summarize or measure their work.

(b) The Second set of employees believed that the present KPIs could be improved and suggestions on how they could be improved were given as follows:

- The KPIs needed better strategic breakdown
- KPIs lacked a sense of engagement
- Need to create buy in from employees

- The KPIs are too many in number.
- KPIs are not visible to the employees
- KPIs are a “Tool for Suboptimization”
- KPIs must meet the customer expectations
- KPIs needed more top management focus
- KPIs needed to reflect the quality of work

(c) The last set of employees believed that KPIs were good tool and currently doing good. They had a positive view on the KPIs. This set had hardly few members, but had a positive view about the present KPIs.

3. The next 2 questions were simple. The intention was to know how the new organizational changes such as PE Next Gear and Agile transformation were perceived by employees. This data was important to know because the final analysis had to be made based on the importance of these issues. The respondents had to vote in levels 1-6. 1 being hindering my performance and 6 being improving my performance.

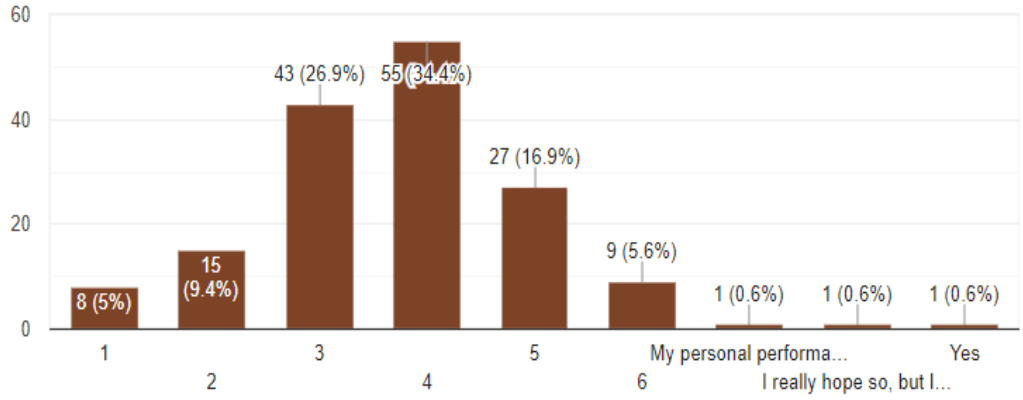

Figure 5.15: How will PE next gear affect performance according to survey

- **PE Next gear:**
  As visible from the figure 5.15, Approximately 57% of employees leaned towards the second half of the spectrum. But still, one could easily notice that employees are not 100% sure to choose the sides and are approximating their choice.

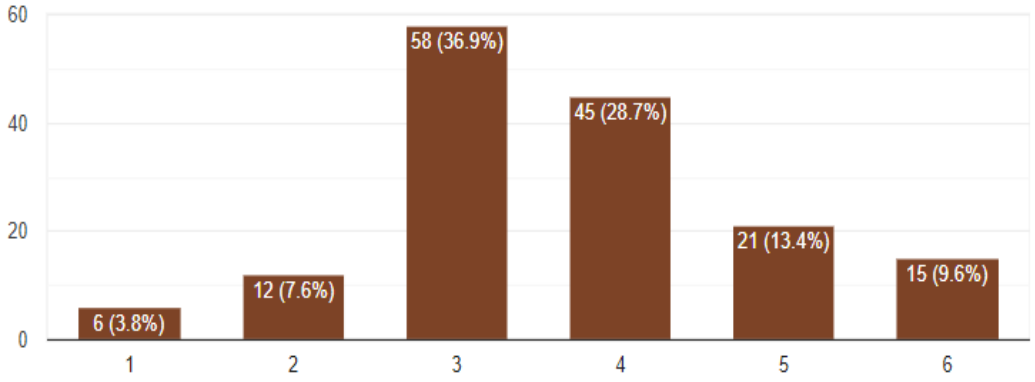

Figure 5.16: How will agile transformation affect performance according to survey

- **Agile Transformation:**

  As visible from the 5.16, Approximately 52% of employees leaned towards the second half of the spectrum. But still, one could easily notice that almost other half of employees feel agile way of working will not be conducive. Also, the highest response was level 3, indicating it would not be suitable for their line of work.

6
Analysis

This chapter focuses mainly on the analysis of the empirical data from an academic perspective, to make fact based conclusions. The section begins with the Interview insights, where based on the interview transcripts the KPIs are analyzed. In the next section, the inferences from the survey are drawn and discussed. Later, the answer to all the three research questions have been analyzed and presented.

6.1 Interview insights

The interviews with the KPI owners and the directors gave insights on the present condition of the KPIs such as how they were framed, how they were measured and their characteristics. Based on the literature study conducted, various ideal characteristics of the KPIs have been gathered. The interview conclusions are compared with the academic perspectives of the KPIs to understand if the present KPIs satisfy all the characteristics or if they need any improvement. This analysis is done in two phases,

- Initially, each KPI is analyzed using AHP (Analytical Hierarchical Process) and SMART framework to understand the order or rank in which those KPIs satisfy a particular characteristic.

- In the second phase the KPIs are classified as leading or lagging.

