

The Role of Knowledge Management in Strategic Sustainable Development - Comparing Theory and Practice in Companies Applying the FSSD

**Rita Aldabaldetrelu
Juuso Lautiainen
Alina Minkova**



School of Engineering
Blekinge Institute of Technology
Karlskrona, Sweden
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Examiner: Henrik Ny Ph.D.
Supervisor: Professor Karl-Henrik Robèrt
Primary advisor: Andre Benaim
Secondary advisor: Martin Svensson

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Rita Aldabaldetreku, Juuso Lautiainen, Alina Minkova

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Abstract

The purpose of this study is to explore the role of knowledge management (KM) in integrating sustainability into business strategy in companies applying the framework for strategic sustainable development (FSSD).

Corporations have the potential to be key players in moving society towards sustainability, but they lack clear definitions and guidelines around strategic sustainable development (SSD). The authors focus on the benefits of KM in organisations applying the FSSD, which offers general strategic guidelines, but does not refer to the complexity of managing the new sustainability knowledge.

This study first examines the scientific literature around KM and FSSD and compares it with the results of expert interviews to develop a State of the Art Model of KM for SSD. Then the model is compared to current practices of corporations applying the FSSD and the gap is examined.

The results of the analysis show that the concept of KM is widely discussed in the literature, yet it does not have much presence in the business world. The value of knowledge is recognised, but KM is not much used and no structured practices were identified. It was concluded that companies would benefit from a strategic KM system when integrating sustainability.

Keywords Strategic Sustainable Development; Knowledge Management; corporations; FSSD

Statement of Contribution

Alina was the first caller of the team, gathering us around the initial topic. She has been the main source of creativity and innovation through the different stages and also through the different topics. She is very persistent yet strategic, and has a great thirst for learning and trying new things. When she works on a specific thing she dives deeply into it and is independent, yet always checking in with what she is doing to be sure that it is going in the right direction. Furthermore, Alina's critical thinking skills have been invaluable and massively contributed to the project. When we are in sense-making mode she always grabs a pen and paper and by asking questions and putting the answers on paper, guides and facilitates the process in a very natural way. In addition to these, she has been the perfect host in our many meetings at her place. She has written the methods, executive summary, parts of results and discussion, and facilitated interviews.

Juuso is very good at sensing how the team is feeling, as well as making sure that we are all in the same page and understand what we are doing. He is perhaps the most tangible thinker of the team, which is very helpful for Alina and Rita, otherwise they would get lost in the abstract ideas. He has encouraged us to get out of our comfort zone and write emails and lead the interviews. Among us he is the one who in shaky moments of workflow can the fastest appeal to objective mind and constructive thinking. He is attentively noticing and challenging the gaps and pitfalls in our judgements and discussions and persistently facilitating the collective effort to resolve the issue and create a common ground for understanding. Juuso has written the conclusion, and parts of the literature review, results, and discussion. He has also facilitated interviews.

Rita is very patient in explaining her ideas and views, and has an incredible skill of asking the right questions instead of challenging someone else's or justifying the way she thinks. She is flexible and open for quickly accepting and trying out suggestions and ideas from other team mates which she combines with always keeping a critical eye on everything that she reads or hears. Rita has taken the role of being the engine of the project. This was perhaps not so obvious in the beginning but her drive, natural leadership, and ability to get things done have emerged stronger and stronger through the project. She is a doer who powers through tasks whether they are planned or not, and does so with great quality. Rita is playful and always manages to bring in the cheerfulness of life in our working days and fills it with wonders and beautiful stories. Rita has written the abstract, majority of the literature review, and parts of results and discussion. She also formatted the paper and facilitated interviews.



Rita Aldabaldetreku



Juuso Lautiainen



Alina Minkova

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“Hope is not a strategy” - thesis process moto
“Learning is said to be as powerful as sexual drive” –Göran Carstedt

The writing of this thesis has been an adventure itself, which started with various topic changes and ended up with runs and swims in the Baltic Sea. The meetings have often started with a brief Finnish, Russian, and Basque dictionary, and closed with raising Porto glasses.

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Executive Summary

Introduction

Systematically progressing global environmental deterioration caused by extensive human activities accompanied with the increasing need of the rising population poses a fundamental challenge to Earth's self-renewal capacities. Moreover, the complexity of the world as a system implies the interconnection and interdependence of its sub-systems and makes isolated ad-hoc initiatives insufficient to address the arisen challenge as a whole. Sustainability challenge has been long scientifically proven, with its urgency leaving no space for the continuation of 'business-as-usual' practices. Increasing recognition from society has led to multiple interpretations of the concept sustainable development, Brundtland definition being the most referred to. However, because of its normative and rather philosophical nature, there is a need for a robust and effective approach to addressing multiple existing sustainability issues.

In order to avoid causing more complicated problems by reactively tackling separate challenges, one must apply a systems perspective and proactive strategic approach. To make this task easier, the Framework for Strategic Sustainable Development was introduced by The Natural Step (TNS) after more than 20 years of iterations in the scientific world. The Framework consists of five levels (system, success, strategic guidelines, actions, tools) and is supplemented with an application procedure (the ABCD process) for the use in practical organisational settings.

One largely impactful societal sub-system is the economic system, where corporations are major actors playing a two-fold role in relation to the overall sustainability challenge. While business organisations have manifold been proven to contribute to severe natural destruction, as well as the violation of human rights, their power to significantly influence the course of societal development and high-level political decision making cannot be underestimated. At the same time, it is important to acknowledge that the potential to foster the transition towards a sustainable development is diminished by the complexity of pressures that corporations have to deal with alongside their daily operations.

The level of complexity becomes even higher when organisations start rolling out sustainability initiatives. A big number of various approaches have been developed in organisational management theory and practice, Corporate Sustainability (CS) and Corporate Social Responsibility (CSR) being the most well-known. Most of these attempt to develop 'one-size-fits-all' recommendations, and altogether result in organisations finding it difficult to decide which of the approaches is the best to adopt in their particular settings.

There is a common thread in literature that addresses how a company can best deal with the diversity of options out there and successfully navigate through this combined complexity while moving towards sustainability and still staying true to their business ambitions. According to a number of authors, the integration of corporate sustainability into business strategy is the best way to avoid creating extra pressure. Essentially, this means that rather than being perceived as an additional field to manage, sustainability should be present in all organisational levels, including strategic decision-making. FSSD, therefore, has been identified as an approach that aims to do this, while also providing a clear definition of sustainability and general guidance on how the goal of integration can be achieved.

A knowledge-based view on the strategic organisational management states that knowledge is the most valuable resource possessed by companies, but at the same time, one of the main barriers to integrating sustainability in organisations seems to be their lack of knowledge of what and how to do it. Knowledge management (KM), which is defined as a set of managerial techniques, tools and practices designed to leverage knowledge within an organisation, is intended to assist companies in the task of embedding new information and skills necessary for achieving its strategic goals. Therefore, our research aimed to explore if KM can be used as a tool by organisations that apply FSSD to help them deal with complexity and pressures that they encounter in day-to-day operations.

The main research question explored in this study is: *What is the role of Knowledge Management in business organisations that apply FSSD in practice?*

This is supported by the following questions:

1. *What is the State of Art of Knowledge Management for Strategic Sustainable Development?* To answer this question, we investigate how knowledge management theory and expertise in the field relate to each other.
2. *What is the State of Practice of Knowledge Management in business organisations applying FSSD in comparison with the State of Art?* In order to answer the question, we analyse how organisations applying FSSD operationalise the Knowledge Management theory into practice.

Methods

Due to the interdisciplinary nature of this study, which encompasses sustainability science and the field of strategic management, we have chosen a qualitative research approach. It was also suitable for this study as it is considered to be appropriate for the topics with which researchers are not intimately familiar with.

The research was conducted in two phases with the first phase performed in two sub-stages. The research methods for each stage were chosen according to their capacity to answer each of the supporting questions and are described in the table below.

Stage	SRQ	Methods
<i>Stage I</i>	SRQ 1	A. Literature analysis and synthesis. Creation of generic knowledge management for strategic sustainable development (KM for SSD) model. B. 5 semi-structured interviews with experts in the field of knowledge management (academic researchers and professional consultants) using a set of questions structured under the elements of generic model. Thematic coding of the interviews. Development of the final State of the Art KM for SSD model.
<i>Stage II</i>	SRQ 2	3 semi-structured interviews with business organisations that apply FSSD in practical setting. Thematic coding of the interviews. Comparison between State of the Art and State of the Practice of KM for SSD.

The results of two stages served as a base for providing an answer to the primary research question, which is explored within the discussion chapter.

