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The new standard for innovation management systems

A comparative study of Volvo Construction Equipment's
innovation management system and CEN/TS standardized
innovation management system

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Abbreviations and definitions

AE	Volvo CE's abbreviation of Advanced Engineering
CEN	European Committee of Standardization (Comité Européen de Normalisation)
HPWS	High Performance Work Systems
HRM	Human Resource Management
ISO	International Organization for Standardization
IMS	Innovation Management System
TS	Technical Specification

Abstract

- Titel:** The new standard for Innovation Management Systems – A comparative study of Volvo Construction Equipment’s innovation management system and CEN/TS standardized innovation management system
- Authors:** Dilan Alaa Josef, Said Al-Swiri & Sivan Rahman
- Mentor:** Erik Lindhult
- Examinator:** Tomas Backström
- Course:** Graduation Project in Innovation Management INO325 – 15 credits
- Purpose:** The purpose of this study is to analyze Volvo CE’s current innovation management strategy and compare it with the European Committee for Standardization’s (CENT/TS) standardized innovation management system. The study can be helpful for the organization to understand the gap between their current management system and the recommendations found in the CEN/TS innovation management system.
- Method:** A qualitative research methodology with a deductive approach combined with action research has been used to answer and fulfill the research question and purpose of this study.
- Theory:** Our theoretical framework will introduce the five areas presented in CEN/TS IMS (2013) and describe their content more detailed with help from theoretical frameworks related to these areas. We will also consider other theorist's perspectives and compare their thoughts, description and models with what is been described in the CEN/TS regarding these five areas.
- Empiricism:** Interviews with three of Volvo CE’s innovation coaches has been made to gain an understanding about the current status of the company’s innovation management strategies related to the requirements the five areas mentioned within CEN/TS IMS.
- Analysis:** In this section, a gap analysis has been made between Volvo CE’s current innovation management strategies and the requirements of the CEN/TS IMS for each area covered by this study.
- Conclusion:** Overall, we think that Volvo CE have a good potential to develop a fully functional IMS in accordance with the requirements of CEN/TS 16555-1 into their organization with their current innovation management model as a starting point to build upon, and by following the references and recommendations provided by this study, the company has great chances in succeed with this mission.
- Keywords:** *Innovation management system, standardization & implementation*

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1. Introduction

As innovation becomes more accepted and popular within the new work era, it comes to no surprise that the actual word and focus on innovation has become a critical component for organizational survival. Practically, all the economic growth that has occurred after 1980 is linked with innovations. Innovation is also a common denominator for today's large and successful organizations that have succeeded in creating a competitive advantage over its competitors. These organizations utilize new knowledge and technology to create new or improve their products and services but also for how the products and services are created and delivered (Tidd & Bessant, 2013 p. 5-7). The big challenge however lies in the difficulty to manage and implement innovation into an organization thus innovation is a complex process with much uncertainty. Unfortunately there is no simple strategy or recipe for an organization to follow to become innovative and for many organizations the innovation process considered as unmanageable. Many organizations today have difficulty in making innovation a part of their work model, which prevents those organizations from developing new skills and strategies to improve the efficiency of their products, services and work-models. Such organizations usually do not survive on the market for long periods of time and eventually become outcompeted. Organizations on the other hand that have understood the importance of innovation and are able to manage the complexity of the innovation process have managed to survive and withstand the tough competition on their markets for decades. History furnishes us with several examples of such innovative organizations where Google, 3M and Corning among others are a few in a long list (Tidd & Bessant, 2013, p. 79).

There is no model or standard that can describe and ensure a successful innovation process within an organization, but there is however a number of factors in the process such as leadership, organizational structure, communication and motivation that can influence the innovation outcome. These factors must be managed and implemented properly so that right conditions for an innovative work environment can be created. Organizations who manage to deal with those factors the right way have much greater chances of managing the challenges and uncertainties that exist in the innovation process (Tidd & Bessant, 2013 p. 106). The key to creating an innovative organization lies thus in being able to create a functional innovation strategy and implementing it into the organization. The innovation strategy must define how the innovation driving factors must be managed, organized and supported in a proper way for it to result in success. This strategy involves several aspects within the organization where leadership, shared vision, innovation-willingness, structure and networking are a few key-aspects among others in the concept (Tidd & Bessant, 2013, p. 108).

1.1 CEN/TS Innovation management standard

Recently the European Committee for Standardization (CEN) has developed a new Innovation Management System (IMS) that aims to guide organizations to introduce, develop and maintain a framework for systematic innovation management practices. Establishing such a management system would according to this IMS allow any organization regardless of sector, type or size to become more innovative and to achieve more success with their product, service, process, organizational design and business model innovations. The innovation management system will include all activities that are required for generating innovations on a continuous basis and can be a stand-alone management system or be integrated into the core operations and management of the organization. The IMS comes as a Technical Specification (TS) that is identified as CEN/TS 16555-1 and provides guidance on establishing and maintaining an innovation management system into an organization. The TS is best suited for small and medium-sized

organization since particular attention has been given to the needs of small and medium-sized enterprises during the development of this Technical Specification, The first part was developed in 2013 and it is available for implementation. Parts 2 to 6 have been released this year, 2015; and they are also available. The part 7 is still in preparation (CEN/TS 16555, 2013). The general title of the TS is *Innovation Management* and consists of the following seven parts.

- Part 1: Innovation management system.
- Part 2: Strategic intelligence management.
- Part 3: Innovation thinking.
- Part 4: Intellectual property management.
- Part 5: Collaboration management.
- Part 6: Creativity management.
- Part 7: Innovation management assessment.

This study will be limited to part 1 and will only cover some of the moments included in the IMS model below due to time restrictions and the scope limitations for this report. The following figure (Figure 1) demonstrates the key elements that is covered by the innovation management system mentioned in the TS.

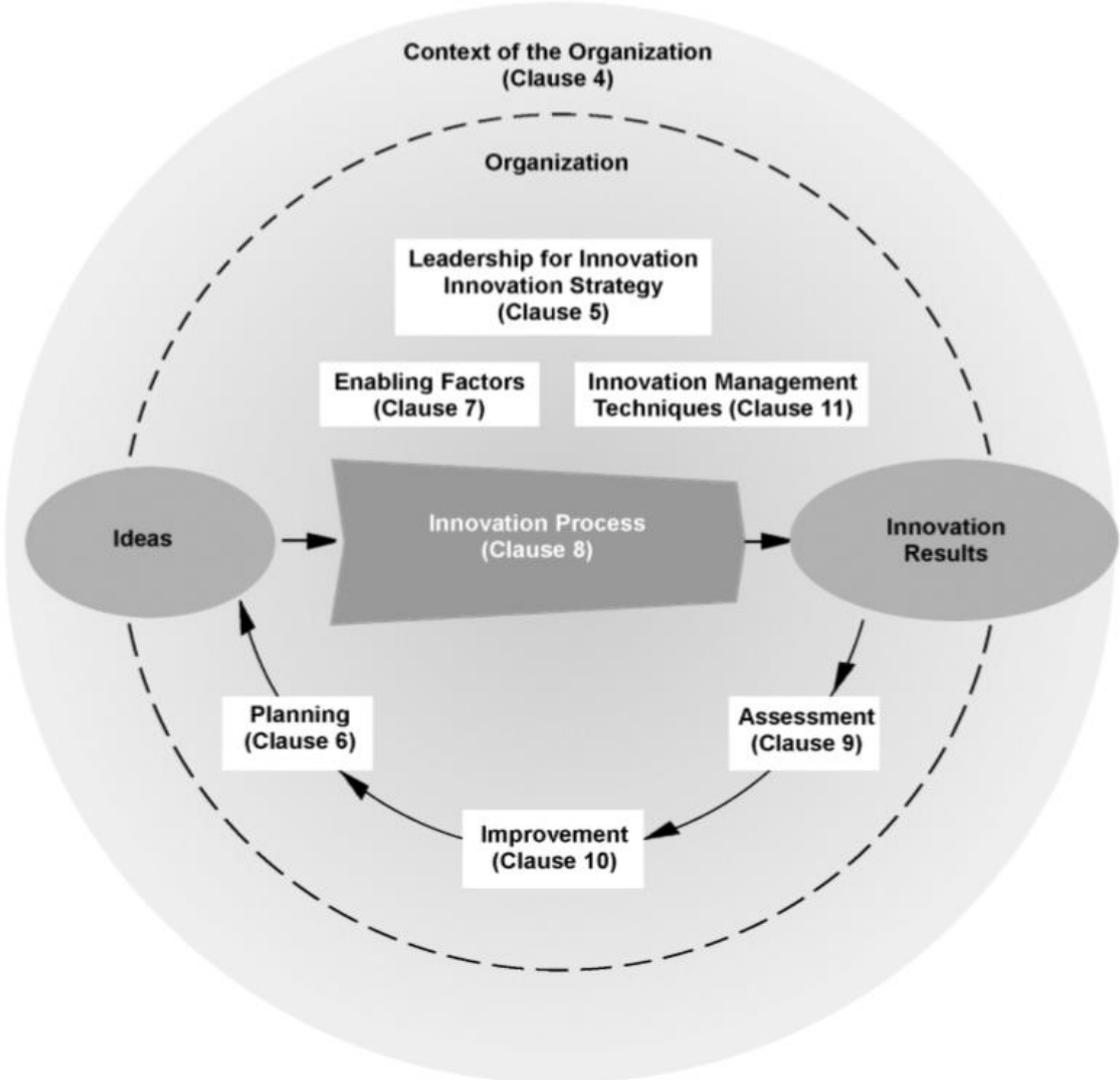


Figure 1.1 Key elements covered by this innovation management system (SIS-CEN/TS 16555, 2013).

The aim of this research is to study the current innovation management strategies in Volvo Construction Equipment (Volvo CE) and make a gap analysis between the current status of the company regarding innovation management and the requirements of the IMS.

1.2 The Organization

Volvo Construction Equipment is one of the world's leading manufacturer of construction equipment such as wheel loaders, excavators, articulated haulers, road construction machines and compact equipment. The company is located in Sweden with its four facilities spreaded over Arvika, Hallsberg, Eskilstuna and Braås. Volvo CE in Eskilstuna manufactures powertrain components, axles and transmissions for Volvo's wheel loaders, articulated haulers and motor graders. This production facility is a modern and advanced factory and with its 850 employees it is the largest employer in the city of Eskilstuna. The daily work here includes machining, assembling and production of components who then are delivered to Volvo's assembling factories around the world (Volvo stage, 2014). These complex workflows require advanced organization strategies and conductivity which makes this organization an excellent spot to study innovation management on. Volvo CE is an independent business area of the whole company which is divided into several separate organizations and those are Group Trucks, Construction Equipment, Buses, Volvo Penta, Governmental Sales and Volvo Financial Services. Volvo CE is part of a successful company that has a long history of successful innovations such as the three point seatbelt, I-shift and Volvo Dynamic Steering, for instance. Volvo's promise to their customers and society is to drive progress and be perceived as the industry's most innovative company. This requires from the company to be in the forefront of technology development as well as new services and business models. Therefore Volvo has special interest on identifying innovation management tools that might support an established and solid innovation culture.

1.3 Current innovation model

The core idea in Volvo CE's vision is that the company needs to be continuously innovative in order to secure a long-term profitable growth. The company believes that being able to adapt to changes by innovations in a constantly changing world is a critical fact for succeeding on the market. To ensure the achievement of this vision, the company started to develop an Innovation Model in 2009 by performing on-depth research and simultaneously investigating the status quo in the company to theoretically and practically understand the innovation management process. More than 50 employees in Volvo CE globally, cross-functionally and on different levels were interviewed. As a result of the research and the investigation the Innovation Model with its 9 factors were defined and a decision in February 2010 initiated the implementation and development of the Innovation model. The Innovation Model with its 9 factors can be illustrated by following figure (Figure 2). Below we will briefly describe each factor in the model to explain the implications in every factor.



Figure 1.2 The 9 factors within Volvo CE's Innovation Model (Volvo CE, 2015)

Innovative culture

Here, the company has developed an understanding that an innovative culture has a much stronger impact into the organization's innovativeness than the innovation management strategy. Without an innovative company culture, all other efforts that occurs from the innovation management strategy are in vain and nothing will change. The company's innovation coaches are the ambassadors for this task and have the responsibility to and has got the knowledge on how the innovative culture is looking on the site they are located at. This area will always need a strong focus from the company since it is affected by the people working in the company and most of all the leaders.