The phases are explained below:

6.1.1 KPI Characteristics analysis by SMART and AHP

Based on the article by Shahin(2007), a combination of SMART and AHP was used to analyze the KPIs to understand if they meet the SMART criteria. The AHP was conducted using the interview data and observations.
The following KPIs were chosen to perform the AHP, as understood from the empirical data these were given more importance. The list of chosen KPIs are :

- QJ lead time
- PROTUS
- DCN Release
- Project Deliveries

- Test cell delivery precision
- Financial KPI´s
- Net operational expenses % of latest decided budget CAP

AHP for each of the criteria of SMART was conducted and the rating/ ranks of the KPIs were obtained as follows:

6.1.1.1 Specific

As mentioned in the theory, this criteria meant the KPI needed to be precise and clear. Detailed study on objective behind these KPIs, the way they are measured etc were used to conduct the AHP, and the Ranks of the KPIs were derived as shown in figure 6.1.

	Category	Priority	Rank	(+)	(-)
1	QJ lead time	28.6%	2	19.7%	19.7%
2	PROTUS	29.1%	1	19.8%	19.8%
3	DCN releases	2.9%	7	1.1%	1.1%
4	Project Deliveries	5.3%	6	4.9%	4.9%
5	Test cell deliveries	12.2%	4	9.7%	9.7%
6	Financial KPIs	6.3%	5	3.9%	3.9%
7	Net operational costs	15.5%	3	7.1%	7.1%

Figure 6.1: KPI Ranking based on Specific character

This analysis aimed at verifying which KPI was most specific and rank them accordingly. From the interviews and this analysis we see that PROTUS and QJ lead time were the most precise and specific KPI with 29.1% 28.5% priority respectively. It was also being followed regularly by all the employees. They have 2 different measures under them, though one of them needed revision according to the interviewees, it was still very specific and related to the work. The least specific, as seen in the Fig. was DCN Releases with a priority rating of 2.9%. From the interviews it could be recollected that this KPI needed clearer definitions like agreed completed date and had to be more specific in its definitions and targets.Project deliveries was the second least with 5.3% priority, as understood from the interviews the KPIs under this were vague, abstract and complicated.
Hence, the data from the interviews and the definitions of the KPIs contributed to classify how specific the KPIs are.

6.1.1.2 Measurable

Using the description as mentioned in theory the importance ratings were given to each KPI, and the following result was obtained as shown in figure 6.2:

	Category	Priority	Rank	(+)	(-)
1	QJ lead time	9.4%	5	5.8%	5.8%
2	PROTUS	20.6%	3	13.8%	13.8%
3	DCN releases	4.5%	6	2.0%	2.0%
4	Project Deliveries	2.3%	7	0.9%	0.9%
5	Test cell deliveries	18.6%	4	8.6%	8.6%
6	Financial KPIs	22.1%	2	9.7%	9.7%
7	Net operational costs	22.4%	1	9.4%	9.4%

Figure 6.2: KPI Ranking based on Measurable character

The "Net operational costs" and "Financial KPIs" were relatively more measurable with a priority rating of approximately 22%. They had a clear definition for calculations and smoother ways to collect data.
The least ranked was again the Project deliveries with 2.3% priority rating. The measures were vague and complicated to make conclusions as mentioned in the interviews, hence it has the lowest rank. Similar issue was faced with measuring Engineering direct runners under DCN releases as measures were easy to manipulate and the employees thought the measures were unreliable.

6.1.1.3 Attainable and Realistic

These criteria had a similar meaning as defined in the theory, hence the AHP was conducted by keeping both attainability and realistic nature in mind. The data from 2018 KPIs were used with more focus, to input the ratings. The ranks were obtained from this analysis as depicted in figure 6.3:

	Category	Priority	Rank	(+)	(-)
1	QJ lead time	4.9%	6	2.5%	2.5%
2	PROTUS	9.3%	4	6.5%	6.5%
3	DCN releases	6.3%	5	3.7%	3.7%
4	Project Deliveries	2.3%	7	1.5%	1.5%
5	Test cell deliveries	20.0%	3	13.4%	13.4%
6	Financial KPIs	36.7%	1	20.0%	20.0%
7	Net operational costs	20.5%	2	9.7%	9.7%

Figure 6.3: KPI Ranking based on Attainable and Realistic character

The financial KPIs and net operational cost were the first two with 36.7% and 20.5% priority. They had achievable targets, though there were out of target value in few months they did not seem unrealistic. But Project deliveries had the least rank. The targets were not realistic. Depending on the projects it was difficult to compare them or set the same target. The real quality of the project was not being measured, and just having the current KPIs was not a good goal. The second least rated was QJ Lead time, though this KPI had the right objective and measures, the targets set were not attainable. Throughout the year this KPI was marked red, there was no analysis done to set attainable targets, thus making it the second least attainable KPI.

6.1.1.4 Time Sensitive

Keeping the definition mentioned in theory the ranks were obtained for each KPI as depicted in figure 6.4

Most of the KPIs were time sensitive, but the highlight was the KPI with least rank i.e Project deliveries. As per the interviews, though the KPI was supposed to be measured and analyzed monthly, the data was updated rarely. One of the KPIs under project deliveries was measured only once in the year 2018. Hence this KPI received the least priority rating of 5.9% Engineering direct runners under DCN releases on the other hand got the second least rating as the release time changed and hence does not provide complete reliability in time factor.