Results

As a result of literature analysis, ten key elements of generic KM for SSD model were identified. Expert interviews confirmed most of the arguments mentioned in the literature, adding a number of additional nuances, as well as providing a more practical view on certain aspects of model elements. Below we present the descriptions of the elements derived from the synthesis of literature and themes identified in expert interviews.

Vision for KM is in line with the organisation's overall vision. It contains an envisioned statement for future knowledge and provides guidance and direction for knowledge necessary to be gained to achieve sustainability vision.

Strategy of knowledge management supports overall business strategy and includes learning objectives with a focus on managing knowledge necessary for reaching sustainability goals. An ABCD-process can be used to apply backcasting and prioritisation process to learning-related actions.

Action Plan serves as a roadmap to an organisation's KM vision. Similar to an organisation's general action plan, it includes the vision itself, strategic learning goals, and concrete actions' descriptions together with answers to prioritisation questions.

Knowledge Processes are managed with the main purpose to build employees' capacity for engaging in sustainability.

- *Create & Acquire* process requires a proper organisational context encouraging creativity, interpretation, adoption of each other's ideas and meaning-making. Organisational context is created by taking a holistic view on the organisation's culture, structure and infrastructure and by addressing the aspects of all three at the same time.
- *Share* process requires adapting content and amount of sustainability-related knowledge depending on the receiver. The intention to encourage dialogue, questions, ideas, and replications of improvements in approaching sustainability should be kept. Simple and standardised knowledge sharing practices should be established.
- *Use* process benefits from the application of a formal methodology for the gradual development of employees' sustainability knowledge application capacity. Motivation to use existing sustainability-related knowledge should be constantly maintained.
- *Evaluate* process contains a baseline assessment and reassessment of currently possessed sustainability-related knowledge, as well as a knowledge management performance evaluation using numeric (e.g. financial), and qualitative measurements which would serve as a tool for value-creation and filtering of KM initiatives.

Organisational Structure would benefit from less hierarchies and divisions with commonly shared boundaries and conditions. A strong leadership in sustainability knowledge adoption is in the organisational structure to successfully manage sustainability-related knowledge. Other key elements include presence of sustainability (knowledge) champions and cross-functional project teams or task groups that would address the cross-disciplinary nature of the sustainability field.

Organisational Culture clearly manifests the "why" and "how" of learning and embraces sharing and the replication of values. It aims to nourish engagement of both top management

and employees. Besides, it cultivates talent creation and retention as well as success celebration, openness and transparency, and acceptance of mistakes.

IT Infrastructure, represented by Information and Communication Technologies (ICT), serves as an important enabler of all the elements of knowledge management system and strategically utilises a variety of tools useful for supporting and improving each of them.

Regarding practical applications of knowledge management theory in the organisations applying FSSD, interviewing representatives of companies has revealed a rather low extent to which theoretical developments are used in business environment. Organisations lack both concrete KM vision and strategy as well as action plan for related activities. There is evidence of solid create & acquire and share processes practices, whereas we have not managed to identify whether use and evaluate processes have been touched upon in some way. Besides, the interviewees demonstrate a thorough understanding of preferable state of organisational structure and IT infrastructure, however due to limited data we cannot evaluate whether it reflects reality. With regards to structure, strong emphasis on the role of leadership echoes the experts' view, while other aspects have not been considered to be of top-priority.

Discussion

How do knowledge management theory and expertise in the field relate to each other?

The findings that were identified when developing the State of the Art KM for SSD model presented both surprises and expected arguments. The fact that experts confirmed the necessity for an organisation to develop KM vision and strategy might come from their shared awareness of FSSD, where these are key elements. Differences, identified in KM processes where experts did not mention practices manifold by researchers, can be explained by the too theoretical nature of developments (e.g. communities of practice), unreality of fully implementing the offered procedures (e.g. learning events) and sometimes the novelty of offered concepts (e.g. sharing knowledge with “coopetitors”; KM performance metrics). At the same time, literature and the experts' views aligned to the most extent in regards to culture and IT infrastructure for knowledge management, which might reveal the recognition of their influence on productiveness in the business sphere. Finally, the different foci of literature and experts' attitudes concerning the ideal state of organisational structure (flatter design versus strong initiative leadership) revealed our own bias in connecting powerful leadership with rigid hierarchical structures, which is not always the case. Overall, one of the key things that the results seem to point at is that the theoretical research on classifications and definitions of KM concepts has not translated pragmatically into the use of the experts and practitioners. Besides, the findings highlighted the challenge of communicating the value of KM, from theoretical concepts into practice.

How do organisations applying FSSD operationalise the KM theory into practice?

Although we did not hold any particular expectations, we were surprised to discover a significant difference between existing theoretical knowledge and its practical applications. We observed that the interviewed companies did not consider KM as a specific focus area. Nevertheless, as we tried to identify the presence of KM elements that were unconsciously implemented by the organisations, we could conclude that all of them have the necessary

foundations for KM implementation, such as standardised knowledge acquisition and sharing processes, thorough comprehension of beneficial corporate culture and ICT tools. Besides, the emphasis on the role of leadership, echoing the experts' view, possibly illuminates an important tipping point of organisational transformation. Overall, we find it interesting that although the pitfalls in organisational knowledge seem to be quite obvious and knowledge is clearly recognised as a crucial asset, companies did not attempt to address them by using elements from FSSD (including backcasting and prioritisation process). Often proactive, but rather ad hoc approach to organisational learning is hard to justify in times when complexity is widely acknowledged to be present in all spheres of society.

What is the role of Knowledge Management in business organisations that apply FSSD in practice?

The comparisons and analyses of answers to the SRQ 1 and SRQ 2 concluded that currently companies applying FSSD do not have any structured system to manage their knowledge in general and sustainability knowledge in particular. It was unprecedented to see the extent to which company practices do not reflect the theoretical developments. We have stated that the poor presence of KM processes might be the result of the lack of awareness about the existence of KM and the benefits that it can potentially offer. At the same time, it remains unclear who is “responsible” for raising organisational awareness and whether apparent concept's obscurity questions its overall usefulness. As a result, we have concluded that the current role of KM in companies applying the FSSD is very limited, almost non-existent, in comparison to what it could have been if it were applied in its entirety.

We have witnessed in the interviewed organisations that applying FSSD is a challenging and long, transformational process which at its initial stages implies a great amount of knowledge to be embedded in the whole organisation. Our research convinced us that developing a holistic knowledge management strategy can be a rational first step when rolling out this initiative. If potentially implemented during the process, KM would ensure that the organisation has the necessary knowledge to gradually go through the FSSD integration by providing a clear vision for necessary sustainability-related knowledge and by identifying the processes and enablers that will facilitate the strategic and efficient use of knowledge. This in turn will enhance the influence of companies in the global society and help them in moving strategically towards sustainability by constantly ensuring that the right knowledge is in the right places at the right time.

Conclusion

Having identified an extensive gap between the key elements of the State of the Art Knowledge Management for Strategic Sustainable development model and their application in practical business setting in FSSD organisations, we conclude that current role of knowledge management in the strategic transition of society toward sustainability is rather minimal. The ways to fully utilise the potential of knowledge management claimed by scientific research are still to be discovered. For this, future research focusing on practical aspects of knowledge management application is needed.

Glossary

Cascading effect: Training representatives of different departments followed by them to train the rest of employees.

List of Abbreviations

FSSD: framework for strategic sustainable development

IT: information technology

ICT: information and communication technology

KM: knowledge management

KMS: knowledge management system

KMP: knowledge management performance

KPI: key performance indicator

SECI: socialisation,

SP: sustainability principles

SSD: strategic sustainable development

TNS: The Natural Step

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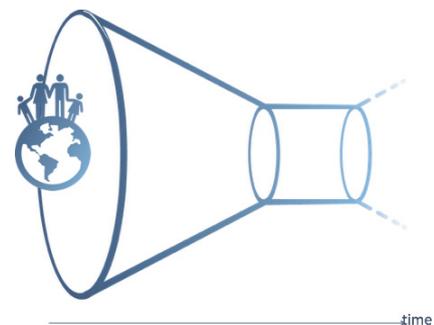
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1 Introduction

We begin this section by discussing the sustainability challenge and its complex nature. We then present the strategic sustainable development (SSD) approach followed by the framework for strategic sustainable development (FSSD), which serves as a structure to plan strategically towards sustainable development. Next, we state the important role companies have in the SSD and the struggles they face when dealing with the complexity of the issue and the lack of clarity from research on how to tackle it. After stating the value of integrating sustainability into the business strategy through the FSSD, knowledge management is introduced as a supporting tool for companies to better and more efficiently embrace sustainability. Lastly, we conclude with contemplating the purpose, research questions, and research scope of the report.