Sharing ideas

This factor encourages a more collaborative and open approach to the idea sharing process because the company thinks that innovation no longer comes from one enlightened genius, but instead from collaborative thinking with several perspectives. Therefore, the company wants to push the community to be more active on interacting with the organization which will provide greater possibilities for developing new ideas. The top management needs also to improve their support and focus for new ideas so that selected idea-projects get priority and deliver good results.

Future scenario goal

When it comes to which type of innovation the company needs to focus on, radical innovations is the long-term targets that Volvo CE want to accomplish with their future scenario goal. The

company has made several incremental improvements on their already existing products and businesses but to secure a long-term sustainability, the goal-direction needs to point toward more radical innovations. Here, the company needs to constantly communicate their future vision to the employees so that it facilitates the employees to see the long-term direction and spark the creative thinking.

Clear innovation process

Volvo CE's current innovations process focuses highly on generating new ideas and the idea generation phase with a seed, a sprout and a flower is a very simple way to explain and visualize how the process works. The company's so called Advanced Engineering (AE) program is a clear way of moving forward with new and promising good ideas. Here the company needs to communicate more to increase the awareness, understanding and make sure that they have all their Technology employees onboard in this way of working.

User oriented

In a constantly changing market the company needs to analyze and be aware of the customer processes and their needs in order to be one of the leading companies and to have satisfied customers. Volvo CE sees the danger in believing that the company is successful and safe in the market since suddenly, a completely new or better solution can enter the market and the customers immediately move to the new solution. Thus, the company has together with Academia developed a Need-finding method to better understand the customer's needs and expectations. The method is planned to be rolled out in the company during this year.

Clear owner

The owner of the company since 2009 is the EVP of Technology and is aware about that the best innovations and ideas come from diversity - in age, in gender, in function, in country and culture. A weakness in Volvo CE's current innovation management solution is that people outside the Technology department are not involved in the innovation process. These people also need to know that they are needed for the company in order to have an innovative climate and to increase the innovative capability.

Management commitment

The company's Innovation Model development and implementation have got a strong support from the top management all the way from the beginning. The necessary budget has been secured and the involvement from top management during the journey has been good. Other improvements that can support the Innovation Model is that the company's innovation coaches, so called iCoaches need to be further accepted and utilized by the line organization. This is not a general statement, in a few cases the iCoach role has been well-integrated and valued by both the Innovation Model network and the line organization. The concept with many iCoaches spread out and few leaders is strongly supported by Academia research and well-aligned with lean principles.

Good physical and virtual working environment

The physical working environment is a weak area within the company, here the company needs to define a strategy to secure that the innovative way of working can be supported. This strategy

includes developing principles on when to conduct information sharing meetings, how to put together project teams and how to optimize office space. There are small, simple improvements that can easily be made and among those are the following; fewer coffee break areas which make people move around a bit more and meet people from other departments, more whiteboards on the walls and small places with stand up tables in corners. All this to support a more innovative climate through the spontaneous discussions and emphasizing dialogues that will take place through above-mentioned improvements. This will eventually lead to the understanding for each other and a “think outside the box” mentality between the company’s employees.

Time for ideas

The company’s understanding of time for ideas is not about that employees should have free “unallocated” time for thinking about whatever they want to. Instead, it refers to that they should not work with too many different tasks that are requiring different skills. To do the same type of work for several projects, or to do several different tasks in one project are both allowing creativity as long as the number of projects or number of tasks are not too many at the same time. The human brain needs time for analysis and reflection to see new ways of doing things, new solutions and new opportunities. The ideas also need to meet from different perspectives, in dialogues with other people to enable ideas to become innovations. Today it is difficult for Volvo CE’s employees to find time for sharing their thoughts, ideas, challenges and knowledge, and thus, the company need to rebalance the number of tasks that are demanding too many different skills and too little time for the product-oriented, technical and customer focused discussions.

1.4 Purpose

The purpose of this study is to analyze Volvo CE’s current innovation management strategy and compare it with the European Committee for Standardization’s (CENT/TS) standardized innovation management system. The study can then be helpful for the organization to understand the gap between their current management system and the recommendations found in the CEN/TS innovation management system. The contribution of this study will also facilitate the implementation of this technical specification which will support a more systematic approach toward innovation and provide a framework and common understanding regarding innovation and innovation management for the organization and its external parties, like supplier, contractors or other external collaborations.

1.5 Problem discussion

As we mentioned in the introduction there is no simple model or standard for an organization to follow to manage the innovation management process and become innovative. In fact, several decades of research on this field has tried to solve this mystery by creating several insights into the innovation process, but without any success on providing a comprehensive framework to guide innovation management practices. The problem according to Tidd & Pavitt (2001) lies within the innovation management studies which have been based on a broad range of disciplines including management science, economics, geography, sociology and psychology. The broad variation within the research scope has therefore led to studies with very different adaptations into methods, definitions and samples. This diversity of research has even limited the accumulation of knowledge regarding innovation management. In additions, most studies have failed to include some measure of performance or success which makes it difficult to

translate much of the research into management prescription (Tidd, 2000). Nowadays there are initiatives both from public and private sectors to support and encourage business innovation management and the innovation management standard developed by the European Committee for Standardization is an example of such initiatives. By introducing an innovation management standard the CEN is trying to minimize the diversity and uncertainty that lies within managing the innovation process. According to CEN, standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline organizations (SIS-CEN/TS 16555, 2013).

1.6 Research scope

The research made on this study has only involved Volvo CE in Eskilstuna, Sweden and the outcome/result of the study will therefore not apply to Volvo's other organizations. The technical specification for the IMS seeks to establish systematic ways to approach innovation management within companies. Therefore the research has been looking for processes and procedures already established in the company that can support a structured and methodical approach on how Volvo CE handle and manage innovation. This study will be based on part 1 of the technical specification which will address the following activities and key components that are required for generating and managing innovations:

- Context of the organization
- Leadership for innovation and strategy
- Planning for innovation success
- Innovation enablers/driving factors
- Innovation management process;
- Assessment of the performance of the IMS
- Improvement of the IMS
- Innovation management techniques

As mentioned earlier in the report, this study will not cover each and every area described above due to the scope limitations of this research and a limited interest in these areas from Volvo CE's side. The company has prioritized certain areas that the analysis of this study will focus on. The following five areas has been chosen by the company:

- Planning for innovation success
- Innovation enablers/driving factors
- Innovation management process;
- Assessment of the performance of the IMS
- Improvement of the IMS

Several similar case studies over the company's innovation management system has been made from other students and therefore, the company has acquired a wide knowledge base over those areas that will not be covered by this study.

1.7 Research issue

This study involves a company with relatively good experience in handling management systems, and also with a long and solid experience in technology innovations that are to be

integrated into product or services. Volvo Group has for example implemented a quality management system based on the family of standards ISO 9000 and an environmental management system based on ISO 14000. The company has however less experience with implementing an authorized innovation management system like the CEN/TS IMS used on this case. The study will thus attempt to respond to the following question:

- What is the gap between the current status of the company regarding innovation management and the requirements of the CEN/TS IMS?

2. Method

“Not everything that can be counted counts, and not everything that counts can be counted”.
~ Albert Einstein

2.1 Subject matter

The purpose with this study is to analyze Volvo CE current innovation model versus an innovation management system (IMS) by CEN (European Committee for Standardization). The interest came from both sides, ours and Volvo CE. Innovation is a growing interest in many companies and that is why Volvo CE is planning to implement CEN IMS, to promote innovation in their organization. Our research goal is to, together with Volvo CE, look at the gap between Volvo CE innovation model and CEN IMS. After that we suggested proposal on how Volvo CE could reduce the gap.

2.2 Method approach

In this section we will discuss qualitative research together with action research.

2.2.1 Qualitative research

Based on our research question and purpose we chose to do a qualitative research combined with action research. The reason why we did a qualitative research were because we wanted to put focus on a limited theme and that was Volvo CE innovation model. We wanted to immerse on it and not measure several angles (Bryman, 2011, p. 348). It's like interpreting concept from a fairy tale and focus on word rather than numbers.

We wanted to interpret and understand our participators in a social reality in a certain environment that explains this reality (Bryman, 2011, page 240-241). We observed our participators in a social environment under a certain time to get a picture of their culture that a social group exhibits (Bryman, 2011, p. 344).

2.2.1.1 Orientation

The orientation is deductive because we wanted to test the theory from CEN IMS on the reality (Wedin & Sandell, 2003, p. 14). We started with interpreting the theories from CEN IMS and scientific articles elated to it so we could produce interview questions to our respondents. After we could analyze the gap between Volvo CE current innovation model and CEN IMS.

2.2.1.2 The study's quality and generalizability

Patel & Davidsson (2003) states that no matter what research approach the researchers takes, the analysis in the study must be both reliable and trustworthy to be useful. Validity and reliability is for that reason two concepts that often highlights in this discussions. Its two concepts that treats the surveys trustworthy and quality (Grenness, 2005).

Reliability means, according to Bryman (2011, p. 351-521), in which grade the result can be repeated if the study is put on an identical or similarly manner. Since we did a qualitative study where our empirical data collection came from our respondents, we can't see it possible to generate exactly same answers from the respondents in repeating interviews. The reason is that innovation as a concept is very subjective to its nature.

Wedin & Sandell (2003, p. 90-91) states that validity is actually easier way to measure the trustworthy rather than reliability in a qualitative studies. Validity in qualitative studies involves in which degree the researcher succeeded in measuring what he/she wanted to measure as well studying right phenomenon (Wedin & Sandell, 2003, p. 90-91). Bryman (2011, p. 351-352) classifies validity in two categories: internal validity and external validity. Internal validity means how consistent the results are in relation with how it actually is in practice. External validity refers to the degree of generalizability (transferability to other contexts and situations) (Bryman, 2011, p. 351-352).

To maintain a high degree of internal validity in this qualitative study where the results are largely based on our interpretations, we attended on all interviews. This gave us opportunity to compare our perceptions of the result that we generated from the interviews which afterwards increased the internal validity. We also did an audio recording during the interviews which we afterward transcribed into a text in form of categories based on CEN/TS theory. According to Bryman (2011, p. 428-429) audio recording and transcription is the easiest way to work with in qualitative interviews to interpret the data collections.

According to Bryman (2011, p. 352), the degree of generalizability is (external validity) also important to maintain quality in a study. Bryman (2011) describes generalizability as how repetitive the result is other than those included in study. External validity, unlike internal, constitutes a problem for qualitative researches because of their tendency to focus on one area and use limited selections (Bryman, 2011, p. 352). Because of that our argument is not to put focus on generalizability.

2.2.3 Action research

We combined action research with qualitative research to use the qualitative research as a research grant, where we analyze Volvo CE practical by interviews, and action research as an innovation grant, which is to evaluating and discovering improvements of Volvo CE current innovation model.

Action research is a concept that defines co-creation, i.e. it involves the use of research and practice in business (KK-stiftelsen, 2013-01-28). We wanted to help Volvo CE with our knowledge about innovation leadership and our research. It's a way for science and companies to get close to each other and leads to new knowledge is discovered and applied (KK-stiftelsen, 2013-01-28). Another argument why we did an action research with Volvo CE is that we had the same output phase. We wanted to combine people from Volvo CE and university so they

could work together and share knowledge. Our goal is to analyze Volvo CE current innovation model with CEN/TS IMS, at the same time we will also learn from it. We wanted to research Volvo CE practical with the goal to change the object that we research, which is their current innovation model, and that can be done with an action research as approach (Christensen, 2004, p. 170).

2.2.3.1 The study’s quality and generalizability

The validity in action research will follow Lindhults & Johansson (2008) theory about how to get validity scientifically, and that is to use valid theories, data approaches and knowledge claim. For reliability we will make sure that our study is reproducible and that the process of our research is changeable (Johansson & Lindhult, 2008).

2.3 Theoretical selection

Our theory framework has been developed in a continuous process, which means it has been developed, expanded and rejected in connection with how our own knowledge and understanding of innovation leadership has expanded during the process. Our theory is mainly based on CEN/TS theory, which is a central contribution in this study. Based on this model bellow, we selected a number of central concepts from the CEN/TS IMS. Those concepts are:

Category	Concept
Innovation management strategy (IMS)	Innovation vision and strategy; leadership; goal and planning; and innovation drivers

Chart 2.1 CEN/TS innovation management strategy in concepts (own model).

With help of scientific theories and empirical data from our interviews, we can analyze and evaluate the gap between Volvo CE current innovation model and CEN/TS IMS.