	Category	Priority	Rank	(+)	(-)
1	QJ lead time	18.0%	2	9.0%	9.0%
2	PROTUS	21.8%	1	9.0%	9.0%
3	DCN releases	8.9%	6	4.5%	4.5%
4	Project Deliveries	5.9%	7	4.9%	4.9%
5	Test cell deliveries	13.8%	5	6.4%	6.4%
6	Financial KPIs	15.3%	4	8.1%	8.1%
7	Net operational costs	16.4%	3	7.4%	7.4%

Figure 6.4: KPI Ranking based on Time Sensitivity

6.1.2 Leading and Lagging categorization

Apart from the analysis of SMART, it is also necessary to know if the KPIs were leading or Lagging. Based on the definition of leading and lagging KPIs given by Manuele(2009), PE sweden KPIs were divided into both categories. % of gross expenses is categorized as leading, since the budget for the year is known and tracking monthly expenses would help predict budget overrun in future, hence making it a leading KPI in this case. Whereas, GPOT is categorized as a lagging KPI, since the value is got only after a gate is passed and if it is not passed it cannot be fixed for that month or period of time. Thus, with similar understanding all the twenty three KPIs are categorized as represented in Table 6.1 :

Leading Indicators	Lagging indicators
% of gross expenses	NEW to Market ready
NEW to Containment action	Inflow vs. solved (status 10 / status 8), 3m rolling
PROTUS age in status 10 - 3 [days]	Trust and Passion KPIs
Projects with fulfilled need maturity	Patents: No. of ideas
QDCF fulfilment	No. of closed Kanban initiatives (incl VGAS actions)
DVG Certified Knowledge	Engineering Direct Runners
Chargeability	DCN released on time
% of latest decided budget CAP	GPOT - Gates Passed On Time
	Test Cell Delivery Precision
	Total time reported in SCORE

Table 6.1: Leading and Lagging indicators

From the table 6.1 above, it is seen that most of the KPIs were lagging indicators, which means the results were analyzed only after the damage was done. Peterson(2014) mentions that "KPIs are meant to provide a compliment of leading and lagging indicators that effectively communicate the day to day operations of the business.", hence there needs to be a right balance of both leading and lagging KPIs to drive the business.

6.2 Survey insights

In this section ,the inferences from the survey is drawn. Most part of the survey deals with the following four aspects:

- KPI
- Strategic Cascading
- Performance measurement
- Communication

The employee insights on all these 4 aspects are summarized here with factual data obtained from surveys. Academic theory is also used to support the claims. The analysis is discussed section wise.

6.2.1 Section 1- Demographics

The first section of the survey begins with collecting demographic data. We could infer from the survey numbers that there was sufficient representation from each department under PE-Sweden. This will ensure that the responses could be generalised and the further analysis can be applied to whole PE-Sweden. The second data collected was the amount of experience in Volvo. The majority were more than 15 years experienced, reaffirming the fact that they were interested to present their views which are rooted from Volvo culture. Basically, the data available proved that there was diversity in the responses provided.

6.2.2 Section 2 - About KPIs

According to the survey data, it could be seen that around 68% of employees thought of KPIs as just a top management thing and not related to them. This clearly signifies lack of intent among the employees to ownership of KPIs, which is one of the important characteristics. As mentioned in theory, KPIs need to be owned by an individual or a team (Kerzner, 2013). Also, around 13% employees opined that they do not know why KPIs exist clearly expressing their displeasure of concrete measurement of their work or subtly indicating less relevance of present KPIs. This was also opined by top management during interviews that more awareness is needed to propagate the necessity of KPIs. Only the remaining 18% employees feel connected with the KPIs and have selected the option that KPIs are my teams progress chart. When asked about the frequency of discussing KPIs, it was important to note that around 38% of employees mentioning they never discuss about KPIs during team meetings. Majority chunk also opined that they discussed it sometimes. Therefore,

the mindset of employees has to be changed to work more effectively with KPIs. The top management has to encourage more discussions on KPIs, as Kaplan (1992) describes the need to focus on operations to handle the internal business in the balanced scorecard model.
70% of respondents inform that they do not follow the KPIs and the reasons for them has been discussed in empirical data section. The bad quality of KPIs and lack of awareness are presented as two prominent reasons. The characteristics discussed in theory such as, KPIs have to made more aligned, easy to understand and actionable to increase the quality (Kerzner, 2013). Also, visual communication needs to be employed. As discussed in theory, Griffith (2002) mentions the importance of communication for improved performance. Therefore,KPIs should be made visible and bring in the culture of discussing KPIs during meetings to increase the awareness.
It is also important to know the strengths. Among the few who informed they follow the KPIs, the reasons are interesting. Most of them follow it to just get an overview about the trend and check the progress against the targets. The other reason was management follow up on important KPIs which made them follow it. Overall, the internal motivation and self-interest among the employees to deal with the KPIs have to be focussed on.
The last question in this section quantified which KPIs are used across all the departments. The top 5 KPIs which have received the maximum responses have been listed. This data will be used to infer on the validity of present KPIs.