1.1 The Sustainability challenge

The sustainability challenge caused by human activities has been scientifically proven to be a global issue that sooner or later will push society into a new phase of world development where “business-as-usual” will no longer be possible (Steffen et al. 2011). The environment has been heavily deteriorated, which puts into question whether the Earth will still have the ability to provide the environment for human development in the future (Steffen et al. 2011). Environmental problems have become global, with longer time lags from cause to effect, and there are more actors involved, causing greater complexity (Holmberg and Robèrt 2000). These issues are difficult to solve and may have adverse impacts on society. Moreover, Earth’s population is rising, demanding more resources to meet their needs (Holmberg and Robèrt 2000). In other words, while the resources and capacities for self-renewal in the ecosphere are decreasing, the world’s population continues to increase (Broman et al. 2000), creating a global sustainability crisis. Robèrt et al. (2013, 2) have metaphorically described “the gradual decline of the biosphere’s potential to sustain civilisation in the face of growing global societal needs” as a funnel. If society does not change the unsustainable practices, the increasing pollution and the scarcity of natural resources, represented by the funnel’s wall, will systematically deteriorate the conditions for human activities (Robèrt et al. 2013). In other words, entering the funnel means that there will be less room to manoeuvre, with less resources and solutions available, and it will be easier “to hit the wall”. Thus, sustainable development becomes a must in keeping the right direction and avoid the wall of the funnel.



*Figure 1.1 The funnel
(WikiEducator 2016)*

When defining sustainable development, the Brundtland definition is the most common and it says the following: Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987). However, there are several interpretations of the same definition because there might be different understandings of what is valuable and what should be sustained or developed (Hedenus et al. 2016). Moreover, the concept of sustainable development is normative, it only says how we should behave, which is not a scientific question. It is a moral obligation to care about the present and future generations, but it does not say which actions

have which consequences (Hedenus et al. 2016). Thus, it can be concluded that although the Brundtland definition might be useful in certain situations (seeking for actions for example), it is not enough to guide society towards sustainability, as there is no common understanding of the concept and it does not provide any guidelines.

The Brundtland definition is rather philosophical (Robèrt et al. 2002) and due to the severeness of the issues we are facing as a society and the limited time to find solutions, there is a need to move towards a global sustainability, for which we need to develop robust and effective means to address the growing number of sustainability challenges being faced. This is further needed because of the complexity of the issue and the lack of time before the damages are too big. As Robèrt et al. (2013) suggest, ‘the challenges are typically “discovered” rather than predicted in any consistent and robust way’. Thus, it is essential to take a strategic approach if we want to aim for a global sustainable society.

1.1.1 Complexity and systems view

The world is made up of complex systems, even though we have historically thought of them as simple machines that could be disassembled and studied piece by piece. The economy, natural resource systems, and society are complex issues, and so is the sustainability challenge (Homer-Dixon 2011). According to Homer-Dixon (2011), complex systems are characterised by having many interconnected components that are difficult to bound; non-linearity, meaning that there is a disproportion between the cause and effects; and emergence, making the system unpredictable. Moreover, he stresses that the dispersion of power within our society, mainly due to the accelerated technological developments, has caused a “proliferation of agents, which is equivalent to a rapid increase in the number of components within our societies, and in consequence a rapid increase in societal complexity” (Homer-Dixon 2011, 3).

Bousquet and Curtis (2011, 45) clearly explain that “complexity is particularly sensitive to systemic properties”. Systems are identified as being greater than the sum of their parts, mainly due to the properties that emerge from the relationship between the different parts. Thus, the authors have states that it is not possible to understand the system only by analysing its part because it nullifies its properties (Bousquet and Curtis 2011). Consequently, it can be concluded that a systems view is needed to fully understand complex systems and issues like the sustainability challenge, which touches on several systems and subsystems. Only when we are aware of the issue in its entirety will we be able to act on it.

1.2 Strategic Sustainable Development

This chapter lays out the core elements of a strategic approach towards sustainable development. Many sustainable development concepts, methods, and tools tend to focus on “subsystems” of the full system “human global society within nature” (Robert 2009, 210). Additionally, often the approach for sustainable development is that of mitigating negative effects in the concerned subsystems. This way sustainable development only treats existing issues instead of proactively solve new ones from emerging. The challenge here is that by only looking at specific problems in specific subsystems, instead of seeing the larger patterns between the systems, it becomes difficult to make strategic investments to solve challenges in the future. Even worse, this may lead to new, even more, complicated problems. In order for

governments, businesses, and research institutions to innovate for a better future, they need to be able to examine the full system with clarity and organisation, together with scientific boundaries and opportunities. This approach and structured clarity have better chances for long-term success than tackling individual challenges as they come. Taking a too narrow perspective on wicked problems like climate change might result in solely reducing CO₂ emissions rather than searching for strategic ways to finance initiatives that aspire for societal, inter-industry change where sustainability is applied at the “basic principle level” (Robert 2009, 210) through the value chain. For this, a proactive, systems approach is required.

Fortunately, there is enough scientific knowledge to apply this approach. It has also been found that once the ground rules and common understanding has been established, more efficient collaboration among managers of different sectors can take place. This is very important as the global threats are complex and hence require collaboration between different societal forms, levels and industries. However, there is no need to abolish the current sustainable development initiatives, methods, and tools, but instead, leverage them in a more strategic way.

The following are the fundamental elements that strategic sustainable development embeds:

- Based on science of ecological and social systems
- Systems view on tackling complex problems, instead of individual discipline-based thinking
- Strategic, with a stepwise process towards a society’s sustainable future. The process is inclusive and engaging, utilising financial and non-financial resources
- Structured with dedicated spaces for the system, definition of success in the system, “guidelines for strategic decision making”, actions, and tools and concepts.
- Methods, providing guidance on using different sustainable development tools and concepts.

1.3 Framework for Strategic Sustainable Development (FSSD)

After a 25-year-old learning process that has involved scientists and practitioners, and through several iterations, the Framework for Strategic Sustainable Development has been developed (Broman and Robèrt 2015). The framework is designed for strategic sustainable planning and aims to help all sorts of organisations and institutions to move towards sustainability. It provides organisations with an understanding of the sustainability challenge and a common language to address it. It is based on the sustainability vision, bounded by the sustainability principles, from where the organisation will have to follow a backcasting process (Robèrt 2009).

The framework has five different levels (Robèrt et al. 2013; Robèrt et al. 2002; Holmberg and Robèrt 2000; Broman and Robèrt 2015):

(1) The system level represents the overall system, the society within the biosphere. The constitutional principles of the functioning of the system must be understood before planning (e.g. thermodynamics, biogeochemical cycles, ecological interdependencies of species, societal exchange with, and dependency on, the ecosphere) (Robèrt et. al. 2002). The current

systematic degradation caused by human activities will be acknowledged and will serve to justify the following levels (Robèrt et al. 2013).

(2) The success level defines the objective - a sustainable society. As “there is no limit to the number of possible designs for sustainable societies, the definition must be searched for on the principle level – any sustainable society would meet such principles” (Holmberg and Robèrt 2000). The principles have to fulfil certain characteristics, as they need to be operational for the backcasting process, and universal across sectors and disciplines. These will allow the balance between strict definitions that would hardly find consensus on the field, and the vague concepts that would hinder analysis and collaboration between sectors and disciplines (Broman and Robèrt 2015). The characteristics are the following:

- *Necessary*, not to impose unnecessary constraints and not to cause confusion over arguable matters;
- *Sufficient*, to have a solid ground on the understanding of the system;
- *General*, to be used in all fields and at any scale, in order to enable collaboration between disciplines and sectors;
- *Concrete*, to serve as guidelines when finding solutions to the challenge;
- *Non-overlapping*, to facilitate understanding and the creation of indicators to audit progress.

The principles present system boundaries for humanity to operate within in order to ensure that our society has life sustaining systems in the future as well. Organisations should comply with the social and ecological principles to “support the global society’s compliance” with these principles (Broman and Robèrt 2015, 4). Consequently, the ecological principles derive from mechanisms by which natural life sustaining systems can be destroyed and the social principles are derived from structural obstacles that might degrade the social system (Broman and Robèrt 2015).

In a sustainable society, nature is not subject to systematically increasing:

1. concentrations of substances extracted from the Earth’s crust, such as fossil carbon or metals;
2. concentrations of substances produced by society, such as nitrogen compounds or CFCs;
3. degradation by physical means, such as large scale clear cutting of forests and over-fishing.

And, in that society, people are not subject to structural obstacles to:

4. health
5. influence
6. competence
7. impartiality
8. meaning-making

The principles should also be applied in organisations when creating the organisational vision of success, as described in the A step below. The vision gives guidance to the organisation in changing economic, social, and environmental circumstances and should be bounded by the sustainability principles to ensure that they stay within the limits of the socio-ecological system mentioned in the systems level (1). Consequently, the organisation will gradually develop towards sustainability.