2.4 Empirical selection

According to Bryman (2011, p. 350-351), is the sampling in qualitative approach often selected, and that’s what happened in this study. Our sample is targeted since Volvo CE is a very big company with several territory areas and we just wanted to focus on one area. Therefore, we only selected participant with a connection to Volvo CE IMS. Our mainly contact was Jenny Elfsberg, she manages the Volvo CE innovation section. She recommended five people to us that are related to that section. Because of lack of time we only interviewed three people, including Elfsberg herself, but that still gave us interesting result and didn’t affect our study.

2.5 Interview

In the beginning we wanted to collect most of the data by an observation, but because of lack of time and that we didn’t want to interfere with Volvo CE workers, we chose to put focus on qualitative interviews instead. Bryman (2011, p. 412-413) argues that qualitative interviews is the best way to collect data in qualitative studies because of its flexibility, and that suited us and Volvo CE well.

According to Bryman (2011, p. 412-413) qualitative interviews in qualitative research is most likely the most used method to collect data. The difference between qualitative interviews and quantitative interviews is that qualitative interviews is less structured where the focus is to listening at the respondent (Bryman, 2011, p. 412-413). What lifts qualitative interviews mostly is to let the interview move in different directions until the respondent finds the most fitting area (Bryman, 2011, p. 414).

Each interview took about one hour and took place in Volvo CE. Each transcription took different times, but about two hour and longer. When the transcriptions was done, we coded it in different categories based on CEN/TS IMS. Bryman (2011, p. 422) argues that it's important to do the interviews in a quiet environment and that the respondent doesn't feel's nervous during the interview. Because of that we followed our respondent's needs, for example where the interview took place. We also acted so friendly as possible to avoid the interview effect. Interview effect is when the interviewer and the respondent affect each other mutually which in turn affects how the respondent response (Bryman, 2011, p. 229).

2.5.1 Semi-structured interview

Semi-structured interview is a concept which cover many styles of interviews. The question is for an example more generally formulated compared to a structured interview (Bryman, 2011, p. 206). This interview technique suited us because it gave us opportunity to ask follow up question during the interview and interpret the answers that we think are important (Bryman, 2011, p. 206).

We had specific themes based on CEN/TS IMS that we used during the interviews, which also calls an interview guide (check appendix). The respondent had the freedom to answer the question in their way and in which sequence (Bryman, 2011, p. 415). This kind of interview style allows the respondents to explain their deepest feeling about what they think about the relation between Volvo CE current innovation model and CEN/TS IMS.

2.5.2 Structure

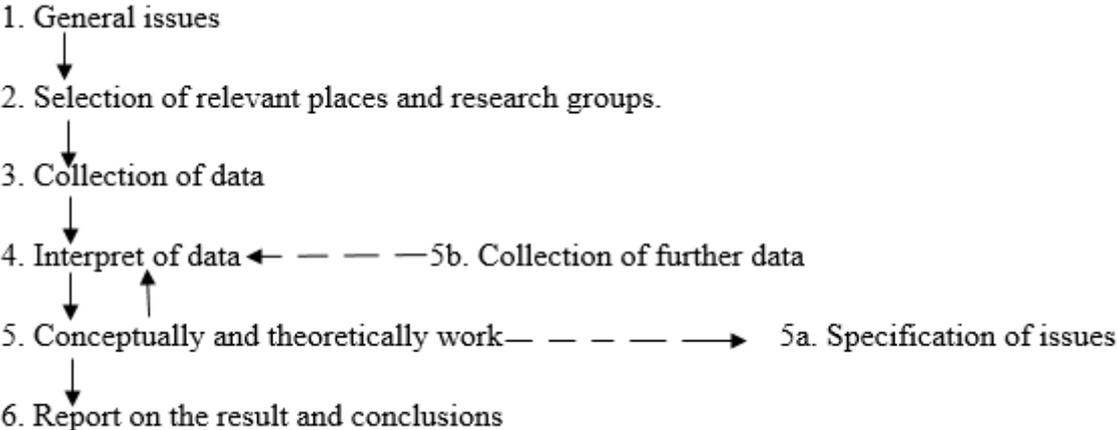


Figure 2.1 This figure explains our qualitative research step by step (Bryman, 2011, p. 346).

2.6 Planning action

In the beginning we created a bond with Volvo CE to get to know their company and their innovation process better. Elfsberg, our main contact person in Volvo CE, explained to us Volvo CE existing innovation model and that they wanted to implement CEN/TS IMS in a near future. After that we talked about how we could create value for each other and our conclusion was that we could make a research in Volvo CE by interviewing their employees that are related to their innovation model. Through that we could get empirical data collection and analyze its gap to CEN/TS IMS and reduce the gap with help of scientific theories.

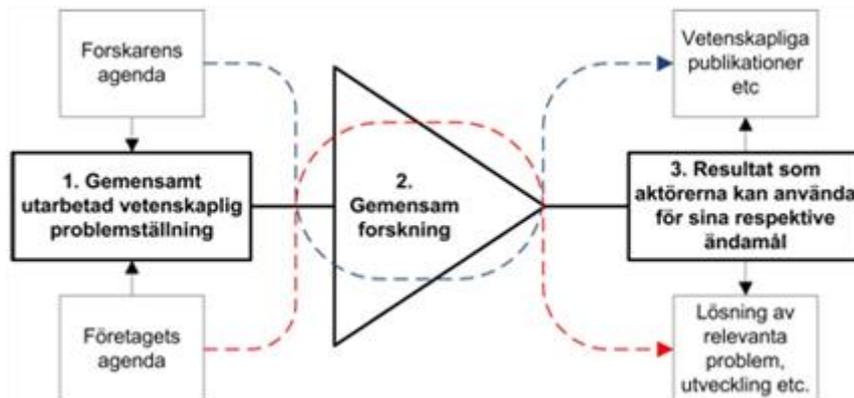


Figure 2.2 The picture visualizes the co-production between us and Volvo CE (KK-stiftelsen, 2013-01-28).

2.6.1 Structure

The action approach can be explained in four elements, following this order: planning action, taking action, evaluating action and construction (Coughlan & Brannick, 2014). First we planned how to take action and that led to interviewing the employees. After finishing collecting all data, we started to analyze this data and came up with a construction, which is the result (the gap between CEN/TS and Volvo CE current innovation model).

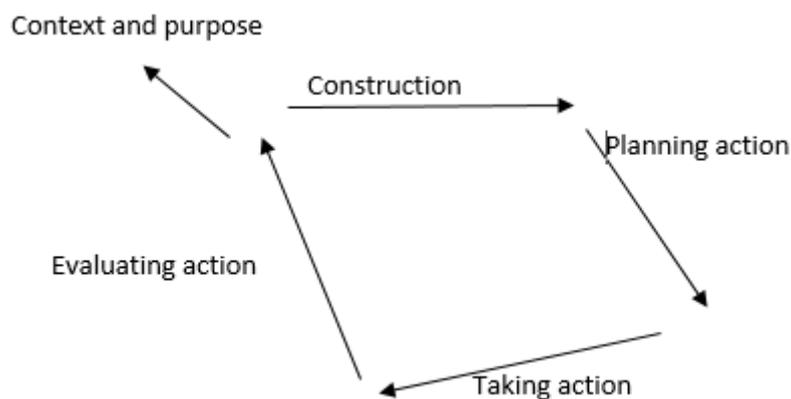


Figure 2.3 The model visualize the process behind action research (Coughlan & Brannick, 2014).

2.6.2 Purpose

Lindhult (2015) states that it's important to contribute with an innovation grant in action researches. Our main goal with action research in this study was to help Volvo CE reduce the gap between their current innovation model and CEN/TS IMS. That was made by working

together. We could with our knowledge about innovation leadership and Volvo CE knowledge practical work together. That led to an innovation grant, which is to figure out latent pattern in the gap and reduce it.

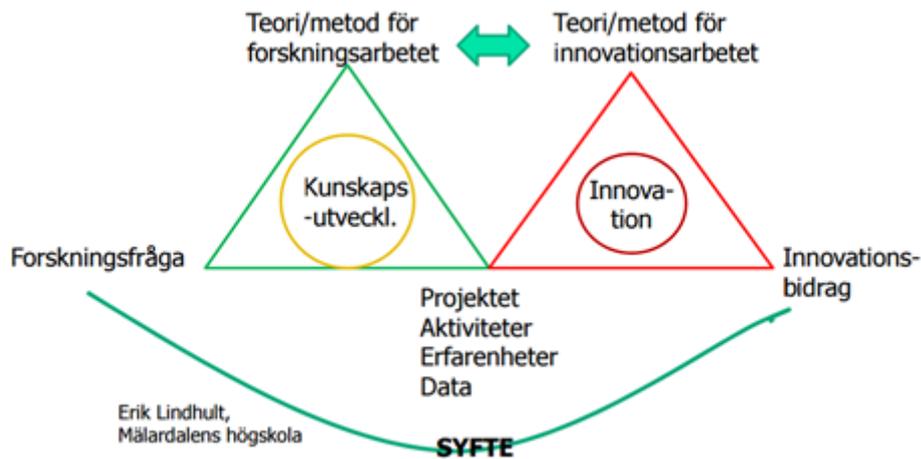


Figure 2.4 This figure illustrates the purpose with action research (Lindhult, 2015).

3. Theory

In this section we are going to introduce the five areas presented in CEN/TS (2013) and describe their content more detailed from theoretical frameworks related to these areas. We will also consider other theorist's perspectives and compare their thoughts, description and models with what is been described in the CEN/TS regarding these five areas. The five areas targeted in this section are:

Planning for innovation success: the actions must be planned because of risks and opportunities they have to deal with.

Innovation enablers/driving factors: two fundamental responsibilities in the context of IMS (Innovation Management System) should be defines in the organization, responsibilities for special innovation projects and general innovation management.

Innovation management process: a detailed innovation process which contains relevant steps should exist in the organization

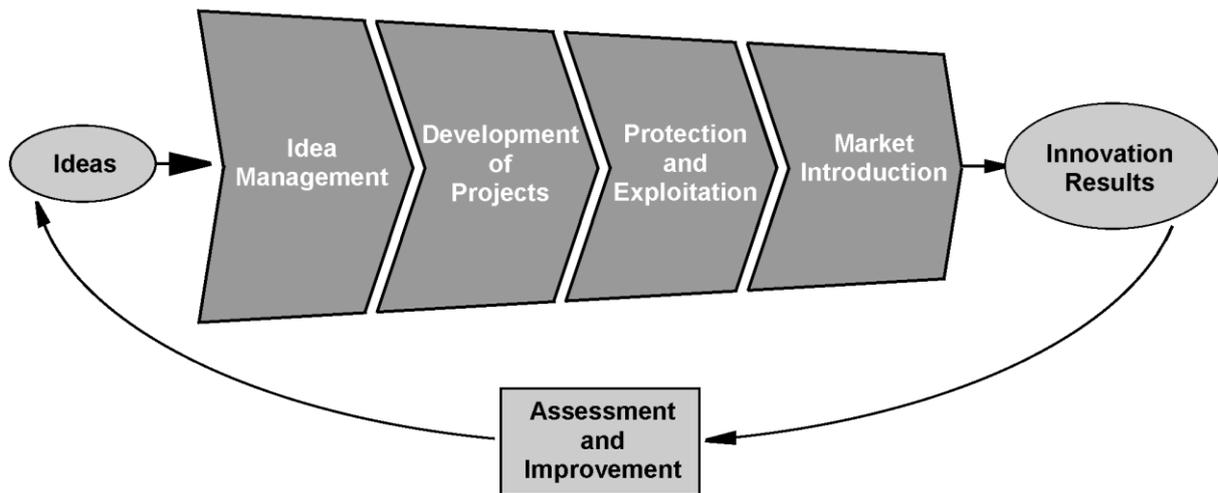


Figure 3.1 the innovation management process described in CEN/TS 16555-1.

Performance assessment of the innovation management system: indicators/methods for monitoring and criteria for evaluating in the organization should be established

Improvement of the innovation management system: suitability and effectiveness of the IMS through the use of the innovation vision and strategy, leadership, objectives and planning, innovation enablers/driving factors, assessment of the performance and top management review should be continuously improved.