6.2.3 Section 3 - Strategy

As mentioned in the empirical section, the awareness about the strategy is good. Around 78% of employees are aware of the GTT strategy. This is a welcome sign to create more aligned KPIs, as Kerzner (2013) describes KPIs must be aligned to business strategy for more effectiveness. Also, the various communication tools used to propagate strategy have been accepted by the employees. The two most powerful tools are Violin and information by section managers. The next step could be using these 2 medias to further clarify how the strategic cascading is done so that employees can connect it to their daily work. The chart used in OKR section could be helpful in this matter.

To understand how strategy cascading is done by the managers, employees had varied perceptions. Around 33% felt that they have no idea about this or the managers have not translated the top level goals to them. As Loch (2018) argues that key benefit from strategy cascading is clarity for technical personnel, it is important that the managers take this seriously. This is also related to KPIs not being discussed often during the team meetings as well. Some people perceived that the discussion on this matter is done in group meetings verbally and no hard documentation is done for them to refer later. Only around 5% opined that they were happy with the translation of goals by their managers. Here we can infer that, employees need a proper tool or hard documents to refer back and relate their tasks to the top level objectives.

6.2.4 Section 4 - Performance measurement

The thought process of employees regarding how they would like their performance to be measured was elicited. As presented in the empirical section, most employees reaffirm their performance when they receive feedback from their manager or team. This reassures the aspect of align and connect for teamwork mentioned by Doerr (2018). The next best preference is to satisfy the team goals and in turn reflect that they have contributed. These 2 facts assure that the culture of teamwork is very well established in PE-Sweden. Employees feel easy to discuss together with their team and contribute to achieve collective success.

But, at the same time there were 81 responses on I do not measure properly indicating lack of quantifiable achievement. Also, around 45% of people informed they have their own set of targets. Although, this indicates the interest to keep track of their progress, the efficacy and validity of these measures with respect to team goals will be questionable.Here is where the OKR framework will be helpful, as Doerr(2018) mentions OKR will measure of achieving targets in relation to the objectives and achieve transparency in personal goal setting.

The second question probed about the satisfaction level of employees about the previous performance measurement tool. The majority opined that it did not aid them to achieve their targets. Therefore, the new performance touchpoint tool has a good chance to fill the vacuum and get employee acceptance.

6.2.5 Section 5 - Future needs of KPIs

Using the Kano evaluation method according to frequencies as described by Sauerwein (1996) the future needs can be gathered. All the 4 kano questions are correlated to the characteristics with the number of opinions expressed by employees. Basically, the preference of the employees regarding the KPIs is presented. First quantified values are represented in table 6.2 and then the analysis is discussed later.

	Must be	One dimensional	Attractive	Indifferent	Reverse	Questionable
Clear Strategic Cascading	70	30	11	36	04	09
Documentation of objectives	52	30	18	47	05	08
Clear definition & visual communication	39	26	13	71	03	08
Contribute to develop & follow KPIs	31	27	16	72	07	07

Table 6.2: Kano analysis

Now analyzing the 4 requirements which were proposed in the survey and how the respondents have chosen their needs to be prioritized.

Must be - As visible from the chart, employees infer that strategic cascading is a definitive necessity to be incorporated in future KPIs. Sizeable respondents also prefer the documentation of objectives in online tool or printed documents. These factors must and should be considered.
One dimensional - Though there is no clear winner here, the respondents feel that each of the 4 aspects would increase their satisfaction if obliged. Clear conclusion cannot be reached in this case, but many inferences can be made which will be discussed later.
Attractive - The sparse number of opinions with indicate the lack of interest and awareness of the characteristics of KPIs. Although, respondents would feel extremely satisfied if the documentation and opportunity to contribute would be given to them.
Indifferent - One major factor to note is that the majority of respondents do not feel attached or are negligent with the need for visual communication and to develop KPIs by their ideas.
The values for reverse and questionable are neglected for analysis.

- **Must be -** As visible from the chart, employees infer that strategic cascading is a definitive necessity to be incorporated in future KPIs. Size able respondents also prefer the documentation of objectives in online tool or printed documents. These factors must and should be considered.
- **One dimensional -** Though there is no clear winner here, the respondents feel that each of the 4 aspects would increase their satisfaction if obliged. Clear conclusion cannot be reached in this case, but many inferences can be made which will be discussed later.
- **Attractive -** The sparse number of opinions with indicate the lack of interest and awareness of the characteristics of KPIs. Although, respondents would feel extremely satisfied if the documentation and opportunity to contribute would be given to them.
- **Indifferent -** One major factor to note is that the majority of respondents do

not feel attached or are negligent with the need for visual communication and to develop KPIs by their ideas.

The values for reverse and questionable are neglected for analysis.

6.3 Discussion on Research Questions

1. **1) What is the impact of PE-Sweden KPIs?**
   The focus here is to estimate the impact of KPIs in order to view which of them are important for the day to day business. The estimation is done by combining the insights from the interviews, survey data analysis and the observations of the research students to connect the KPI to the strategy. Therefore, the results and behaviour they drive according to the KPI owners and directors, the popularity of usage among the powertrain engineers and the viability of each KPI according the GTT strategy forms an important part to estimate the impact of the KPIs.