(3) The strategic level focuses on the how to strategically approach the objectives described in level (2). It takes a step-by-step approach by also ensuring that there will be enough financial, social, and ecological resources along the way (Robèrt et al. 2013). By doing so, businesses will find opportunities and avoid risks when facing the funnel (Holmberg and Robèrt 2000).

In order to ensure that the company is moving towards the stated purpose and that they are not sacrificing their existence, the framework provides three questions for prioritising the actions from the next level (4) (Robèrt et al. 2004, 44-45):

- Does this action proceed in the right direction with respect to the Sustainability Principles?
- Does this action provide a “stepping stone” (flexible platform) for future improvements?
- Is this action likely to produce sufficient return on investment (ROI) to further catalyse the process?

(4) The actions level will encompass all the concrete actions that were selected and inspired, informed, and scrutinised by the strategic guidelines level (3) (Robèrt et al. 2013). If the process was done correctly, these concrete actions will comply with the system conditions for sustainability (Robèrt et al. 2002). They will constitute the steps towards the sustainable future and will greatly depend on the nature of the organisation.

(5) The tools level is composed of “the concepts, methods, and tools that are often required for decision support, monitoring, and disclosures of the actions (4) to ensure they are chosen strategically (3) to arrive stepwise at the objective (2) in the system (1)” (Robèrt et al. 2013). The tools and metrics will have to focus on the actions evaluation in regards to the overall plan and objectives, as well as on the monitoring of the impacts in the protected system (Robèrt et al. 2002).

In a practical setting, FSSD can be operationalised through an ABCD process. It is an easy-to-execute four-step iterative tool designed for “creative co-creation of strategic transitions” within an organisation which integrates all the levels of FSSD (Broman and Robèrt 2015, 7). The steps are as follows:

A. In this step, participants learn about the sustainability challenge by taking a systems perspective on the current state of the world and gain an understanding of sustainability principles. This is followed up by a collective creation of the organisational vision bounded by the systems conditions.

B. During this stage, the current state of organisation’s operations is assessed and contributions to the bigger challenge are identified. This is supported by analysis of assets present in the organisation which can support bridging the identified gap between desired vision and current reality.

C. In this step, participants engage in a creative brainstorm of any possible actions and solutions that an organisation can undertake in order to reach the vision. No constraints and judgement take place at this stage. The ideas may only “be scrutinised with respect to the vision within sustainability principles” (Broman and Robèrt 2015, 8).

D. For this stage, strategic guidelines provided by the strategic level of the FSSD, including the prioritisation questions (see above), are applied. Then, a prioritisation process is conducted in order to develop a concrete organisational action plan for development towards the vision created in step A.

1.4 The Role of Corporations

The sector of corporations is widely recognised as one of the major creators and accelerators of numerous environmental issues such as oil spills, resource depletion and waste accumulation, which endanger the future of human existence (Millon 2015, 35). However, in the recent years companies are increasingly perceived as “agents of social change” and “development brokers complementing the existing development initiatives” (Kudlak and Low 2015, 223).

This two-fold role of corporations, especially multinational corporations (MNCs), makes their relationship with and contribution to the global sustainability challenge rather complex. In the case of multinationals, the effects are very severe and global. On the one hand, as Giuliani and Macchi (2014) put it, governments compete aggressively with one another for the MNCs’ investments. They see many benefits of this, such as increasing employment and access to new technology. Additionally, MNC subsidiaries can help local firms boost their activities and create new business opportunities, which positively influences the development of local economy (Giuliani and Macchi 2014, 480). These are often seen as links to the positive development of the society. The negative side is that basic human rights are often sacrificed for the achievement of economic objectives. Furthermore, human rights violations by the international corporations are intentionally neglected by some poorer country governments in order to reap the economic advantages (Giuliani and Macchi 2014). In terms of negative environmental impacts, global oil companies particularly have a bad track record in causing greenhouse gas emissions, leaking liquid pollutants and disposing of toxic waste to the environment (Garcia-Rodriguez et al. 2013).

As stated above, corporations have the potential to be key players in the transition to a more sustainable society. Kudlak and Low (2015) write that “the evolution of the global governance landscape has empowered corporations (and the non-governmental entities) and weakened the role of traditional public agents (such as governments). While often accused of creating and accelerating many societal and environmental problems, corporations are also increasingly perceived as part of the solution to these problems” (Kudlak and Low 2015, 223).

Moreover, it is important to acknowledge that currently companies are experiencing extensive pressures from a big number of stakeholders they depend on and who often have conflicting and even contradictory demands. According to Aragón-Correa et al. (2007), the proclaimed interests of consumers, managers, or employees in sustainability do not imply the willingness to prioritise their actions according to these interests. In addition, there is a lack of trust among stakeholders in regards to the claims made by businesses (Aragón-Correa et al. 2007). In order to continue operating and retain legitimacy, organisations have to cope with and balance stakeholders’ expectations at least on the minimally accepted level and develop strategies which would serve this purpose (Cho et al. 2015). As a result, the strategies developed in such circumstances tend to “lack internal consistency” and raise “fundamental concerns over the behavioural integrity of the organisation” (Cho et al. 2015,

81). In literature, this kind of organisational response to the external pressures is referred to as organised hypocrisy and is characterised as a practical and necessary behaviour, considering the broader societal context of corporations' talk, decisions, and actions (Brunsson 2002). Further, a more detailed description of this context is provided.

1.5 Dealing with complexity

Firm operations take place in very complex environments, so they need to structure and reduce uncertainty to create consistency and foster conditions of stability (Engert et al. 2015). Business strategy is used to tackle the complexities related to the business environment, but corporations also have to deal with ecological and social complexities. On the one hand, strategic decision-making in itself is a complex matter that involves multi-level information processing and the choice of the outcomes of that processing (Schrettle et al. 2014). When integrating sustainability into the process, the complexity arises as the alternatives increase (Schrettle et al. 2014). Moreover, Schrettle et al. (2014, 74) have concluded that 'there is no descriptive model, which supports decision-making of firms facing a sustainability challenge by linking all relevant dimensions in a transparent way'. On the other hand, the issues related to corporate sustainability are very diverse (Engert et al. 2015) and the definitions and key constructs for Corporate Social Responsibility (CSR) and Corporate Sustainability (CS) have proliferated during the last years, adding more uncertainty (Montiel 2008).

The issues of corporate sustainability approaches and the integration of sustainability into the strategic decision-making are going to be discussed in the following sections.

1.5.1 Different approaches

In the field of management literature, a number of terms are used to refer to social and environmental management issues, such as Corporate Sustainability (CS), Corporate Social Responsibility (CSR), Corporate Social Performance (CSP) and Environmental Management (EM). In the social responsibility field, academics have taken different approaches on CSR, making it an ambiguous concept, but the most cited definition is Carroll's (1979) which says that "the social responsibility of business encompasses the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time". CSP refers to 'the overall social responsibility of business, evolving from the principles of legitimacy, public responsibility, and managerial discretion' (Montiel 2008, 252). In contrast, the term CS was developed after the Brundtland definition of sustainable development was created. It is defined as "meeting the needs of a firm's direct and indirect stakeholders (such as shareholders, employees, clients, pressure groups, communities etc.), without compromising its ability to meet the needs of future stakeholders as well" (Dyllick et al. 2002, 131). However, there is another branch of CS that only focuses on ecological sustainability, where EM is also classified. These conceptualise and define the interactions between corporations and the environment. All the different approaches share the same goal, even if they come from different historical backgrounds. In recent literature, it seems that CS and CSR are converging (Montiel 2008) because of their shared environmental and social concerns.

There are a number of ways of applying CS and CSR practices within companies, which, together with the complexity of the issues, brings great confusion to managers when they

have to approach the problem. For example, Barnett (2007) points out, there have been many failed attempts to create a business case for CSR by relating the increase in trustworthiness and reputation of the company with an increase in financial performance. In addition, research suggests that one-size-fits-all proactive approaches with the aim to increase financial returns also increase the confusion around the topic and disappoint those who do not achieve the desired results (Aragón-Correa et al. 2007).

In conclusion, even if organisations were willing to act on sustainability issues, the natural complexity of the business environment, together with the added sustainability load and the unclarity of concepts on the definition of sustainability and the different ways of addressing it, some guidance and knowledge are needed to face the challenges.