3.1. Planning for innovation success

3.1.1 Risks and opportunities

According to CEN/TS (2013), external and internal issues referred to the needs and expectations, the innovation vision and strategy, and determination of the risks and opportunities that need to be addressed to the following points:

- Make sure that IMS can achieve its intended outcomes,
- preventing or reducing undesired effects
- achieving continual improvement

It is important that the organization consider these points when planning for IMS. Plan for action to deal with these risks and opportunities, integrating and implementation of the actions into its IMS processes and evaluate the effectiveness of these actions should be implemented by the organization. Considering of risks and uncertainty is important in all innovation activities (SIS-CEN/TS 16555, 2013).

Granero et al (2015) state that exogenous factors like the external environment of the firm, and even other formable aspects such as organizational culture, structure and strategy are included factors in the determinants of innovation. The leaders in the organization have many times been recognized for being strategic decision makers with the ability to see opportunities and right decision making for encouragement of innovation. When it comes to risk taking, the authors also state that the leaders propensity to take risks is positive when it comes to defining the firm's ability to innovate, which is stated in a number of research (Granero et al, 2015).

3.1.2 Operational planning

Innovation targets at relevant functions and levels must be established by the organization. It is important that the innovation objectives and the innovation vision and strategy are consistent, communicated, measurable if practicable, monitored and updated as appropriate. Retaining of documented information on the innovation objectives is important for the organization. The organization must decide activities, resources, responsibilities and milestones for the innovation driving factors, the process of innovation management and establish the indicators to monitor the short and long-term success of the IMS (SIS-CEN/TS 16555, 2013).

The function of the amount and the quality of resources dedicated to the task is what makes a firm's innovative activity successful. Innovation expenditure and human capital are variables that are consistently connected with innovation performance (Klingebiel & Rammer, 2014).

An important part of different areas for management like strategy, operations management and management of human resource is planning (Zwikael et al, 2014).

Klingebiel & Rammer (2014) are presenting three ways to succeed with innovation activities and these are:

Resource allocation breadth

The resources are spread across a number of projects and covering diverse aspects of potential preferences for the customer in the future. When talking about breadth, the argument is the more projects, the more aspects covered and higher probability of at least some innovation success. Ding & Elisabeth (referred in Klingebiel & Rammer 2014) illustrated this by reporting how Sony increased their chances of success in one of their projects by carrying between 20 and 30 development projects in the area of video tape recorder technology. When it comes to breadth, search and objectives, an analogous argument for performance has been made. What leads to better informed decision for new products is the existence of more sources of innovation and a broader search design (Klingebiel & Rammer, 2014).

Selectiveness

One bad aspect that might lead to discontinuing a project that have gone through the development path is what is called selectiveness, which is also bad for performance. A situation that can be a good example is when a company with sufficient resources for the development of their project ideas, and everyone had been promised a positive return on investment. The firm can avoid situations like this by increasing the breadth of the innovation project it pursues (Klingebiel & Rammer, 2014).

Innovative intent

The degree of innovative ambition that is associated with the firm's product development varies. When some firms focus on projects that are close to their existing products, other firms focus on projects that are distant from what they already know and their ability. A firm with innovative intent has the ability to see more variability in the lesser known terrain compared with their less ambition companions. Another property of innovative firms is that they differ when it comes to getting benefits of implementing breadth with selectiveness (Klingebiel & Rammer, 2014).

Tidd (2001) presents how degree and type of innovation affects management. The problem with innovation work is the gap between managers perception of successful innovation and the criteria's to achieve it. Another problem, which can also be seen as a barrier for generalizability of innovation research is when not specifying the type and degree of the examined innovation. Two forms of innovation are presented here. The first form is product innovation, which means the changes in the products and services offered by the organization. The second form is process innovation, which means changes in the way of delivering and creating products and services (Tidd, 2001).

3.2. Innovation enablers/driving factors

3.2.1 Organization of the roles and responsibilities

There are two main responsibilities presented in SIS-CEN/TS (2013) that must be defines by the organization in the context of IMS, and these are: responsibilities for the specific innovation projects, and general innovation management.

The responsibilities can either be assigned to a structured unit, a team or even a single person in the organization depending on its structure and how big it is.

Here are some responsibilities that should be included in the general innovation management: ensuring effective and efficient innovation management according to the recommendations of this technical specification, operational planning development, innovation process initiation and driving, the innovation project responsibilities can be assigned for every innovation project and when it is needed, subcontracting of external experts for specific tasks or projects where a gap in internal expertise is identified can be included, innovation project coordination, reporting of progress and performance to top management (SIS-CEN/TS 16555, 2013)

Ferreira et al (2015) are presenting a model by Tidd & Bessant which includes some innovation driving factors for the organization. The model is called conceptual model and consists of parts. Each part is explained with a sentence or more. There is of course more fact about the parts, but the most important fact is presented and the following are the parts included in the model:

Innovation activities

- **Strategy:** researchers consider that innovation is market oriented and strategic when it comes to strategic innovation.

- **Process:** according to different studies, innovation is the result of functionally event that are innovative and implemented in coherent stages and a number of processes.

- **Learning:** the firm becomes more flexible and innovation-based activities become dominated by learning according to researchers when talking about innovation processes

- **Organization:** some aspects like methods, responsibility redistribution, making decision about division of labor and structuring of new activities are important in innovative organizational environments.

- **Networking:** the view to explain why firms collaborate is based on resources. Complementary resources are important when it comes to inter-firm collaboration (Ferreia et al, 2015).

3.2.2 Resources

Some aspects like establishment, implementation, maintenance and continual improvement of the IMS need determination, and even get their essential resources provided by the organization (SIS-CEN/TS 16555, 2013).

Wu & Chiu (2015) are defining the term competitive performance and presenting two sources of competitive performance. The ability to earn rather than getting return of the industry's investment is the definition of the term competitive performance. In the literature, a number of perspectives for sources of competitive performance have been discussed and here are two examples:

- collective learning in the organization as core competence, coordinating different skills of production and integrating multiplex streams of technology.
- capabilities that are dynamic for distinctive processes and its adoption of evolution path (Wu & Chiu, 2015).

3.2.3 Competence

Some of the organizations important tasks presented in CEN/TS (2013) are:

- decide what competences are needed for a person who is working with innovation activities and development of them.
- Be sure that they are competent persons with appropriate education, are trained and have experience.
- Where applicable, take action to get the competence that is necessary, and evaluate how effective these taken actions are.
- Keep improving the skills and capabilities that are essential to enhance the innovation performance (SIS-CEN/TS 16555, 2013).

Other types of competences are presented by Bolivar-Ramos et al (2012) and these are:

- to make the organization survive, it is important to innovate continuously
- The ability to take advantage of competencies of the organization, technologies and knowledge for stimulating competitive benefits are the engines for innovation driving.
- To promote organizational learning and development, strengthen and renewing technological competencies, increasing pressure on the firms is the tool (Bolivar-Ramos et al 2012).

3.2.4 Awareness

Three things a person who is working under the organization's control must be aware of and have motivation for according to CEN/TS (2013) and they are:

- How important innovation is for the organization
- Vision and strategy of innovation
- How important their contribution is to make the IMS more effective, including benefits of improved performance (SIS-CEN/TS 16555, 2013).

In this section, Aalbers et al (2013) are explaining how awareness, knowledge-transfer and the innovation process can be affected because of diverse problems which can arise in the organization. Knowledge-transfer limitation and even lack of awareness can arise because of autonomy of units in a multi-unit organization structure, where individuals don't aware of each

other's activities both on individual and unit level. When it comes to the innovation process, it can be limited because of one's bad connection which also limits the knowledge-transfer (Aalbers et al, 2013).

3.2.5 Communication

CEN/TS (2013) says that internal and external communications that are relevant to the IMS should be established by the organization, taking into consideration aspects as what to communicate, when, to- and by whom, the provision of communication channels and the intended feedback (SIS-CEN/TS 16555, 2013).

Mooi and Frambach (2012) state that it is helpful for innovation to create relationships after observing practice. They give an example referenced to von Hippel (1988) who finds that most innovations in some industries originate from suppliers ideas and suggestions. Attention has been received to how buyers innovation encourages by the relationship between buyer and supplier. Because greater innovation helps buyers adapt to changes in the environment and even develop competitive advantages, it is important for them (Mooi & Frambach, 2012).

3.2.6 Documented information

According to CEN/TS (2013) documented information determined by the organization as being necessary for the effectiveness of the IMS and the evidence of its performance should be included in the organizations IMS. When appropriate, the documentation should be created, identified, shared, updated, stored, controlled and protected. The identification, update, confidentiality of the documented information can be the same that those required in that system if the organization has implemented a management system. Reasons like size of the organization and its type of activities, number of innovation projects, the complexity of processes and their interactions, the competence of persons etc decide how much the extent of documented information for an IMS can differ from one organization to another (SIS-CEN/TS 16555, 2013).

It is important for the organizations to share knowledge. It enables the skill and competence development for them, value increasing and even sustaining competitive advantages. Because knowledge embodies intangible assets, routines and processes which are not easy to imitate, it is counted as the most valuable resource in the firm. Knowledge sharing is needed for development of new products and technologies according to considerable research (Renzl, 2008).

3.2.7 Strategic human resources

A strategic approach to human resources should be included in the IMS according to CEN/TS (2013). The human policy should:

- foster creativity, learning and dissemination of knowledge
- Implement job design that allows variation, challenges and open interactions
- Encourage open interactions, trust, diversity and tolerance
- Provide procedures for employee contract ensuring appropriate incentives for innovation
- Encourage participation and representation in the innovation process of persons in the organization when appropriate
- Allow persons access to relevant information from management.

Employee involvement and co-determination is subject to different laws, regulations and social partners' agreement (SIS-CEN/TS 16555, 2013).

Lu et al (2015) state that it is important that the organization implements a distinct set of HRM practices that emphasize the human side of management and the need to develop the desired service-oriented behavior for achieving organizational objectives. That is the condition to succeed in competitive environment (Lu et al, 2015).

Lu et al (2015) are also presenting a few hypothesis that are describing the relationship between HRM and organizational performance, and how it is moderated according to each hypothesis.

Hypothesis 1: HPWS has a positive influence on the organizational performance

Hypothesis 2: the relationship between the HRM and organizational performance is moderated by age diversity, so under high age diversity the relationship is stronger compared with under low age diversity, when it's weaker

Hypothesis 3: the relationship between HRM and organizational performance is moderated by professional tenure diversity, and we can say that the relationship is stronger under high professional tenure diversity, when it's weaker under low professional tenure diversity

Hypothesis 4: the relationship between HRM and organizational performance is moderated by expertise diversity, and it is stronger relationship under high expertise diversity than low expertise diversity (Luet al, 2015).

3.2.8 Intellectual property and knowledge management

A policy for the intangible assets and management should be defined by the organization according to CEN/TS (2013). It should even provide a structure for management of internal- and external knowledge and the level and means of protection. It's benefit for the organization is that it can make such knowledge accessible for individuals involved in innovation projects and processes. Research of historical and current IP (intellectual property) in the public domain can be an important source of ideas, avoiding duplication and providing inspiration (SIS-CEN/TS 16555, 2013).

Some of the rules that should be included in the policy are:

- establish awareness of what the consequences of infringement of third parties IP are
- Establish responsibilities for managing IP
- Establish the importance for the organization to obtain freedom to operate and manage/control risks related to its IP
- If necessary, provide training (SIS-CEN/TS 16555, 2013).

Having a system for managing IP and knowledge in the organization is possible. If they have it, then the organization needs to be coordinated with the IMS so that interaction between IP management, the knowledge management and the IMS can arise in order to be effective as the factors that enable innovations (SIS-CEN/TS 16555, 2103).

Palmqvist et al (2012) state that IP (intellectual property) is essential for the organization. The importance of intellectual property rights (IPRs) or intellectual property (IP) is increasing, especially for firms that are innovative. Growing importance of knowledge management in business is one of the reasons for this (Palmqvist et al, 2012).

3.2.9 Collaboration

According to CEN/TS (2013) a policy for internal- and external collaboration should be defined by the organization. Collaboration within the organization should be fostered so that ideas and knowledge can be shared across different persons, groups and units by:

- dissemination of challenges and stimuli for ideas and problem solving
- Encouraging persons and groups to collaborate to develop ideas and share knowledge.

Collaboration and networking with external organizations can help identify ideas, customer needs, knowledge and partners, to help with both problem solving and exploitation of ideas. Opportunities can be defined by:

- activity listening and adopting ideas from customers, suppliers and other parties
- Joining knowledge transfer networks, professional bodies and trade associations
- Collaborate with- or commissioning universities and innovation support services to assist with idea generation and development.