   - **Interviews:** Based on the collective inputs of KPI owner and the directors, each KPI is classified into 5 different classes from 1-5. This is a verbal scale, where 1 depicts the KPI has to be scrapped, 2- May be not needed, 3 -Needed, but rethinking required , 4 - Important, but needs improvement, 5 - It is perfect in the present state.

   - **Survey:** Based on the number of responses of the powertrain employees on the KPIs they had chosen to associate their work the scale has been developed. If the vote count on KPI is 0-20, then the scale 1 is allotted, 20-40 vote gives relates to scale 2 with the vote count of 80-100 giving the scale 5.

   - **Observation:**This section combines the overall understanding from the point of view of the research students. The connection of the present KPIs to the GTT strategy is established and ranked here. Although this scale is subjective in nature, the objectivity is tried to be maintained by referring the significance of KPIs to the equivalent strategic objective mentioned in the GTT strategy. Here the scale of 1-5 is used with 1 being the weakest link and 5 being the strongest. Once again it is to be noted that this rating considers the strength of alignment between KPIs with present definition and its link to GTT strategy.

KPIs	Interview	Survey	Observation	Impact score
QJ lead time	4.5	5	5	112.5
PROTUS	4.5	5	5	112.5
Trust & Passion KPIs	2	1	2	4
Change KPIs	1.5	1	2	3
DCN Releases	3	4	3	36
Project deliveries	3	5	4	60
Test cell performance	3	3	4	36
Financial KPIs	3	1	4	12

Table 6.3: Impact score analysis

As visible from the table 6.3 QJ lead time, PROTUS and Project deliveries have the highest rating combining all the 3 inputs. It indicates that these 3 areas of KPIs have a major impact on the business in PE-Sweden. The ones with moderate impact scores, DCN Releases and Test cell performance also indicates the impact of them on the business. But, as these KPIs are not owned or handled by all PE-Sweden employees it has received a moderate score. Finally,the KPIs in the area of Trust Passion and Change needs to be scrapped or completely rethought so as to make them effective in the future scenario. Overall, this recommendation combines the insights from all our research including interviews, surveys and literature study of academic and volvo specific content.

Now, the discussion about what behaviours are the present KPIs leading is mentioned here. This is wholly considered by combining the inputs of KPI owners and directors. The KPIs which may lead to bad behaviour are listed here. GPOT, DCN released on time, Engineering direct runners, time reported in SCORE. The reasons are briefly mentioned here:

- GPOT - possibility of modifications and approvals in the project tasks to push the project to next gates.
- DCN Released on time - As presently, DCN release date is not coordinated/linked with the project stages, the approval date can simply be put later to achieve good rate.
- Engineering direct runners - The focus to push higher numbers here can make the engineer to think twice before changing the design to really improve a part.
- Time reported in SCORE - waste of time for both employees and managers.

All the other KPIs were not specifically leading to good or bad behaviours and mainly depended on the employees mindset of how they approach them.

2. **What are the ideal characteristics of the KPIs, what improvements**

are needed in the existing KPIs?
The focus of this question was to compare the KPIs against the ideal KPI characteristics mentioned in the literature. AHP-SMART analysis was conducted as explained in the earlier section and the following results were depicted:

- QJ Lead time and PROTUS were rated well in being Specific, Measurable and Time sensitive criteria. Since they were the KPIs which were actively followed by teams they needed improvement in being more attainable and realistic. Hence, the targets for the KPI could be reconsidered so that they could be attainable.
- On the other hand the Project deliveries KPI was a very important one for the organization, but lacked most of the criteria under SMART. It is necessary to reconsider this KPI, to make it more specific, measurable and time sensitive.
- The Engineering Direct Runner KPI was attainable but they needed to be more Specific, Measurable and time sensitive, as mentioned by the interviewees the KPI needed to drive the right behaviour to fulfill those criteria.

Apart from these, the rest of the KPIs were moderately lacking few characteristics which are explained below:

- The Financial KPIs were rated average in the AHP-SMART analysis. They needed to be more specific but otherwise were having good characteristics.
- The KPIs under the Trust and Passion were not considered in the AHP analysis, as they were graded as the least important KPI, or "not so relevant/ necessary" KPIs in the interviews. They were not context driven, relevant anymore nor did they trigger change.
- The KPIs under Change were also not considered in the AHP, as one of them was being scrapped and the interviews proved that they had to be reconsidered completely as the present ones were not effective at all.

The categorization of KPIs in leading and lagging showed that only 9 out of 23 KPIs were leading. As understood from the theory, it is better to have more leading indicators than lagging ones. Hence, redesigning the KPIs to be more leading indicators would be an input.

The characteristics that needed more focus as compared to the twelve KPI characteristics mentioned in theory (Kerzner, 2013) were:

- **Owned:**The KPIs needed clearer owners, and the group or individual needed to collect and analyze the data more effectively
- **Few in Number:** Currently there are too many KPIs. Hence it is necessary to reduce them to have very few and clear KPIs.
- **Easy to Understand:** Few KPIs like Project deliveries were difficult to understand and measure. Hence, the KPIs need to be redefined, so it easy and straightforward.
- **Trigger changes:** The present KPIs are lagging and the actions on KPIs like DCN releases, Project deliveries, Financial KPIs were not taken. Hence the analysis of KPI results needed more focus, so they could trigger

continuous improvement

3. **What supporting factors are needed to increase the effectiveness of KPIs at Volvo?**
   After considering all the characteristics and impact of present KPIs, the support structures which are lacking to make substantive improvements in the way KPIs are discussed. In this section, academic theory mentioned on the supporting factors is compared with the empirical data gathered from interviews and surveys. The resulting analysis is discussed below.