1.5.2 Integrating Corporate Sustainability into the Business Strategy

As the result of these complexities and options to tackle them, we asked ourselves: “How can a company best deal with the diversity of options out there and successfully navigate through this combined complexity, while moving towards sustainability and still staying true to their business ambitions?” As described below, it emerged from literature that integrating corporate sustainability into business strategy is a productive way to do this strategically. As it was mentioned before, Engert et al (2015) write that “it is important to structure and reduce uncertainty and create consistency in order to foster conditions of stability” (Engert et al. 2015, 2834). According to the authors, integration of CS into strategic management helps a company to do that. Schaltegger et al. (2013, 220) talk about the importance of “environmental, social, and sustainability management systems” in making sustainability indicators and plans part of the company’s core activities. However, the authors continue that to “achieve more radical changes, however, sustainability has to become an integrated key element of the company’s value proposition and competitiveness (see, e.g., Porter and Kramer, 2011). This requires the integration of technical management approaches into more fundamental market-oriented sustainability approaches”. According to them, sustainability can even act as an integral and transformative “driver of business” (Schaltegger et al 2013, 220). Epstein and Roy’s opinion (2003, 80) is that fully integrating sustainability into corporate business can only happen if there is sufficient financial return on investment (Epstein and Roy 2003, 80). Hahn and Figge (2011) contend this and say that in order for the business sector to genuinely/holistically add to sustainable development, there is a need for “rethinking and broadening the notion of corporate profitability beyond the narrow focus on return on economic capital” (Hahn and Figge 2011, 342). Regardless of these differences in views, it is clear from the literature that there are benefits, both for business and the ecosystem, in integrating sustainability into business strategies.

As argued by Kleine and van Hauff (2009), taking into account economic, social, and environmental dimensions of corporate sustainability can serve as a pragmatic foundation in integration into strategic management (Kleine and von Hauff 2009). If organisations want to embed sustainability into their operations, it means that managers must think about the different dimensions when making strategic decisions and integrate them into the company strategy (Epstein and Roy, 2001; Bonn and Fisher, 2011). Furthermore, “this integration process ‘requires that organisations develop learning structures and fundamental change processes that will allow them to question and change the way they think about their relationships with the natural environment’ (Stead and Stead 2000, 324). This, of course, is easier said than done. Many companies carry out their sustainability programs on an

“operational level” rather than integrating CS into “all business levels” (Bonn and Fisher, 2011, 2834). In the same article, the authors lay out three different levels: normative, strategic, and operational, based on others’ research, in which corporate sustainability can be integrated. In the normative level, CS is concerned about maintaining and improving the genuine of the company’s actions. “It comprises corporate vision and policy, corporate governance and organisational culture” (Bleicher, 1996; Engert et al. 2015, 2834). In the strategic level, the corporate sustainability is measured, and long-term goals are strived for. The operational level is about applying the CS strategy thoroughly (Engert et al 2015). Therefore, there are many organisational aspects that have to be taken into consideration during the process of integration.

To sum up, as it was mentioned in the beginning of the section, firstly there is no clear and tangible definition of what sustainability or sustainable development mean and secondly, companies are advised to integrate the non-defined sustainability into their strategy with no clear guidelines. Moreover, companies will have to go through a change process to embrace and acquire new values, principles, knowledge, and practices when they decide to move towards a sustainable future.

We have identified that the FSSD serves to fill both gaps. On the one hand, it gives a clear and operational definition of sustainability by describing eight scientifically proven sustainability principles, which will guide the organisation in the right direction. On the other hand, the strategic level, with the prioritisation questions, together with the backcasting and ABCD processes, offers clear guidelines to be strategic in the process. Taking into consideration the speed of continuous technological and cultural development, which complicates building particular scenarios, a vision based on principles provides corporations with an opportunity to be more flexible in building the strategy and strategically manage trade-offs. Besides, FSSD allows organisations applying it to not only understand the full challenge, but also see the “potential self-benefits of proactivity”, including complying with future policy changes and new market possibilities (Broman and Robèrt 2015, 3). Additionally, “the common principle framing” of the vision offered by FSSD enables collaboration across sectors, organisations, as well as departments within a single organisation (Broman and Robèrt 2015, 4).

1.6 Knowledge management for integrating sustainability into business strategy

When analysing company's success, the strategic management can be viewed in two different ways: the market-based and resource-based views. On the one hand, according to the market-based view, the success of the company will depend on the structure of the market (Helm et. al. 2014). On the other hand, the success of the company in the resource-based view “comes from unique bundles of tangible and intangible assets that are valuable, rare, imperfectly imitable, and sustainable” (Zheng et. al. 2010, 764). These include internal organisational resources like assets, capabilities, knowledge, or organisational processes (Helm et. al. 2014). Later, the knowledge-based view was developed from the resource-based view, which claims that “where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge” (Nonaka 1991). Thus, knowledge creation and utilisation capabilities become of essential importance in the companies when seeking competitive advantage (Zheng et. al. 2010).

1.6.1 Knowledge and Knowledge Management

Knowledge is defined in many different ways in the academic literature. Scheepers et al. state that knowledge is the potential to influence action, while Nielsen et al. (2007) talk about knowledge as capability. Knowledge can also be distinguished from data, information, and wisdom (Greiner et al. 2007; Anand and Singh 2011), and scholars like Schrettle et al. (2014, 79) suggest that “knowledge consists of information and know-how”. They further explain that information is a set of facts, propositions and symbols that can be transmitted while the know-how is “the accumulation of skills that enables the work on and completion of a task in a smooth and efficient way”. Consequently, the know-how cannot be transferred, but has to be learned. In relation to learning, McGee and Thomas (2007, 539) have raised the question of the nature of knowledge, saying that it can either be “framed in asset terms involving such key strategic assets as intellectual capital or (...) captured in a dynamic framework where learning is the variable of interest”.

Coming back to the integration of sustainability into the business strategy and the complexity of the issue that corporations have to deal with, it is not surprising that ignorance and lack of information are the main barriers to organisational change (Lozano 2012). In other words, there is a lack of information and knowledge on the how and why to make the integration, as the measurement, management and accountability of environmental and social performance are not as familiar as that of the financial performance (Spangler et al. 2014). Thus, taking into consideration the value and importance of knowledge for competitive advantage and the lack of knowledge as the main barrier to the integration of sustainability, we may conclude that knowledge management is more than a managerial practice, it’s “a central mechanism that leverages organisational cultural, structural, and strategic influence on organisational effectiveness” (Zheng et al. 2010).

Knowledge management (KM) has been described as “a set of procedures, infrastructures, technical and managerial tools, designed towards creating, sharing and leveraging information and knowledge within and around organisation” (Bounfour 2003); “as a conscious strategy of getting the right knowledge to the right people at the right time, and helping people to share and put the information into action in ways that strive to improve the organisational performance” (O’Dell and Grayson 1998); “KM is achieving organisational goals through the strategy-driven motivation and facilitation of (knowledge-)workers to develop, enhance and use their capability to interpret data and information (by using available sources of information, experience, skills, culture, character, personality, feelings, etc.) through a process of giving meaning to these data and information’ (Beijerse 1999). Additionally, researchers also discuss the processes that KM encompasses, by highlighting the creation, acquisition, capturing, storing, sharing, and using the knowledge (Swan et al. 1999) (Senge et al. 2002).

In an organisation, learning and selection processes are key to create, capture and integrate the knowledge (Kim et al. 2012). Well established integration mechanisms embedded in the organisation will become a core capability for the firm (Kim et al. 2012), allowing them to learn and use the information more effectively. The learning in a company happens to the individual and the organisational levels. Knowledge creation starts with tacit knowledge (individual) and is transferred to the organisational level as explicit knowledge, through socialisation and integration processes (Nonaka and Takeuchi 1995). Thus, the organisation’s

task is to “access, transfer, and integrate that tacit knowledge within and throughout the organisation” (McGee and Thomas 2007) and make it a key ingredient of their capital stock.

Literature has distinguished two main levels in the process of organisational learning: the simplest level called single-loop learning and the most complex level called the double-loop learning. On the one hand, the single-loop focuses on finding errors and correcting them through feedback loops (Pemberton and Stonehouse 2000), by detecting and correcting errors and changing behaviours (García-Morales et al. 2009). The learning doesn't go beyond the rule level to the insight level, which means that “there are usually no significant changes in structure, culture, organisational systems or organisational theory-in-use” (García-Morales et al. 2009, 569). On the other hand, the double-loop learning searches for solutions that are not immediate by “developing principles that may inform and determine future organisational behaviour, and lead to new ways of doing business” (Argyris and Schön, 1978; Argyris 1992 in Pemberton). This type of learning explores the “whys” by developing double-loop feedback that connects the errors to the values and norms of the organisation and changing them (García-Morales et al. 2009). It's a cognitive process (Pemberton and Stonehouse 2000) that “emphasises constant experimentation, generates systems rather than fragmented thinking, and creates the desire to think beyond the accepted limits of the problem” (García-Morales et al. 2009). The single-loop and double-loop levels can also be compared to Senge's concepts of adaptive learning and generative learning (Chiva et al. 2010).