Consideration should carefully be given to the IP ownership when collaborating (SIS-CEN/TS 16555, 2013).

Fidel et al (2015) state that companies will more likely survive and even get improved in performance while maintaining their competitive advantage if they invest in knowledge and innovation management. The authors also state that it is very important to share knowledge through collaborative innovation. According to a number of researches, implementation of knowledge management is beneficial for innovation activities to succeed (Fidel et al, 2015).

3.3 Innovation management process

3.3.1 Innovation process

According to CEN/TS (2013) the organization should establish a detailed innovation process covering all relevant steps from gaining insight about a problem or opportunity to successful launch. The innovation process is highly dependent on such aspects as the type of innovation, the kind of organization or the internal structure. So there are many ways to proceed (SIS-CEN/TS 16555, 2013). The innovation model presented in CEN/TS, 2013 includes these steps:

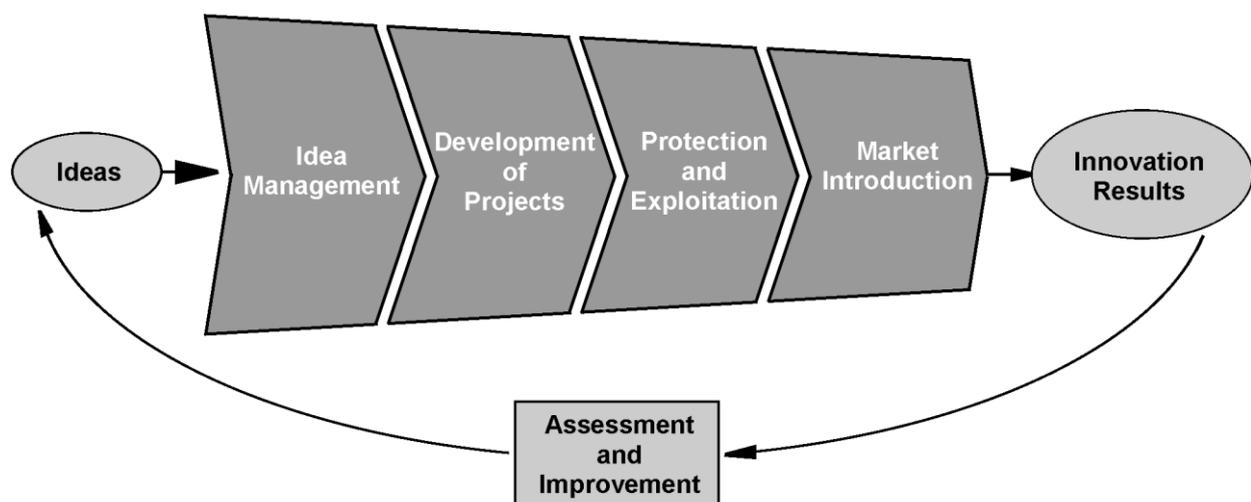


Figure 3.2 the innovation model as presented in CEN/TS 16555-1.

Idea management: includes the generation, capturing, evaluation and selection of new ideas.

Development of the innovation projects is following a recommended methodology, for example a “phase-gate” process or an innovation thinking process, or possibly combining both of them.

Protection and exploitation of the outcomes of innovation activities should be made using the best option of protection in every case, and following the defined mechanisms and agreements for exploitation if applicable.

Market introduction of the innovation can include the following steps: identifying the intellectual property environment on the target markets, developing the marketing and sales plan and securing funding and organizational resources for market introduction and expansion (SIS-CEN/TS 16555, 2013).

We can compare this innovation model with another which is presented by Tidd and Bessant (2013). The model shows where innovations come from and includes the following steps:

- **Search:** how to find opportunities for innovation?
- **Select:** what are we going to do and why?
- **Implement:** how to make it happen?
- **Capture:** how to get the benefits from it?
(Tidd & Bessant, 2013).

3.3.2 Assessing the result of the innovation process

According to CEN/TS (2013) there are two types of results of the innovation process for the organization; financial- and non financial results. The organization should specify what, how often, against what and by whom results should be assessed. The organization should define indicators to assess innovation results. **Financial indicators** for innovation results can include: *profit growth rate, revenue growth rate, cost savings for organization and clients, growth in operational margin and return on innovation investment*. **Non financial** indicators can include: *number of ideas put through the innovation process, market share, efficiency of processes, brand awareness and reputation, impact in the number of employees as a result from innovations, intangible assets and ecological and social sustainability as a result from innovation* (SIS-CEN/TS 16555, 2013, p. 15).

In terms of this section, no literature about assessment of financial- and non financial results were found. However, a model for assessing innovation competence has been presented by Sun et al (2012). The model is called the multi-level conceptual model and includes the following parts:

* Innovation process

- **Idea generation:** the linkage between technological innovation and idea generation is important, and can't be separated.
- **Idea screening:** because many ideas cannot be actualized, a filtering of innovative ideas is required.

- **Idea implementation:** the implementation stage is usually the realization of the conceptual idea to an action plan.

* **Operational enablers**

- **Innovation culture:** if a supportive environment and culture are absent, then innovation can take place by a chance.

- **Innovation method:** foundation that promote innovation can be created by innovation enabling methods in innovative organizations.

- **Resource of innovation:** it is recommended to manage the resources of innovation activity that are associated with finance, time human and physical resources as the correct resource system nurtures innovation ideas and effectively handles troubles.

* **Strategic enablers**

- **Innovation leadership:** the innovation strategy will be difficult to introduce and upheld if a decided and well positioned leadership is absent.

- **Strategy for innovation:** collaboration between diverse parties in the organization is the base for successful implementation of innovative ideas (Sun et al, 2012).

3.4 Performance assessment of the innovation management system

According to CEN/TS (2013) the organization should determine the indicators, methods for monitoring and criteria for evaluating, at least for:

- the innovation strategy
- The deployment of innovation enabling/driving factors
- The innovation process and its results (SIS-CEN/TS 16555, 2013).

It is essential that the performing of the assessment is regular, that's because of the need to ensure a deeper understanding of diverse dimensions of innovation management, and the continuous improvement of the performance of the IMS. The frequency of the IMS assessment depends on two aspects: dynamics of the environment which the organization works in, and how ambitious the organization is to improve the performance of their innovation management more. It's recommended that the organization perform internal controls in addition to other assessment methods to check the performance of the implemented IMS in the organization. It would be possible to integrate this internal verification of the IMS with the internal audit of the general management system if the organization has a management system implemented (SIS-CEN/TS 16555, 2013).

To ensure the organization's IMS's continuing suitability and effectiveness, it is recommended that top management review it. The reviewing should include consideration of the following: *the status of actions from previous top management reviews, changes in external and internal context that are relevant to the IMS, information on the performance of the IMS, opportunities for continual improvement* (SIS-CEN/TS 16555, 2013, p. 16).

Decisions that are related to continual improvement opportunities and any need for changes to the IMS, should be included in the outputs of the top management review. An evidence of the results of management review, documented information should be kept by the organization. For performance improvement and avoidance of repeated mistakes and unnecessary duplication of work, it is important to communicate the results of reviews within the organization (SIS-CEN/TS 16555, 2013).

Jiménez-Jiménez and Sanz-Valle (2011) argues that the relation between performance and innovation is positive. But at the same time, innovation is a risky and expensive activity, with both positive outcomes and negative outcomes for companies. The negativity outcomes are: employee dissatisfaction, market risk, increased cost, or unmotivated changes. But that is something all organizations have to live with. There are always some chances of risk with innovation, but if succeeded, there's a huge potential for positive performance of employee's innovation capacity. Jiménez-Jiménez and Sanz-Valle (2011) also states that the relation between performance and innovation is complex and needs more research. Despite that, there has been empirical evidence which shown that innovative activity in firms has a positive connection with positive performance in firms (Jiménez-Jiménez and Sanz-Valle, 2011).

3.5 Improvement of the innovation management system

According to CEN/TS (2013) the suitability, or effectiveness of the IMS should continually be improved by the organization, through the use of the innovation vision and strategy, leadership, objectives and planning, innovation enablers/driving factors, assessment of the performance and top management review. The deviations must be identified by the organization to help it eliminate the underlying causes by establishing corrective actions, or establish improvement actions for improving of the efficiency and the results of the IMS. To be able to eliminate the weaknesses that are identified as well as to enhance the identified strength of the IMS, a roadmap that includes measures is recommended to be defined. It is essential to communicate the improvement measures and successes within the organization which are appropriate to external interested parties. This helps stimulation of learning and continuous improvement within the organization (SIS-CEN/TS 16555, 2013).

Aragón-Correa, García-Morales and Cordón-Pozo (2007) states that innovation is an important concept for companies to improve their results by changing the business environment. There's a lot of aspects that contributes to performance improvements in firms, mostly from organizational leadership. Leadership is one of the most important individual attribute for improving firm innovation management. It has been shown that leadership has a high significance on organizational learning, indirectly affecting innovation (Aragón-Correa, García-Morales and Cordón-Pozo, 2007).

It's very important that the organization has a collectivity capability which will positively affect improvements and organizational learning in internal business meetings. Through improvements of business innovation, it will lead to organizational learning, but it will also lead to positive performance of employees (Aragón-Correa, García-Morales and Cordón-Pozo, 2007).

The most import purposes with innovation is new applications and new knowledge, especially those related to business improvements, and it has been shown in studies that it has a positive connection between performance and organizational learning. Basically, a company can

improve an innovation management system by leadership style, organizational learning and collective process learning (Aragón-Correa, García-Morales and Cordón-Pozo, 2007).

4. Empiricism & Analysis

In this section we will presents the different requirements of the technical specification (CEN/TS 16555-1) regarding below-mentioned areas.

- Planning for innovation success
- Innovation enablers/driving factors
- Innovation management process;
- Assessment of the performance of the IMS
- Improvement of the IMS

This section will be divided by making references to the parts used for each area by the Technical Specification (CEN/TS, 2013, 16555-1). Each of the parts includes the actual text from the technical specification (paragraphs in orange color), the status of the current innovation management strategies used by Volvo CE related to that part and, finally, an analysis of the gap to be able to comply with the different requirements. The status of the company's current innovation management is based on interviews made with selected employees from Volvo CE regarding this matter.

4.1 Planning for innovation success

4.1.1 Risks and opportunities

When planning for the IMS, the organization should consider the external and internal issues referred to in 4.1, the needs and expectations in 4.2 and the innovation vision and strategy in 5.1, and determine the risks and opportunities that need to be addressed to:

- ensure the IMS can achieve its intended outcomes;
- prevent, or reduce, undesired effects;
- achieve continual improvement.

The organization should plan actions to address these risks and opportunities, and how to integrate and implement the actions into its IMS processes, and evaluate the effectiveness of these actions. In all innovation activities, risk and uncertainty shall be considered.

Current status

The organization's internal issues regarding planning for an IMS is related to competence limitations. The organization is not equipped to have an IMS due to the lack of knowledge on how such a system should be implemented. As we mentioned earlier in the introduction, Volvo CE has developed its own Innovation Model including 9 factors that shows how innovation should be managed within the organization. But according to our respondent 1 the model is currently on a very high level and cannot be implemented operatively on a core level of the organization, i.e. the model does not provide a concrete description of e.g. which resources and functions are needed, what efforts has to be made and who is responsible for doing what in order to develop more innovative products/services.. There is also a financial limitation in the organization's budget for the AE-department (Advanced Engineering) which operates the preparatory development of the company's products and this budget-limitation leads to a big

restriction for future innovation-related progresses according to our respondent. When it comes to the consideration of external issues, some departments of the organization regularly scans and analyzes their external environment to identify present and future challenges. The Motor-department's external analysis for example focuses on technical and political aspects like intellectual property, science development and legislations. Another function within the organization called Product Planning has the responsibility for planning the long-term development of complete equipment and these plans also involves an external market analysis which utilizes user needs, competitors, partners, suppliers, etc.