   (a) **Top management vigour**
   As mentioned in the theory by Young(2008) the involvement and interest of top management by reviewing plans, follow up and facilitating problems acts as a catalyst for any process. During the interviews, most of the interviewees opined that lack of top management interest and follow up of KPIs has lead to the drop in quality, misalignment of strategy with departmental objectives and lack of motivation to proactively follow and develop the KPIs. This concern was also echoed by employees in the survey where they mentioned that one of the reasons for their lack of interest was less focus of top management.
   Also, in the kano questionnaire it was clearly evident that employees were indifferent about contributing to develop and follow the KPIs. This could be easily improved by top management focussing on empowering the employees to work with KPIs, providing necessary training and constantly showing their interest which would result in the mindset change required. In addition to this, to encourage the successful implementation of new initiatives such as PE Nextgear and Agile transformation, leaders serving as a role model would provide inspiration for the employees. Also, frequent Gemba walks by the top management including the directors would make the employees feel connected to the top management briefings.

   (b) **Strategic cascading**
   This topic was discussed and probed during all the interviews and also the survey. It is a prominent aspect to consider as a support infrastructure for effective application of KPIs. In the theory chapter as Decoene(2006) describes strategic cascading will bring in more alignment to business strategy and operational performance. Especially in RD or product development context will lead to increases motivation for employees. This is achieved automatically when they can connect their day to day work to business goals and feel they are contributing for success.
   Most of the interviewees informed that previously (before the reorganization) goals were translated to the directors. But now in the present scenario they feel that it is not happening and thus the link between strategy and KPIs is weak. In the survey, the respondents opined that they are aware of the strategy but not much about KPIs and how exactly the goals are translated. Strategic cascading will solve this issue and create awareness about KPIs for all employees. Another important thing to note is that the majority of respondents felt that strategic cascading is a

"must be" quality and hence a dire need.
Overall, one of the prominent reasons for KPIs being ineffective is absence of strategic cascading. Therefore, immediate focus is required from all levels of employees to systematically align and cascade the goals.

(c) **Visual communication**
Another pillar acting as a support factor will be visual communication. As proven by research of Kaplan(2008) it leads to better execution of strategy and provides a clear picture for employees about the goals and objectives. The research has also shown that it will lead to better organizational performance.
In the interviews when asked about ideas for enhancing future KPIs, most of the participants put forth the need for more visualization of strategy and KPIs. As of now, only online tools are used to propagate strategy. But more informative presentation could be made by publishing on various screens in the building. Also, the same idea could be applied to propagate the KPIs as well. In the surveys, when asked about the idea of visual communication of KPIs, most of the employees were indifferent, which was a surprise. But the original reason could be lack of awareness and interest in KPIs which would lead them to this conclusion. Altogether, there is a need to increase visualization of strategy and KPIs to make it reach the employees.

(d) **Visual communication**
This is the pillar which binds strategic cascading, visual communication and engages employees at all levels. The performance measurement using OKR approach has many benefits as presented by Doerr (2018). It will lead to definitive measurement of weekly/quarterly/annual objectives, provide the link between top level goals and functional level targets, standardize the process of performance measurement and goal setting. As described in the figure 4.3, it clearly picturises the breakdown of Vision > Yearly objectives > Quarterly key actions > daily tasks.
During the interviews, some interviewees expressed the intention of using a standardized tool for performance measurement. It was not specific as the performance touchpoint tool was yet to be communicated. But in the survey, when respondents were probed on documentation of goals and objectives majority chose the requirement as "must be". Therefore, across all the levels of hierarchy employees want to have an interactive tool to deal with the business objectives.

7

Conclusion

This chapter presents the conclusions drawn based on the analysis, empirical data and the theory. The important deductions are listed along with the future recommendations.

1. Regarding the present twenty-three KPIs at PE-Sweden, the KPIs with high and medium impact must be continued to use with suggested improvements. Change KPIs need to be completely redefined. The KPIs under Trust and passion can be converted into action plans and be excluded from KPI list. The financial KPIs can be reduced in number and followed only by top management. Therefore, by adhering to all these conclusions the KPIs can be reduced in number and made to reflect business performance. Also the ones driving the wrong behaviours needed to be reconsidered by changing the way of measuring the KPIs.

2. Using the AHP-SMART method the KPIs were analyzed to find the missing characteristics. Management knows what are the right characteristics for KPIs, but adapting them to their situation is the major challenge. Based on the comparison of literature and case the characteristics that needed focus were:

    - Owned
    - Easy to understand
    - Trigger changes
    - Few in number
    - Apart from these, the KPIs needed to be more SMARTer and more of leading KPIs.

3. Major learning from this thesis is that the supporting factors play a great role in effectiveness of the KPIs. The supporting factors which had a major impact in this case were Top Management interest, Strategic cascading, Visual communication and Performance measurement tools. Hence a KPI board model was created which could consolidate all the support factors which is presented in figure 7.1. How the KPI board is envisioned is discussed below.