The generative or double-loop learning makes organisations look at their environment in new ways in order to understand what they are currently doing and to change their practices (Chiva et al. 2010). Today, when “the Newtonian, traditional or mechanistic style is gradually receding in favour of the complex, holistic or emergent style” (Chiva et al. 2010, 115), companies will need to focus more on double-loop learning in order to question and find new ways of doing business. Pemberton and Stonehouse (2000) even go further when stating that in today's environment should go beyond the single-loop and double-loop learning and start learning about learning. This would change the organisation's paradigm by creating “an organisational context that both nurtures new knowledge and exploits its existing knowledge assets” (Pemberton and Stonehouse 2000).

Firms' internal governance mechanisms and learning routines have to be redesigned according to the environment and development in favour of the coordination of the business goals and learning in time (Chen and Fong 2015). When organisations decide to shift towards a sustainable future, their KM processes and strategies will have to be aligned with the corporate strategy. They will have to “develop learning structures and fundamental change processes that will allow them to question and change the way they think about their relationships with the natural environment” (Stead and Stead 2000). First, the organisation will have to set its overall goals and strategy and then they will have a clearer idea about which knowledge management process and system to implement (Chou 2011).

1.7 Purpose

The purpose of our research is to explore if knowledge management can be used as a tool by organisations that apply FSSD to help them deal with complexity and pressures that they encounter in day-to-day operations. The desired aim of the study is to provide these organisations with a universal, relevant and applicable knowledge management for a strategic sustainable development (KM for SSD) model. That would help the managers of all levels to

better understand the processes and conditions involved in managing knowledge related to sustainability within the organisation as well as approach it in a structured and strategic way.

The secondary purpose of our research is to generally investigate and compare the status quo of scientific and practical states of knowledge management discipline.

1.8 Research Questions

Main Research Question (MRQ):

What is the role of Knowledge Management in business organisations that apply FSSD in practice?

Supporting Research Questions (SRQ):

1. *What is the State of Art of Knowledge Management for Strategic Sustainable Development?*
2. *What is the State of Practice of Knowledge Management in business organisations applying FSSD in comparison with the State of Art?*

To answer the first SRQ, we investigate how knowledge management theory and expertise in the field relate to each other. In order to answer the second SRQ, we analyse how organisations applying FSSD operationalise the knowledge management theory. The answers of both SRQs serve as the base for the analysis of the MRQ.

1.9 Research Scope

This study focuses on knowledge management and its applications as a tool that can be used by business organisations to decrease the level of complexity which becomes significantly higher when companies include sustainability in their agenda and organisational strategy.

The main audience of the research are the organisations applying FSSD. The secondary audience are knowledge management researchers who might be interested in empirical evidence of practical implications of knowledge management theory.

2 Methods

In this section, the methods and stages of the research are outlined. Overall, the research was performed in two steps, each of which answered a particular supplementary research question. The research design and methods are explained in detail below followed by reflections on the validity and limitations of this study.

2.1 Overall research approach

Due to the interdisciplinary nature of this study, which encompasses sustainability science and the field of strategic management, we have chosen a qualitative research approach which allows contextual understanding, working with meaning and concerning the point of view. The approach was also suitable for this study as it is considered to be appropriate for the topics with which researchers are not intimately familiar with (Bryman and Bell 2011). The qualitative analysis was performed using the grounded theory method which allowed the research team to collect data and analyse it at the same time, while maintaining close connection to the initial theory, as well as to the new developing theory (Bryman 2008).

2.2 Research process

The research process followed three stages. Each stage was informed by a particular supporting research question and built on from each other.

2.2.1 Stage I: Development of State of Art model of Knowledge Management for Strategic Sustainable Development (KM for SSD).

The first stage of the research included two consecutive sub-stages that were performed to answer Supporting Research Question 1.

I-A. At the first sub-stage of the study a generic KM for SSD: State of the Art model was developed. The essential components of SSD were identified and used for performing literature analysis. A number knowledge management frameworks were analysed and synthesized into the generic model of the KM for SSD.

I-B. At the second sub-stage of the research the State of Art KM for SSD was revisited and revised after five semi-structured interviews were performed with experts in fields closely related to managing knowledge and/or applying FSSD. The final description of KM for SSD model was developed.

2.2.2 Stage II: State of Practice of KM in SSD organisations.

At the second stage, interviews with the representatives of companies applying FSSD were conducted based on the findings from the previous two stages. We explored whether and in what ways knowledge management theory is operationalised in practice in the business environment in order to answer Supporting Research Question 2.

In the following subsections, we outline the methods that were utilised for data collection and analysis at each of the stages of the research.

2.3 Stage I: State of Art KM for SSD model

At the first stage of the research the generic KM for SSD model was created. The focus was to develop a comprehensive practical framework that could be used by the managers in organisations as a helpful tool for fostering the process of integration of sustainability into organisational core strategy.

In order to do so, it was divided into two sub-stages: the creation of the generic KM for SSD model through analysis and synthesis of existing knowledge management literature and revision of the model by integrating findings from semi-structured expert interviews.

2.3.1 Stage I-A: Data collection and analysis

Exploring and selecting literature

In order to gain the understanding of the existing theoretical knowledge in the field of organisational knowledge management, a meta-analysis of literature was performed. For this, we searched for published information by reviewing peer-reviewed articles, journal and books with the help of online databases such as Scopus, Business Source Complete and Google.

Key literature review terms that were used for the search included, but were not limited to the following: “sustainability challenge”, “sustainable development”, “sustainability”, “knowledge management”, “organisational learning”, “learning organizations”, “sustainability strategy”, “sustainability integration”, “business strategy”. In order to document the chosen articles and avoid research overlap, the reference program “Mendeley” was used. Throughout the literature review exploration, it became apparent that very little research was conducted in academia that would connect knowledge management with sustainability-related issues.

During the selection process of the materials for further analysis and synthesis, the preference was given to those that satisfied most of the following criteria:

- Articles that are written in peer-reviewed journals;
- Articles that are originally written in the English language;
- Articles that contain descriptions of frameworks, models, processes and actions designed for practical implementation of knowledge management within organisations;
- Articles that base the knowledge management theory on the core concepts of SSD;
- Books and handbooks that were written between 2010 and February 2016.

A preliminary analysis of each document was made in order to confirm that it matches the criteria described above.

Literature analysis and synthesis

For the creation of the generic model first we analysed core literature on SSD to identify the key components that had to be captured by this model. The following elements were identified: sustainability challenge, systems thinking, complexity, environmental

sustainability, social sustainability, sustainability principles as boundary conditions, the vision of success, backcasting from the vision, strategic planning: prioritisation, guidelines.

The above-listed components were used as key codes for analysing existing literature on knowledge management. Chosen articles were examined and interpreted through this lense. The goal was to look into how each author included the components of SSD in relation to other elements amongst examined frameworks. The sets of elements, processes and their characteristics were extracted and compared in order to identify the ones that are widely recognised within the research field. They were sorted and organised according to similarities; the unique aspects were also taken into consideration if they showed a strong connection to any of the core SSD concepts. Finally, all the findings were synthesised into the generic State of Art of KM for SSD model (please refer to Figure 3.1; Table 3.1 first column). It represents a compilation of the different approaches suggested by the literature.

2.3.2 Stage I-B: Data collection and analysis

Expert interviews

The aim of this sub-stage of the research was to revise and validate the generic model of KM for SSD developed at the previous stage. To achieve it we conducted five interviews performed with the experts in the field. Experts were classified as both academic researchers as well as professionals, i.e. consultants working with implementation of knowledge management in public and private spheres. The background of the chosen experts was diverse which allowed incorporating different perspectives on the research topic.

The initial objective was to interview minimum four experts. The existing personal and academic networks were used to brainstorm the list of experts who were likely to be interested in the research. The invitation emails were sent out to a range of experts in during weeks 11 and 12. As a result, five interviews were scheduled for weeks 14 and 15.

The interviews were conducted with the knowledge management theorist and practitioner Arun Hariharan, sustainability researcher Robert Sroufe, founding member of the Society for Organizational Learning Global Network Göran Carstedt as well as two FSSD practitioners working in consulting sphere in TNS Stockholm and Canada involved in developing and running the training programmes for sustainability - Kristoffer Lundholm and John Purkis. The interview with Arun Hariharan was conducted in written form via e-mail, interview with Robert Sroufe was performed in person, whereas the rest were done via skype. All oral interviews lasted between 55 and 75 minutes.