To identify and understand the needs and expectations of interested parties, the company tries to involve other stakeholders such as customers, suppliers and research-organizations in their work process. The company has i.e. a good dialogue with their suppliers who delivers sub-systems and considers their development-potentials and needs. As for identifying customer needs, the company uses a need-finding method called FOIT which is used to analyze the customer behavior and understand the demands and need of the customers. The implementation of this method is an outcome from a collaboration between Volvo CE and a university in Sweden which is yet another example of how the company tries to involve other parties in their work process. Volvo CE follows Volvo Group's vision for the company which is to become the world leader in sustainable transport solutions by creating value for customers in selected segments, pioneering products and services for the transport and infrastructure industries, driving quality, safety and environmental care and working with energy, passion and respect for the individual. According to our respondent 1, the vision points out why and how the company should be innovative but once again, the vision doesn't provide a clear strategy on how it should be managed on an operative level. Our respondent argues that this issue is related to a weak connection and communication between the top management and the operative core-areas within the organization. Lastly, when it comes to the determination of the risks and opportunities, the biggest issue here facing the company is that not every department/function in the organization is equally involved and interested in the innovation-related work that the company tries to accomplish. The willingness for innovation is not common and shared by all functions/departments as many employees have difficulty in seeing the relevance of innovation and what their role would be in innovation-related activities.

Gap to implementation

The organization seems to have a clear understanding of which internal and external issues they are facing regarding planning for a functional IMS. However, in terms of the internal issues, the organization does not have any planned actions to address these issues. The lack of knowledge and the financial limitations are examples of such issues that must be addressed in order to ensure that the IMS can achieve its intended outcomes and achieve continual improvement. The organization's current Innovation Model needs to define strategies on how to achieve the intended outcome of the model on an operational level in order for it to function as a fully potential IMS.

4.1.2 Operational planning

The organization should establish innovation objectives at relevant functions and levels. The innovation objectives should be consistent with the innovation vision and strategy (see 5.1), communicated, be measurable if practicable, be monitored, and updated as appropriate.

The organization should retain documented information on the innovation objectives.

When planning how to achieve its innovation objectives, the organization should determine the activities, resources, responsibilities and milestones for the innovation enablers/driving factors (see Clause 7) and the innovation management process (see Clause 8), and also establish the indicators to monitor the short and long-term success of the IMS.

Current status

Regarding the establishment of innovation-related objectives, the company has not defined any specific goals or activities connected to innovation. For Volvo CE, the meaning of innovation is mainly about idea-generation and idea-development. The only measurable innovation-related activities are how many patents the company seeks yearly which is strongly depended on the company's idea-generating process so called the AE-process. The idea here is that new ideas can be generated from any function within the organization and be supported by the company's innovation coaches, even called I-coaches. Their mission is to guide and coordinate new ideas into fully developed products or services through examination, evaluation and experimentation of these ideas. The process is critical for ensuring that new products or services meets up with market and customer's needs before they are introduced. Every new idea are documented in a forum named Energy Conversion which functions as a virtual meeting place for new ideas in which they can be shared, discoursed and evaluated. This can eventually trigger unplanned innovation-related activities without being directly established by the organization.

Gap to implementation

To comply with the requirements of this point of the technical specification, the organization needs to establish innovation-related objectives consistent with their current Innovation Management Model at relevant functions and levels. The objectives must then be communicated, measurable if practicable, and updated as appropriate in order to define a proper operational planning for innovation.

4.2 Innovation enablers/driving factors

4.2.1 Organization of the roles and responsibilities

The organization should define two main responsibilities in the context of IMS:

- responsibilities for the specific innovation projects;
- responsibilities for the general innovation management.

Depending on the size and structure of the organization, innovation management responsibilities can be assigned to a structured unit, a team or a single person of the organization (even part-time if appropriate).

The general innovation management responsibilities should include:

- ensuring effective and efficient innovation management, according to the recommendations of this Technical Specification;
- developing the operational planning (see 6.2);
- initiating and driving the innovation process (see Clause 8);
- assigning for every project the innovation project responsibilities and when necessary, can include the subcontracting of external experts for specific tasks or projects where a gap in internal expertise is identified;
- coordination across innovation projects;
- reporting to top management about progress and performance.

The innovation project responsibilities should be assigned, for every innovation project, to a team or a person of the organization on the basis of skills and capabilities.

The innovation project responsibilities should include, at least:

- undertaking the innovation project assigned and its objectives;
- using the innovation tools as necessary in the project;
- reporting to the innovation management personnel about the progress of the project.

Current status

The total responsibility for the general innovation management within the organization lies upon a single person which is responsible for innovation-related tasks such as innovation planning, strategy and projects. These plans and projects are then presented to the top management and must be approved in order to be executed in the organization. On an operative level, there is at least one person from each department that carries the responsibility to undertake the innovation projects and their objectives assigned to his function/department. The situation varies for each function as Volvo CE's current innovation strategy is mostly based on technology innovation and therefore the technology related functions are more involved/allocated in these projects than other functions. Here, the organizations innovation coaches plays their role by supporting and coordinating the project leaders with their expertise to ensure that the assigned projects leads to successful outcomes.

Gap to implementation

The organization has defined clear responsibilities for the general innovation management and for the specific innovation projects. The problem however lies, as we mentioned on 4.1.2 within the operational planning for innovation due to the lack of established innovation-related projects and objectives. In other words, the company has planned for who carries the responsibilities of innovation-specific projects while there is no innovation-related projects to carry responsibility for.

4.2.2 Resources

The organization should determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the IMS (e.g. human resources, equipment, facilities and

Current status

According to our respondent 1, the company can provide the resources needed for the establishment and maintenance of an IMS. However, when it comes to the implementation of the IMS, our respondent argues that Volvo CE faces issues on this area do to the lack of knowledge on how such a standard should be implemented as mentioned earlier in 4.1.1. Nowadays, there is a function within the company with enough and appropriate people that can handle the establishment and maintenance of an IMS, and thus the resource-question is not a problem for Volvo CE.

Gap to implementation

As per today, the company has nothing set up regarding the IMS, but when they do, the company needs to determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the IMS.

4.2.3 Competence

The organization should:

- determine the necessary competence of persons working with and developing innovation activities;
- ensure these persons are competent on the basis of appropriate education, training and experience;
- where applicable, take actions to acquire the necessary competence, and evaluate the effectiveness of the actions taken;
- continuously improve the skills and capabilities required to enhance the innovation performance.

Applicable actions may include, for example: the provision of training to, the mentoring of, or the re-assignment of current employees; or the hiring or contracting of competent persons and/or organizations.

Current status

The persons responsible for working with and developing innovation activities in Volvo CE are carefully selected and must possess a particular educational and experiential background in order to be suitable for their position. Nowadays, the company have a broad variation within the profiles of their innovation- responsible employees, where some of them are specialized in technologically-oriented innovation while others works on implementing applied theoretical innovation into their organization. This results in a broad knowledge-spectrum over the organization but leads also to a knowledge-diversity between various functions of the organization. To continuously improve the skills and capabilities required for enhancing the employee-performance, the company has a process for evaluating and improving the effectiveness of their employees, so called “Personal Business Plan” (PBP), where managers and individuals clarify expectations and objectives, identify areas of development, provide feedback and review overall performance. This annual meetings serves for identifying training needs when there is a knowledge gap and are common for any individual working for the organization, i.e. not only for innovation- responsible individuals.

Gap to implementation

Here, the company has a clear method for choosing appropriate and experienced individuals with necessary competences for working with and developing innovation activities. The Personal Busies Plans serves also as a great tool for continuously improving the skills and capabilities of the innovation- responsible individuals that is required to enhance the innovation

performance. Thus, the company's current ways of handling the above-mentioned criteria seems to comply with the requirements of this point of the technical specification.

4.2.4 Awareness

Persons doing work under the organization's control should be aware and motivated about the importance of innovation to the organization, the innovation vision and strategy (see 5.1), and about the importance of their contribution to the effectiveness of the IMS including the benefits of improved innovation performance. A strong innovation culture (see 5.3) can provide this.

Current status

The majority of Volvo CE's employees and functions are not aware of the innovation-related work that the company tries to establish and accomplish. According to our respondent 1, many employees cannot or don't want to see the importance of innovation because they find it difficult to understand how they and their work-position can be involved and integrated into Volvo CE's innovation strategies. The Technology department of Volvo CE are the heart-function and have the main responsible for innovation within the organization. But even here, the awareness and contribution for innovation varies among the employees and this due to, according to our respondent that some employees will always be more creative and motivated than others, and thus be more driven in this area.

Gap to implementation

As we mentioned earlier in 7.1, Volvo CE's understanding of innovation is grounded on a technology perspective and therefore it comes as no surprise that the Technology department has the main responsibility and contribution for innovation. However, in order to improve the effectiveness of the IMS, Volvo CE need to involve other functions and find out how these can contribute to help with the fulfillment of the company's innovation vision and strategy. In order to build a strong innovation culture within the organization, every single employee needs to understand that he or she are an important part of the puzzle no matter what their work-tasks are or where in the organization they are positioned.

4.2.5 Communication

The organization should establish internal and external communications relevant to the IMS, taking into consideration aspects as what to communicate, when, to whom and by whom, the provision of communication channels and the intended feedback.

Current status

The internal communication is managed by the same person who has the main responsibility for innovation management in Volvo CE. This person makes sure to communicate and share relevant information internally in the organization at regular basis about what is happening within the AE-department which is, as we mentioned earlier, the central function for virtually all the innovation-related work done by the company. Regarding what communicates externally, the matter here is quite sensitive since Volvo CE's innovation-related work often involves patents and new technology-opportunities and therefore, what can be communicated to external stakeholders is quite limited and restricted do the sensitivity of the information that the company holds internally.

Gap to implementation

The information communicated internally in the organization is highly focused on product or technology-related progress made within the AE-department and do not include any descriptions or guidance on e.g. how other functions/departments can be involved and contribute to promote the total innovation performance of the company. The internal communication should also include relevant information on how Volvo CE's current innovation management model can be used and implemented on an operative level. The company should also be more open with their communication to external stakeholders since these can provide useful feedback that can help shaping and improving the company's internal innovation management processes.

4.2.6 Documented information

The organization's IMS should include documented information determined by the organization as being necessary for the effectiveness of the IMS and the evidence of its performance, as derived from the application of this Technical Specification.

The documentation should be created, identified, shared, updated, stored, controlled and protected when appropriate.

NOTE 1 If the organization has implemented a management system (e.g. according to EN ISO 9001), the identification, update, confidentiality and control of the documented information can be the same that those required in that system.

NOTE 2 The extent of documented information for an IMS can differ from one organization to another due to the size of organization and its type of activities, the number of innovation projects, the complexity of processes and their interactions, the competence of persons, etc.

Current status

Since the company has not implemented a management system, there is no documented information relevant for the effectiveness of the IMS and the evidence of its performance. However, all innovation-related activities which takes place within the company are documented in a digital database called Interact which functions as a journal for innovation-related activities. For instance, any type of new ideas that can potentially become into new innovations are documented in this database including the whole generation-process of these ideas. The innovation-related projects, researches and AE-activities are also reported and documented in a similar database called the Book of Knowledge which is specifically available for the Motor-department. The documentation-process including what type of information are being documented varies between the different departments of the organization and the documented information are often not shared and accessible for other departments.

Gap to implementation

Despite the lack of an implemented management system, the company has some clear ways of documenting innovation-related activities and projects. These documentations are currently of no or little relevance for the effectiveness of the IMS but can be useful and necessary when the company starts planning and implementing one in the future.

4.2.7 Strategic human resources

The IMS should incorporate a strategic approach to human resources. The human resource policy should:

- foster creativity, learning and dissemination of knowledge;
- implement job design that allows variation, challenges and open interactions;
- encourage open interaction, trust, diversity and tolerance;
- provide procedures for employee contracts ensuring appropriate incentives for innovation;
- encourage participation and representation in the innovation process of persons in the organisation, when appropriate;
- allow persons access to relevant information from management.

NOTE Employee involvement and co-determination is subject to different laws, regulations and social partners' agreements.

Current status

Volvo CE's HR-policy does not describe how the requirements of this area should be managed within the organization, however based on our respondent's personal experiences, the policy fosters dissemination of knowledge and learning through a shared norm by experienced employees who have the responsibility to teach and guide less experienced employees. The job design often allows for variation and challenges within the work-tasks and especially for those employees who are driven and want to advance in their roles and positions in the organization. Diversity and tolerance are two highly-encouraged factors within Volvo CE where the company has a known culture for accepting mistakes and hiring employees with different backgrounds, personalities and cultural aspects. When it comes to the encouragement of participation and representation in the innovation process of employees in the organization, there is no statement from the HR-policy that encourages these factors, however our respondent assures that any employee within the organization has the freedom and mandate to participate in the innovation process if so desired.