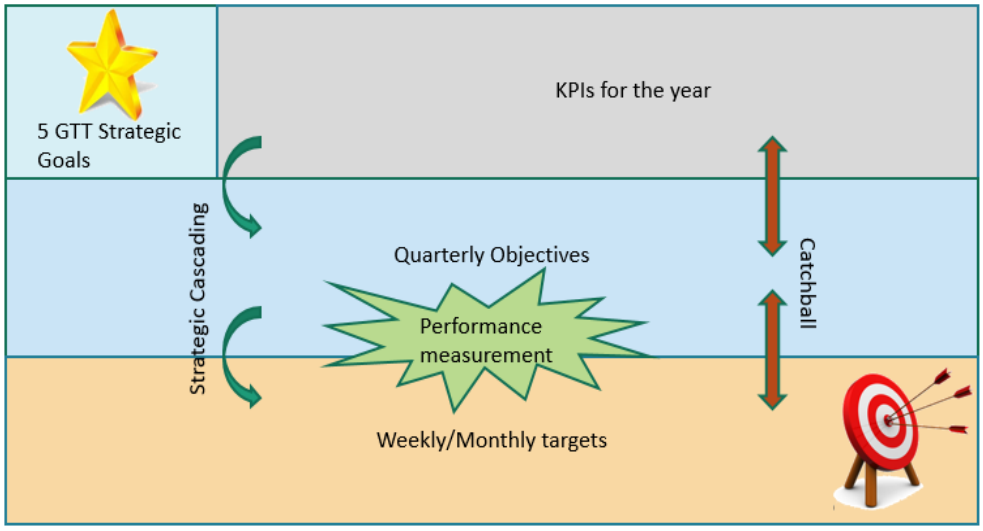

Figure 7.1: KPI board

The 5 strategic priorities of GTT act as a north star to build the KPIs. Handful of KPIs are selected by top management for the year. It is important to ensure that these KPI align with the strategy and are applicable to most teams. These KPI targets are then broken down into quarterly objectives by catchball between the directors and group managers. This acts as a second step of strategic cascading. In the next step, teams together with their group manager can decide the objectives and key results for the quarter. These quarterly objectives are then broken down into weekly/monthly targets completing the strategic cascading. Also, this will automatically bring in awareness and participation of employees. Therefore, it satisfies all the important aspects such as Strategic cascading at all levels, Visual communication with the board, Top management interest by creating KPIs and following up on targets and better usage of performance measurement by OKR methodology.

Based on the conclusions of this thesis following future recommendations are given:

- Pilot test of the KPI board could be done, and improved to make it more adaptable and effective before using it across PE-Sweden.
- The new KPIs for future could be developed keeping in mind the characteristics that need to be improved.

8

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9
Appendix

9.1 Appendix 1

Template of Semi-structured interview questions for Directors of PE-Sweden

1. Describe your normal work day in a min

About KPIs

1. How intensely do you follow KPIs?
2. What are your views about present PE-Sweden KPIs in general? (Negatives & Positives) do you think they are driving the business in the right direction?

About Strategy

1. How are the company goals/targets allocated to you from the PE-Sweden?
2. How do you deploy the strategy to your department?
3. How do you measure the performance of your department?

Questions with focus for future needs

1. How would you motivate your team to work with KPIs?
2. On what should future KPIs be built on, what improvements can be made in existing ones?
3. Final concluding comments on overall feeling about KPIs.

9.2 Appendix 2

Your remarks about PE-Sweden KPI´s

Hello Powertrain Engineers,

We are Master students from Chalmers. Our thesis at Volvo-GTT is to analyse KPI´s (Key performance indicators) of PE-Sweden. Mainly about how they are presently affecting the business and driving the behavior. The end result is to analyze and improve the present KPI´s combining the needs of top management and all the employees.

After gathering insights from top management and all the Directors/Sektionschef, its time to know your perspectives regarding KPI´s as your suggestions and buy-in is very important for achieving company strategy. Conclusions from all these will help to define the attributes for KPI´s of PE-Sweden.

We have prepared a short survey which will capture your experiences and ideas about the KPI´s.

We assure you that your responses will be kept anonymous and data will be used only to support our thesis work. Hence, kindly be frank :P

Awaiting your candid and eye-opening insights.

(The Language in few places are automated according to language set in your Google Chrome, but the questions remain in english*)

If you have any queries, kindly contact:
deepak.balihalli@volvo.com
nikhita.bhushi@volvo.com

* Required

1. **Your department under PE-Sweden** *
   Mark only one oval.

   - ◯ Combustion
   - ◯ Complete Powertrain
   - ◯ Base Engine
   - ◯ EATS
   - ◯ Driveline
   - ◯ Electrics & Electronics
   - ◯ Verification, testing & materials technology

2. **Your experience in Volvo** *
   Mark only one oval.

   - ◯ 0-5 years
   - ◯ 5-10 years
   - ◯ 10-15 years
   - ◯ 15 and above

Views on KPI´s

In this section, we would like to know your views on present KPIs of PE Sweden, and also your general understand of using KPIs in an organization.

3. **What do you feel about KPI´s in general? (You can choose more than one)** *
Check all that apply.