The format of the interviews was semi-structured and had the following layout: 1) perspective on knowledge management as a discipline; 2) perspective on sustainability-related knowledge; 3) practical implications of knowledge management theory in the sustainability field. The reasoning behind the choice of semi-structured interviews over other possible options is that there was only one opportunity to interview each of the experts. Therefore, this format allowed us to make immediate changes in order to best use the limited time available and still keep the interaction focused (Savin Baden and Howell Major 2013).

Transcription and coding

All the interviews were transcribed; the transcripts are available upon request. Each of the research team coded the interviews for specific practitioners. In order to identify information that was specifically related to SRQ #1, a list of predetermined categories was derived based on a generic KM for SSD model. The categories used were: vision, strategy, knowledge management processes (create & acquire, share, use, evaluate) organisational culture, organisational structure, IT infrastructure and other. Throughout the coding process, we maintained flexibility and openness to divergences in order to identify new aspects and connections that were absent in analysed literature and were valuable to later refine the final KM for SSD model.

Final model of KM for SSD

In order to provide a final answer for SRQ #1, findings from both sub-stages were compared and synthesised into the final State of Art model of KM for SSD. For this, all the categories were listed in the unified excel document accompanied by descriptions provided by literature and expert interviews. The final model informed the content of the interviews conducted on the next stage of the research.

2.4 Stage II: State of Practice of Knowledge Management in SSD organisations

The purpose of this stage was to answer the SRQ 2, i.e. define the State of Practice of Knowledge management in business organisations applying SSD in comparison with the State of Art KM for SSD Model. Informed by this, the goals of this stage were to compare the findings of theoretical model with practical experience of applying knowledge management techniques and concepts, to identify the gaps, and, if applicable, give recommendations as well as review the State of Art KM for SSD model with the purpose of making it more relevant for use within organisations. In order to do so, four interviews with representatives of three organisations applying the FSSD were conducted and analysed. Further elaboration on methods provided below.

2.4.1 Stage II: Data collection

Since the focus of our research is set on the organisations that apply the FSSD, for this stage of the study we were looking for the organisations that are working with the framework in their day-to-day practices. Since the Natural Step (TNS) is a non-profit organisation that assists organisations in learning about and how to apply the framework, the decision was made to reach out for those organisations that are known to be long-term clients of TNS. The following selection criteria was applied:

- organisations work with FSSD
- organisations have collaborated with TNS advisors
- organisations have made a clear public statement on their websites regarding their engagement with sustainability.

Since the State of Art KM for SSD model developed at Stage I of the study takes a systemic perspective on the organisation, our goal was to perform the interviews with representatives who would occupy a position either in the top management of the organisation or would have a direct influence on the organisation's sustainability strategy development and implementation process.

For the search of contacts, personal and academic networks were used. In total 10 invitations for collaboration were sent out and 3 positive replies were received. The attempt to use TNS network was made by the research team, however, a stable contact was not established. Once the agreement about collaboration was made with the interviewees, each of them was provided with core information about the thesis purpose and aims as well as the questions for the interview. The interviewees who took part in the study were: Claes Kollberg (Plant Manager at Cementa AB Degerhamn, Sweden), Ingela Nordin (Global Sustainability Manager at Beckers Group, Germany) and Anna Borgeryd (Chairman of the Board at Polarbröd AB, Sweden).

Since conventional face-to-face interviews were not possible, the interviews with Claes Kollberg and Ingela Nordin were conducted via Skype and lasted 55 and 75 minutes respectively, whereas Anna Borgeryd participated in two interviews via phone call 60 and 30 minutes long. Similar to Stage I-B, the questions for the interviews were designed in semi-structured format and the list was sent to the interviewees prior to the call. All the members of the research team were present during the calls. The tasks were divided - one of the team members was assigned to be the lead interviewer, whereas the other two were both listeners and note-takers. With the interviewees' consent the conversations were recorded.

The layout of the interviews for each participant followed the same structure: 1) familiarity with the concepts of knowledge management and organisational learning; 2) sustainability knowledge; 3) managing knowledge and learning in practice.

2.4.2 Stage II: Data analysis

Similar to data analysis in Stage I-B, all the interviews were transcribed and coded using the same set of predetermined categories derived from final KM for SSD model. After the interviews, we shared the notes and impressions, which helped us to create a complete picture of the results.

After completing the coding process, we built spreadsheets containing all the information that was identified as relevant for each category. Before performing the final analysis, we made sure that information presented in the spreadsheets was related to the categories and specific codes, and that the information was clear and non-overlapping. As a final stage, a comparison between State of Art and State of Practice was performed. It is presented as a narrative in the results section and synthesised in Table 3.2.

2.5 Validity

It is important to address validity in qualitative research, which includes being transparent about its strengths and limitations. We attempted to ensure validity in a variety of ways.

The diversity of the team allowed us to use the investigator triangulation strategy for cross-examining from multiple points of view. The members of the team come from three different countries (Finland, Russia, and Basque Country (Spain)), have various professional and cultural backgrounds and different ways of thinking. Additionally, the team referred to peer examination at different stages of the research. Two face-to-face meetings with peers involved in the field of sustainability research on both stages of the project, as well as peer feedback round at the final stage, provided excellent support in the form of challenging assumptions and decisions, having a critical look at the accuracy of methods and giving fresh perspectives on various aspects of the research. The feedback received from peers and advisors was discussed and incorporated in the research.

Meryl et al. (2009) wrote that one of the crucial steps in ensuring the validity of results is to have “direct communication” with the study subjects (e.g. in a form of an interview), and by making the data collection and analysis process “systematic, documentable, and qualitatively accurate” (Meryl et al. 2009. 1263). Furthermore, by carefully grounding the interviewing process (including crafting the questions and the interviewing technique) in scientific methods assists in ensuring the validity of the results (Meryl et al. 2009). We kept the intention to do so throughout the whole process. The possibility of misinterpretation was minimised by recording the interviews and fully transcribing them for the analysis.

In addition, the research team developed group dynamics to ensure a healthy and well-balanced environment for each team member to have an enjoyable and fruitful learning experience. This investment into teamwork served to navigate through the information constructively and deeply explore the questions in a more collaborative and rich way.

All of us were new to Knowledge Management theory. While this helped to avoid the influence of own theories, preferences and perceptions, due to time constraints it was difficult to gain very deep and thorough understanding of the theoretical field. Finally, different levels of the initial interest of the researchers in knowledge management discipline helped to stay critical through the research process and avoid making unconfirmed assumptions when answering the main research question.

2.6 Limitations of the Research

One limitation of this research is that the sample selection of the interviewed organisations can be seen as limiting, as three organisations do not offer the ultimate representation of FSSD practitioners’ experience. Additional companies of different sizes, industries and geographical locations would have increased the validity of the research, however due to imposed time constraints of the project as well as extremely busy schedules of top management employees, such a focused approach took place.

We are also aware of the fact that the study only touches upon the organisations that already work with FSSD with the help of TNS and is not suitable for organisations taking other approaches for their sustainability agenda. The issue of applicability of the results for these organisations was not addressed by the study.

3 Results

3.1 Generic Knowledge Management for Strategic Sustainable Development Model

The Knowledge Management for Strategic Sustainable Development (SSD) Model, shown in Figure 1, offers guidelines for implementing a knowledge management program to strategically drive an organisation's sustainability results. All of the elements are important to consider and are the most effective when used in cooperation with each other and in alignment with the organisation's existing strategy (Hariharan 2015, 124). It consists of the following elements:

1. Vision
 1. Strategy
 2. Action plan
2. Knowledge Management Processes: Create & Acquire, Share, Use, Evaluate
3. Organisational Culture
4. Organisational Structure
5. IT Infrastructure

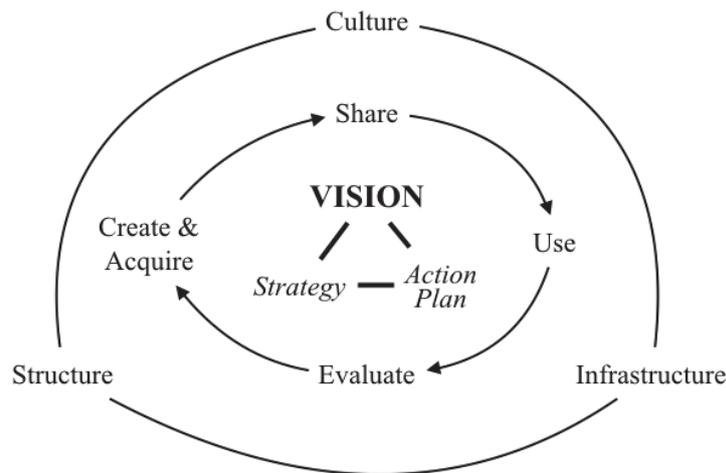


Figure 3.1 Generic Knowledge Management for SSD Model

The Vision is positioned in the middle because it dictates how the other elements work. The Vision provides guidance for what kind of knowledge the organisation should develop, and possibly how to develop it. The Vision also serves a goal, a desired state of knowledge. The Strategy and Action Plan serve as support for the Vision, as they help to define the route towards it and provide tangible guidelines and plans to achieve it. Culture, Structure, and IT Infrastructure are the enablers and affect how this development actually happens, yet they all can be altered (to different degrees). Create & Acquire, Share, Use, and Evaluate are the necessary processes, applied by people in the organisation, for holistic knowledge development in order for the organisation to take strategic advantage of the knowledge and to achieve the knowledge vision in this process. How the organisation creates & acquires, shares, uses, and evaluates their knowledge activities in practice is highly dependable on their

unique conditions (company size, existing infrastructure, investments, strategies etc.) as well as their knowledge ambition level, reflected in their vision. Similarly, how these processes function depends on their organisational culture, structure, and IT infrastructure.