Gap to implementation

The company's human resource policy seems to meet up with most of the TS-requirements for this area despite the fact that the HR-policy does not describe how the requirements of this area should be managed within the organization. However, these human resource strategies need to be incorporated into Volvo CE's HR-policy and communicated effectively in order to engage with the company-culture and reflect the organization's values for its employees.

4.2.8 Intellectual property and knowledge management

The organization should define a policy for its intangible assets (including knowledge and know-how) and intellectual property (IP) management and provide a structure for managing internal and external knowledge and the level and means of protection. It can be useful for the organization to make such knowledge accessible for individuals involved in innovation projects and processes.

Current status

When it comes to the intellectual property (IP), the company has strict policies regarding which persons within the organization have the right to access such information before the intellectual property has been patented or licensed by the company. However, according to our respondent 1 there are no clear policies for the general knowledge management concerning how confidential certain types of information are. This makes it unclear whether the knowledge is

confidential only within Volvo CE or can be shared with external partners such as suppliers and customers.

Gap to implementation

It is clear that Volvo CE has not defined clear policies for some of its intangible assets like the general knowledge management which can create a confusion between the persons working on the organization, about which knowledge can be accessed and shared and vice versa. This fact can be crucial for individuals involved in innovation projects and processes if those individuals do not get access to important and needed knowledge relevant to their work.

4.2.9 Collaboration

The organization should define a policy for internal and external collaboration. Collaboration within the organization should be fostered so that ideas and knowledge can be shared across different persons, groups and units by

- disseminating challenges and stimuli for ideas and problem solving (sourced from employees, strategic intelligence etc.);
- encouraging persons and groups (with a diversity of perspectives) to collaborate to develop ideas and share knowledge.

Collaboration and networking with external organizations can help identify ideas, customer needs, knowledge and partners, to help with both problem solving and exploitation of ideas. Opportunities may be identified by:

- actively listening to and adopting ideas from customers, suppliers and other parties;
- joining knowledge transfer networks, professional bodies and trade associations;
- collaborating with or commissioning universities and innovation support services to assist with idea generation and development.

When collaborating, careful consideration should be given to the IP ownership (see 7.8).

Current status

Volvo CE's policy allows for collaboration between different persons, groups and units within the organization if there is a need for it and if the job-circumstances requires a collaboration. However, there is no striving from the organization to encourage collaborations between different units as every unit within the organization cares for its own responsibilities and manages its own job-tasks. The AE-department is the only exception where collaboration is encouraged and needed in this unit since the innovation-related work done here requires people with different skills and competences. When it comes to external collaboration the company tries to collaborate with other stakeholders (as mentioned in 4.1.1) such as customers, suppliers and research-organizations to identify new ideas, knowledge and customer needs.

Gap to implementation

Here, the company need to foster a culture where collaboration between all units are encouraged so that ideas and knowledge can be shared across different persons, groups and units within the organization, which often results in new ways and ideas for problem solving.

4.3 Innovation management process

4.3.1 Innovation process

In accordance with its innovation vision and strategy (5.1) and correspondent objectives (6.2), the organization should establish a detailed innovation process covering all relevant steps from gaining insight about a problem or opportunity to successful launch.

The innovation process is highly dependent on such aspects as the type of innovation, the kind of organization or the internal structure, so there are many ways to proceed. However, some common aspects integrating the typical “innovation funnel” can be described: framing and insight generation, idea management, development of the innovation project, protection and exploitation of the outcomes and market introduction (see Figure 2 in TS 16555).

Current status

According to respondent 2, the organization has a model when it comes to work with innovation. The model consists of nine steps which has been briefly described in the introduction, and they are: **Innovative culture:** where the understanding how strong the impact of the innovative culture is into the organization's innovativeness than the innovation management strategy. **Sharing ideas:** encouragement of collaboration and open approach to the process of idea sharing. **Future scenario goal:** which type of innovation the organization must concentrate on. **Clear innovation process:** the process that has a high focus on generation of new ideas. **User oriented:** the organization's need of analyzing and being aware of the customer's process and need when it comes to market changing. **Clear owner:** the owner is clear about where the best ideas and innovations come from. **Management commitment:** a strong support from the top management has been given for the development and implementation of the organization's innovation model. **Good physical and virtual working environment:** it is necessary to define a strategy for securing the support of the innovative way of working because of the weak working environment. **Time for ideas:** the employees should not work with many tasks that require different skills.

Gap to implementation

The organization has an innovation model consisting of nine steps, but it seems like it only has a model that shows the procedure during working with innovation. However, what is missing is a model that presents where their innovations come from.

4.3.2 Assessing the result of the innovation process

The results of the innovation process for the organization are financial and non-financial. The organisation should specify what, how often, against what and by whom results should be assessed.

The organization should define indicators to assess innovation results. Financial indicators for innovation results can include:

- profit growth rate;
- revenue growth rate;
- cost savings for organisation and clients;
- growth in operational margin;
- return on innovation investment.

Non-financial indicators can include:

- number of ideas put through the innovation process;
- market share;
- efficiency of processes;
- brand awareness and reputation;
- impact in the number of employees as a result from innovations;
- intangible assets (intellectual property, human resources, know-how, relationships, etc.);
- ecological and social sustainability as a result from innovation (reduction of emissions, reduction of energy consumption, material efficiency, improvement of the work environment and the working conditions, etc.).

Assessing the results against these indicators should provide feedback from success and failure and learning for the further improvement of the innovation management process (see Clause 9).

Current status

Finally, when it comes to assessment of financial and nonfinancial results of the innovation process, respondent 2 states that the organization has something which is called innovation compass. This is a method that they use to observe the organization and what kind of different metrics that can be associate with if they are innovative or not. When it comes to the financial part, they talk about allocation of the budget from the development in the earlier phases compared with the development phase. Then they also look at how innovative the new product is.

Gap to implementation

Respondent 2 only mentioned the financial part when it comes to assessing the result of the innovation process.

4.4 Performance assessment of the innovation management system

The organization should determine the indicators, methods for monitoring and criteria for evaluating, at least for:

- the innovation strategy (see 5.1);
- the deployment of innovation enablers/driving factors (see Clause 7);
- the innovation process (see 8.1) and its results (see 8.2).

The assessment should be performed on a regular basis to ensure an in-depth understanding of the different dimensions of innovation management and the continuous improvement of the performance of the IMS. The frequency of the IMS assessment depends on the dynamics of the environment the organisation operates in, as well as on the ambition of the organisation about further improvement of their innovation management performance.

In addition to other methods of assessment, an internal verification should be performed at defined intervals to check the performance of the IMS implemented in the organization.

If the organization has implemented a management system (e.g. according to EN ISO 9001), this internal verification of the IMS can be integrated with the internal audit of that general management system.

Top management should review the organisation's IMS to ensure its continuing suitability, adequacy and effectiveness.

This top management review should include consideration of:

- the status of actions from previous top management reviews;
- changes in external and internal context that are relevant to the IMS;
- information on the performance of the IMS;
- opportunities for continual improvement.

The outputs of the top management review should include decisions related to continual improvement opportunities and any need for changes to the IMS.

The organization should retain documented information as evidence of the results of management reviews.

The results of reviews should be communicated within the organization to help improve performance and avoid repeated mistakes and unnecessary duplication of work.

Current status

Volvo CE hadn't implanted an innovation management system (IMS) in their organization yet, therefore we will instead compare how Volvo CE can evaluate their current innovation model based on how CEN/TS (2013) evaluating their IMS.

Volvo CE have an innovation mode, but not a system/strategy for innovation operational. Volvo CE believes in their employees, for example, have Volvo CE icoaches, which is a role that involves to consultate their employees and attend in meetings to evaluate the performance of their employees and give feedbacks (Respondent 3). Volvo CE also have top managers, but their role is not to affect the employee's directly; for an example, they don't attend in the meetings, but leading more generally by visions (Respondent 3).

Gap to implementation

Volvo CE has already followed many requirements of CEN IMS; the company has innovation drivers like time for ideas, an innovation process in the AE-process, and a process for testing ideas, etc. Though a gap Volvo CE could reduce are the innovation strategy, and that is mostly because Volvo CE hadn't implanted an IMS yet, but planning to. To reduce this gap it's important to review the IMS itself, and that includes that the top managers of Volvo CE attend at meetings where employees can discuss and ask questions. During this meeting, the top managers can access information about the performance of their current innovation model; what is good, what is bad, and what can get better. With this information Volvo CE can focus on

what needs to be focusing on. The problem here is that Volvo CE is a very big company and it's hard for their top managers to attend on all meetings. In their place, icoaches take the role as a reviewer of Volvo CE innovation management and collect this information to the top managers.

4.5 Improvement of the innovation management system

The organization should continually improve the suitability, appropriateness or effectiveness of the IMS through the use of the innovation vision and strategy, leadership, objectives and planning, innovation enablers/driving factors, assessment of the performance and top management review.

The organization should identify deviations, and establish corrective actions in order to eliminate the causes of the deviations found, or establish improvement actions in order to improve the efficiency and the results of the IMS.

A roadmap with measures should be defined to eliminate the identified weaknesses as well as to enhance the identified strengths of the IMS. The implementation of the improvement measures should be monitored regarding the defined time-line, the completeness of the defined tasks, and the impact expected from the measures on the IMS.

To stimulate the learning and continuous improvement within the organization, the improvement measures and successes should be communicated within the organization and as appropriate to external interested parties.

Current status

As mentioned in 4.4 (performance assessment of the innovation management system), Volvo CE hasn't implanted an IMS yet, so therefore we can't analyze the gap because Volvo CE hasn't operate an IMS yet and can't therefore improve something that doesn't exist yet. But as we mentioned in our introduction, Volvo CE follows an innovation model; we will compare how Volvo CE improves their current innovation management with how CEN improve their IMS.

Volvo CE aims to improve their employee's innovation ability (Respondent 3). In their current innovation model, Volvo CE encourage their employees to actively work with their ideas independently; Volvo CE believes that will improve their employee's innovation ability (Respondent 3). Icoaches in Volvo CE got a role to inspire the employees by assisting them and evaluate their performance with the goal to get better performance from the employees (Respondent 3). Volvo CE also got a lot of group work (Respondent 3). The employees are able to work with each other, with that they are able to juggle with ideas and it also lift their creativity.

Volvo CE strategy for improvements is incremental, which means they do improvements step by step. The opposite is called radical innovation, which means improvements directly (Volvo CE).

Gap to implementation

Volvo CE fulfills a lot of CEN IMS items. For example Volvo CE has a vision, leadership, innovation enablers/driving factors, innovation performance review. What Volvo CE really lacks is communication and strategy.

Today Volvo CE aims to implement the CEN IMS, and they already follow their innovation model and has done for a while. To reduce the gap between how CEN improve their IMS and how Volvo CE improve their innovation model, Volvo CE needs to push their innovation model harder. The top managers need to push their employees to follow this innovation model and communicate with them monthly or annually, which will lead to improvements.

5. Discussion & Conclusions

The aim of this study was to analysis the current innovation management strategies used in Volvo Construction Equipment (Volvo CE) and make a gap analysis between the current status of the company regarding innovation management and the requirements of the CEN/TS 16555 IMS. The following areas within the CEN/TS IMS was covered by this study and in this chapter we will discuss the main findings that have been described in details on the Empiricism & Analysis chapter (Chapter 4).

- Planning for innovation success
- Innovation enablers/driving factors
- Innovation management process;
- Assessment of the performance of the IMS
- Improvement of the IMS

Starting off with Planning for innovation success, the biggest challenge in this area that is facing the company lies within their own-designed innovation management model (see figure 1.2). The model describes how innovation should be managed generally in the organization but does not provide any descriptions or guidance on how to accomplish the recommendations of the model on an operative level. Therefore, the company needs to adapt the implications of the model to the respective function or department within the organization so that the model can provide a concrete signification for all functions/departments. Our respondent stated that the organization lacks the knowledge on how their innovation management model should be implemented, therefore we think that by following the recommendations found in the CEN/TS 16555 (Part 1), the company can fulfill this knowledge gap and develop their current innovation management model into a fully functional IMS. When it comes to the operational planning for innovation where the organization should, according to the CEN/TS establish innovation objectives at relevant functions and levels, Volvo CE has not defined any specific goals or activities connected to innovation. Klingebiel & Rammer (2014) argues that the more an organization establish innovation objectives, the higher the probability is of at least some innovation success for the organization. Therefore, Volvo CE should establish innovation objectives relevant to the 9 factors described in their innovation management model, and to and to succeed with this task. The company can use Klingebiel & Rammer (2014) model which presents three ways of succeeding with innovation activities. The model is described in details on Chapter 3.