- [ ] Top management thing
- [ ] Me and my teams progress chart
- [ ] I don't know why they exist
- [ ] Other: _____

4. **We discuss about KPI´s in our team...** *
Mark only one oval.

- ◯ Often
- ◯ Sometimes
- ◯ Never

5. **Do you follow KPI´s ? And Why ?** *
Check all that apply.

- [ ] Yes, If so why? (mention in the blank below)
- [ ] No, If so why? (mention in the blank below)
- [ ] Other: _____

6. **My daily work affects the following KPI´s - (NOTE: If you work on any other PE-Sweden KPIs, please write in other option) (You can choose more than one)** *
Check all that apply.

- [ ] QJ lead time (NEW to Market Ready/New to containment action)
- [ ] PROTUS (Inflow vs. solved (status 10 / status 8), 3m rolling /PROTUS age in status 10 - 3)
- [ ] DCN Release (Engineering direct runners/DCN released on time)
- [ ] Project Deliveries(Projects with fullfilled need maturity/ QDCCF fulfilment/ GPOT- Gates passed ontime)
- [ ] Test cell performance(Engine performance test cells/ Engine durability test cells/ Transmission and Electromobility test cells)
- [ ] I don't know
- [ ] Other: _____

Strategy
In this section, few general questions about Volvo GTT strategy is presented to you. It focuses on strategy cascading.

Volvo-GTT strategic priorities

7. **How well were you aware about this strategy** *
Mark only one oval.

	1	2	3	4	
No idea	◯	◯	◯	◯	Well aware

8. **Communication tools used now to propagate strategy (You can choose more than one)** *
Check all that apply.

- [ ] Violin
- [ ] E-mails
- [ ] Top management briefing
- [ ] Informed by section managers
- [ ] None
- [ ] Other: _____

9. **How are the departmental strategic goals translated to targets for your team by your manager?** *

_____

Performance measurement

This section focuses on knowing your understanding of performance measurement

10. **How do you know that your are performing well ?(You can choose more than one)** *
Check all that apply.

- [ ] I have my own set of targets
- [ ] I strictly follow KPI´s
- [ ] I do not measure precisely, instead work continuously
- [ ] I meet deadlines set for my team
- [ ] Through feedback from manager/ team members

11. **Did the previous performance management tool (PBP tool) help you achieve your targets ?** *
Mark only one oval.

	1	2	3	4	
Not helpful	◯	◯	◯	◯	Very helpful

Future KPI´s

In this section we would like to capture your needs regarding future KPI´s.

Note: Each question has the same 5 options. Choose the one you identify with. Please read the questions carefully as they appear similar but have important differences.

12. **How would you feel if strategic goals were broken down and communicated to you ?** *
Mark only one oval.

- ◯ I like it that way
- ◯ I am expecting it to be that way
- ◯ I am neutral
- ◯ I can accept it to be that way
- ◯ I dislike it that way

13. **How would you feel if strategic goals are neither broken down nor communicated to you?** *
Mark only one oval.

- ◯ I like it that way
- ◯ I am expecting it to be that way
- ◯ I am neutral
- ◯ I can accept it to be that way
- ◯ I dislike it that way

14. **How would you feel if a document of objectives/targets is shared with you by your Group Manager?** *
Mark only one oval.

- ◯ I like it that way
- ◯ I am expecting it to be that way
- ◯ I am neutral
- ◯ I can accept it to be that way
- ◯ I dislike it that way

15. **How would you feel if a document of objectives/targets is NOT shared with you by your Group Manager?** *
Mark only one oval.

- I like it that way
- I am expecting it to be that way
- I am neutral
- I can accept it to be that way
- I dislike it that way

16. **How would you feel if the KPI´s were clearly defined and communicated visually?** *
Mark only one oval.

- I like it that way
- I am expecting it to be that way
- I am neutral
- I can accept it to be that way
- I dislike it that way

17. **How would you feel if the KPI´s were neither clearly defined nor communicated visually?** *
Mark only one oval.

- I like it that way
- I am expecting it to be that way
- I am neutral
- I can accept it to be that way
- I dislike it that way

18. **How would you feel if you could contribute to develop and follow the KPI´s?** *
Mark only one oval.

- I like it that way
- I am expecting it to be that way
- I am neutral
- I can accept it to be that way
- I dislike it that way

19. **How would you feel if you could NOT contribute to develop and follow the KPI´s?** *
Mark only one oval.

- I like it that way
- I am expecting it to be that way
- I am neutral
- I can accept it to be that way
- I dislike it that way

Overall inputs

In this section, we encourage to mention your thoughts in a short text.

20. **How should your teams performance be measured** *

21. **Your concluding views about present and future KPI** *

22. **How will PE Next gear affect your performance** *
Mark only one oval.

	1	2	3	4	5	6	
Hinder my performance	◯	◯	◯	◯	◯	◯	I can perform better

23. **How will PE Agile transformation affect your performance** *
Mark only one oval.

	1	2	3	4	5	6	
Hinder my performance	◯	◯	◯	◯	◯	◯	I can perform better

24. **Describe more about the PE next gear and Agile transformation effect on your performance**

25. **If you are willing to contribute more or want to be informed about the progress, kindly put your name and role, so that we can revert back**