Moving forward with Innovation enablers/driving factors, the awareness for the importance of innovation to the organization needs to be extended as per today, the majority of Volvo CE's employees and functions are not aware of the innovation-related work that the company tries to establish and accomplish. As mentioned earlier in 3.2.4, the lack of awareness can according to Aalbers et al (2013) arise because of the autonomy of some units in a multi-unit organization-structure which is the case with Volvo CE as the company's understanding of innovation is grounded on a technology perspective and therefore, the Technology unit has the main

responsibility and contribution for innovation within the organization. Due to this fact, many employees from other units are not aware and cannot see the importance of innovation because they find it difficult to understand how they and their work-position can be involved and integrated into Volvo CE's innovation strategies. Thus, Volvo CE need to involve other functions and find out how these can contribute to help with the fulfillment of the company's innovation vision and strategy, in other words, how they can be a part of the innovation-related work.

Another area within Innovation enablers/driving factors that need improvements is the work-policies provided by the company. The intellectual property rights (IPRs) needs to be more clarified as per today, there is no clear polices for some of the company's intangible assets like the general knowledge management on which type of knowledge/information can be acceded and shared and which can be not. The HRM policies needs also to be redefined according to the recommendations of the TS for 4.2.7 (Strategic human resources).

When it comes to the innovation process, the organization has a process consisting of nine steps. And they only have a model that describes the procedure during the innovation work. What we want to know here is what happens before they proceed with developing their products. Where do their innovations come from? How do they plan the innovation work? An example of a model that can be used to show where innovations come from is Tidd and Bessant (2013) innovation model which we presented in chapter 3 (Figure 3.3).

We are sure about that the organization already has strategies they follow to create innovations. Innovations must have a source. What we don't know is what innovation source the organization has. In this case, we suggest that the organization creates a model, like the model above, and sort the strategies in order. It is possible that employees in the organization are those who find ideas for the organization. The top management perhaps is not 100% aware about how their employees find ideas. In this case, the top management can collect the employees strategies by distributing questionnaires to them. The employees can write down how they think or how they proceed to find ideas. When the answers are submitted to the top management, then they can create a model and put the strategies there in order. Thereafter, the organization has a model that shows where their innovations come from.

Then when it comes to assessing the result of the innovation process, our respondent mentions that the organization has something which is called innovation compass. This is a method that they use to observe the organization and what kind of different metrics can be associated with if they are innovative or not. When it comes to the financial part, it is about allocation of the budget from the development in the earlier phases compared with the development phase. Then they observe how innovative the new product is. When we were searching for literature about assessment of the result of the innovation process, nothing was found about this part. But a model for assessing innovation competence was found, and it was presented by Sun, Wong, Zhao and Yam (2012). This model is presenting for example that the linkage between technological innovation and idea generation is important, operational enablers like innovation culture, innovation method and resource of innovation. We think that this model is good to consider because it can help the organization pay attention to what is important when it comes to competence use during the innovation work.

CEN/TS theory about reviewing the performance of the IMS involves mostly a leadership style to motivate the employees by evaluating their performance. Volvo CE today are reviewing the performance of their current innovation model. They have icoaches (innovation coaches), it's a

role that works like leadership to motivate the employees (Respondent 3). Jiménez-Jiménez and Sanz-Valle (2011) argues that the relation between innovation and performance is positive, but there's also risks. To reduce the gap to CEN/TS way to review the performance of an IMS, Volvo CE needs basically to do what they are doing now, using their icoaches as a leadership role to encourage the employees to follow the IMS. Because, as Jiménez-Jiménez and Sanz-Valle (2011) mentioned, innovation and positive performance has a connection. What Volvo CE can do more based on CEN/TS is to involve the top managers if possible, which would make the internal meetings more serious and encourage the employees even more.

Senge (2004) is a famous author who has written extensively about changes in organizations and its resistance. He presented five psychological discipline to overcome resistance to change (changes that leads to organizational learning etc.). We will not present the five discipline here, but we want to point out that changes always lead to resistance that firms must overcome. Besides resistance, there's also resource issues that can affect organizational learning. Volvo CE aims to implement an innovation management system by CEN/TS in practice. That can be done by developing their current innovation model by reducing the gap to CEN/TS IMS, and even if the model could be hard to implement because of the gap, it will still affect and that is very important (Senge, 2004).

CEN/TS theory about improving their IMS involves mostly collectivity and leadership to find latent disadvantages in the IMS and weak spots that can be developed/improved. Today in Volvo CE current innovation model, they have an innovation culture, meaning leadership vision, time for ideas and autonomy (Respondent 3). Volvo CE top managers affect improvements of innovative activity indirectly, while their icoaches affects mostly directly by communicating with the employees. The central definition of innovation in Volvo CE is to satisfy their customer, to reach that, Volvo CE constantly works by improving their innovation model. Today Volvo CE strategy for improving their innovation capacity is to implement an innovation management system by CEN/TS (Respondent 3).

The gap between how CEN/TS improve their IMS and how Volvo CE improve their current innovation model isn't that big. There's a lot similarities like innovation-leadership, which is a person with leadership attributed and has a role in improving the innovation capacity in the organization. Aragón-Correa, García-Morales and Cerdón-Pozo (2007) states that leadership is one of the most important individual attribute for improving firm innovation management. They mean it affects positive organizational learning and indirectly affecting innovation. Another aspect Aragón-Correa, García-Morales and Cerdón-Pozo (2007) argues, is that organizations needs a collectivity capability which will positively affect improvements and organizational learning in internal business meetings. Through improvements of business innovation, it will lead to organizational learning, but it will also lead to positive performance of employees (Aragón-Correa, García-Morales and Cerdón-Pozo, 2007). CEN/TS (2013) is on the same track as Aragón-Correa, García-Morales and Cerdón-Pozo (2007) meaning that internal meetings is very important for improvements and that the top managers joins those meetings actively. So to reduce the gap between Volvo CE current innovation model and CEN/TS IMS, Volvo CE tops manager's needs to attend in internal business meetings more often to discuss with their employee's about how to improve their current innovation model.

Overall, we think that Volvo CE have a good potential to develop a fully functional IMS in accordance with the requirements of CEN/TS 16555-1 into their organization with their current innovation management model as a starting point to build upon, and by following the references

and recommendations provided by this study, the company has great chances in succeed with this mission.

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6.1. Figures

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6.2 Appendix

6. Planing for innovation success

6.1: Risks and opportunities

5.1 Har Volvo CE en tydlig vision som berättar vad organisationen vill uppnå ur ett innovationsperspektiv och genom vilken strategi ska denna vision ska uppnås?

S: The Volvo Group's vision is to become the world leader in sustainable transport solutions by creating value for customers in selected segments, pioneering products and services for the transport and infrastructure industries, driving quality, safety and environmental care and working with energy, passion and respect for the individual

4.1 Hur ser er omvärldsanalys ut och vilka aspekter/områden fokuserar den på? Enligt IMS-modellen bör en sådan analys fokusera på marknadsmässiga, tekniska, politiska, ekonomiska och/eller sociala aspekter.

4.1 Hur ser organisationens nuvarande och framtida interna möjligheter/potentialer till innovationsledning? Är ni t.ex. medvetna om vilka kompetenser, resurser eller kulturella aspekter som behöver tillföras i organisationen för att kunna leda innovationsarbetet?

4.2 Brukar ni involvera andra intressenter som t.ex. kunder, leverantörer, forskningsorganisationer, eller användare i er arbetsprocess för att identifiera deras behov och förväntningar? På vilket sätt sker detta i så fall?

6.1 Använder ni er utav någon eller några av ovanstående frågeställningar för att fastställa riskerna och möjligheterna med organisationens nuvarande innovationsledningsstrategi? Om inte, på vilket annat sätt arbetar ni med att fastställa risker och möjligheter i den nuvarande innovationsledningsstrategin?

6:2 Operational Planning

Berätta lite om hur ni arbetar med att sätta upp innovationsrelaterade mål för organisationen på olika nivåer eller över olika avdelningar samt hur dessa mål kommuniceras, implementeras och utvärderas i organisationen.

Hur ofta sätter ni upp och följer upp nya innovationsrelaterade mål/aktiviteter för organisationen?

7. Innovation enablers/driving factors

7.1 Organisation of the roles and responsibilities

Vem eller vilka på Volvo CE ansvarar för innovationsledningen och vilka har ansvaret för att innovationsrelaterade projekt/ genomförs, d.v.s. på en operativ nivå?

7.2 Resources

Tycker du att Volvo CE har de resurser som krävs för att kunna implementera, underhålla och utveckla en innovationsledningsstandard i organisationen? Exempel på sådana resurser kan vara mänskliga resurser, hög budget, utrustning etc.

7.3 Competence

Tycker du att ni som arbetar med innovationsledning på Volvo CE har de nödvändiga/rätta kompetenserna och erfarenheterna som krävs för att leda innovationsarbetet här? Får ni någon utbildning eller träning för att utveckla era kunskaper och färdigheter inom innovationsledning?

7.4 Awareness

Är medarbetarna från samtliga avdelningar inom Volvo CE medvetna om er innovationsstrategi/vision samt motiverade och delaktiga till innovationsarbetet?

7.5 Communication

Hur kommuniceras er innovationsledningsprocess internt i organisationen och externt till andra relevanta partners? Vilka har ansvaret för att kommunicera den, vad kommuniceras och till vilka?

7.6 Documented information

På vilket sätt dokumenteras det innovationsrelaterade arbetet som ni utför här och finns denna tillgänglig över hela organisationen?

7.7 Strategic human resources

Tycker du att Volvo CEs HR-policy för medarbetarna överensstämmer med följande punkter?
- Främjar kreativitet, lärande och kunskapsspridning

- Erbjuder arbetsformer som ger variation, utmaningar och öppna interaktioner i arbetet
- Skapar förtroende, mångfald och tolerans bland medarbetarna
- Uppmuntrar till deltagande och engagemang i innovationsprocessen från medarbetarna sida
- Tillåter de anställda att få tillgång till relevant information från ledningen

7.8 Intellectual property and knowledge management

Har ni en policy som skyddar era kunskapsstillgångar och talar om vem internt och externt i organisationen får ta del av vad?

7.9 Collaboration

Hur lider Volvo CEs policy kring interna och externa samarbeten? Kan kunskap och idéer inom organisationen spridas och göras tillgänglig mellan samtliga personer, grupper, och avdelningar?

8. Innovation management process

8.1 Innovation process

Finns det någon modell som Volvo CE utgår ifrån när det gäller att arbeta med innovation? Om ja, berätta om de steg som modellen innefattar samt kortfattat vad dem innebär.

Har ni någon procedur för att utveckla idéer till innovation? Hur ser den ut i så fall?

Använder ni någon metod för att utveckla innovationsprojekt?

Vilken strategi använder ni på Volvo CE för att skydda resultaten av ert innovationsarbete? Berätta också om hur ni utnyttjar dessa resultat.

Vilken procedur använder ni för att presentera resultaten i marknaden, och därmed lyckas med innovationsarbetet?

8.2 Assessing the result of the innovation process

Vilka indikatorer har organisationen när det gäller att bedöma både finansiella - och icke finansiella resultat av innovationsprocessen?

9 Performance assessment of the innovation management system

Hur borde högsta ledningen i Volvo CE agera för att se till att förbättringar i innovationssystemet genomförs?

Hur tycker du möten inom organisationen bör hållas för att reflektera kring innovationssystemet (reflektion om förbättring och åtgärder)?

Vad tycker du är lämpligast som utveckling av innovationssystemet; inkrementell (steg för steg) innovation eller radikal (direkt förändring)?

10 Improvement of the innovation management system

Hur kan ni förbättra er innovationssystem genom dessa begrepp: innovation vision och strategi, ledarskap, mål och planering, och innovation drivkrafter?

Vad tycker du borde göras för att ett innovationssystem med dessa begrepp ska användas mer?

På vilket sätt tycker du att man kan göra för att hitta fel i det här innovationssystemet och åtgärda dem?

Vad tycker du finns för styrkor och svagheter av dessa begrepp (innovation vision och strategi, ledarskap, mål och planering, och innovation drivkrafter)?

Vad tycker du Volvo CE kan göra för att få sina anställda att bli mer medvetna om detta innovationssystem?

Tycker du att denna innovationslednings-standard är lämplig för att jobba med och involvera externa intressenter i processen? (open innovation)? - kan man göra förbättringar?