In the next paragraphs, we give a detailed explanation of the elements in the Knowledge Management for SSD Model, based on the KM and FSSD literature and the interviews with the experts. The summary of the elements can be found in table 3.1 and the synthesis of the compared results from the literature review and the expert interviews can be seen in Appendix C.

Overall, the structure of the model has not altered to a significant degree, whereas certain aspects were reinforced or weakened after the expert interviews were conducted. The results presented here informed the next stage of the research exploring the State of Practice of KM for SSD in organisations applying FSSD.

Table 3.1 State of the Art of KM for SSD Model

State of the art Model	
Vision	<ul style="list-style-type: none"> - serves as a central guiding component for learning and supporting the main (organisational) vision - contains a clear learning purpose and a reachable envisioned future description, including shared knowledge of FSSD
Strategy	<ul style="list-style-type: none"> - supports overall business strategy - includes learning objectives with sustainability focus, backcasting, prioritisation process
Action Plan	<ul style="list-style-type: none"> - a roadmap to organisation's KM vision that includes a vision itself, strategic learning goals, concrete actions' descriptions and answers to prioritisation questions
Create and Acquire	<ul style="list-style-type: none"> Requires a proper context created by taking a holistic view on the organisation - Encourages creativity, interpretation and adoption of each other's ideas - The final goal of building employees' capacity for engaging in sustainability - Applying concrete knowledge creation & acquisition tools
Share	<ul style="list-style-type: none"> - adapting content and amount of sustainability-related knowledge depending on receiver and with intention to encourage dialogue, questions, ideas and replications of improvements - establishing simple and standardised knowledge sharing practices - share sustainability knowledge with "coopetitors" - applying diverse knowledge sharing tools (e.g. virtual portals, communities of practice)
Use	<ul style="list-style-type: none"> - formal methodology should be applied for gradual development of employees' knowledge application capacity - build motivation to use existing knowledge
Evaluate	<ul style="list-style-type: none"> - baseline assessment of currently possessed knowledge - knowledge management performance evaluation using numeric, including financial, and qualitative measurements which would motivate and filter KM initiatives
Structure	<ul style="list-style-type: none"> - flatter structure with less hierarchies and divisions - commonly shared boundaries and conditions - strong leadership in sustainability knowledge adoption - sustainability knowledge champions - establish cross-functional project teams or task groups

Culture	<p>clearly manifests “why” and “how” of learning and embraces sharing and replicating values.</p> <ul style="list-style-type: none"> - engagement of top management; openness to new ideas and change - employee engagement and empowerment: belief in everyone’s potential and safe environment for participation - talent creation and retention - celebrate success; openness and transparency; acceptance of mistakes, failure and risk-taking; trust; communications;
IT Infrastructure	<ul style="list-style-type: none"> - ICT being an important enabler of all KMS elements - A variety of applications useful for supporting and improving KM for SSD

3.1.1 The KM for SSD Vision

Botha (2000) states that the most crucial component of a corporate strategy is to create a vision of the type of knowledge that an organisation needs. Then, it should be applied in the management processes in order to become executed (Botha 2000). The knowledge vision supports the overall organisational vision by making sure that the organisation will have the needed knowledge to achieve its goals (Lundholm 2016; Purkis 2016). It will provide the company with clarity and guidance in aspects like who should know what and when. Consequently, the knowledge vision will be created after the overall organisational goals and objectives are established. The KM vision should contain the description of necessary and sufficient knowledge to move the company towards its overall vision (Lundholm 2016; Purkis 2016). Lundholm (2016) stated that even if it might be hard to think about future knowledge needs, it will allow the firm to be innovative by encouraging the employees to imagine how the perfect product would look like and how can they ensure that they will continuously have enough knowledge to develop it.

Moreover, having a direction for the knowledge helps employees to apply their skills and knowledge under productive and organised conditions (Botha 2000). In parallel, the organisational vision serves as a vessel for giving guidance and direction for organisational learning and relevant practices (Pembererton 2000; Carstedt 2016). Similar to overarching vision of the organisation, knowledge vision may also include references to “organisation’s core purpose, core values and overall “end-goals” to a level of specificity that is felt relevant and can be agreed upon” (Broman and Robèrt 2015, 7) and can be framed in the same format as the overall one. Also, leadership, being a major enabler and reinforcement of vision, plays an important role here in directing the learning and creating conditions for “continuous improvement based on sharing ideas, trust, experimentation and external vision” (Pembererton et al. 2000).

Concerning the engagement and connection to the vision, it might be worthwhile creating a statement of envisioned future of how the knowledge management in the organisation will look like once the vision is reached. The envisioned future is more flexible than the vision, but it has to be consistent with it. It includes a brief description of “the more bold, daring, and possibly unachievable goals”, also called the stretch goals and is written in the organisation’s own language (Robèrt et al. 2015, 141). The following is an example of a knowledge management vision:

“To connect people, work smarter and get results. This includes accessing and leveraging worldwide development knowledge; generating new intellectual capital, and continuously learning from their activities”. -USAID (USAID 2016)

As it was mentioned before, the KM vision will support the overall organisational vision. In the sustainability field, as Doppelt (2003) points out, those companies that let their vision guide them, and abide by rules that ensure environmentally sound practices, contribute to the economic and social development of the system they are a part of. The vision is also an essential component of the FSSD, described in the introduction of this paper. In the context of the framework, the organisational vision is bounded by the eight sustainability principles (SPs) in order to make it sustainable. Nonetheless, it is not enough to create a sustainability vision; the vision has to be understood and shared in the organisation (Lundholm 2016; Purkis 2016). Once the people in the organisation have an understanding of the vision and believe in its purpose, they will have a higher tendency to contribute their knowledge and know-how in their work. KM processes will facilitate the sharing process to ensure that there is a common understanding of the organisational vision. As an example, both Lundholm (2016) and Purkis (2016) stated that organisations should have a shared knowledge about the FSSD in order to have a shared language that will enable employees to collaborate.

KM will also help the organisation in the development of the sustainability vision by raising awareness on their current sustainability-related knowledge and avoiding setting goals that are too far from them, based on their expectations and beliefs (Lundholm 2016). When the organisation is not ready for a fully sustainable vision, there is the possibility of implementing “a cascading level of visions”, where they start with not perfectly sustainable goals and from there, as they gain confidence and see results, move into more sustainable visions until they set the one that is fully sustainable (Purkis 2016).

Overall, the KM vision will help the company to ensure that they will have the necessary knowledge to reach their organisational vision by providing them with guidance and clarity in knowledge matters. Moreover, KM will help with the understanding and sharing of the general sustainability vision throughout the organisation, which will increase the engagement and collaboration of employees as they will share a common language and purpose. Lastly, companies will benefit from KM when developing their sustainability vision, as they will gain awareness of their current sustainability knowledge which will help them identify more relevant goals and priorities.

KM for SSD Strategy

It has been well established in the research field that an organisation’s knowledge strategy should be an integral part of its business strategy (Grant, 1996; Hansen et al., 1999; Zack, 1999b; Earl, 2001). The experts stress that it is important to align the knowledge management efforts with the organisation’s strategic goals and objectives (Lundholm 2016; Sroufe 2016; Hariharan 2016; Purkis 2016).

Similarly to strategic planning for sustainability approach, as mentioned above, it is also important to have a vision for knowledge in order for the organisation to know what is the desired level of knowledge they need to achieve their strategic sustainability and business objectives (Botha 2000, Pemberton and Stonehouse 2000). Then, an organisation can backcast from that vision and assess the current reality of their knowledge (Robèrt et al. 2015, 50, Lundholm 2016; Sroufe 2016; Hariharan 2016; Purkis 2016, Carstedt 2016). Backcasting works well for knowledge development especially for long-term sustainability (Lundholm 2016). After backcasting and understanding the current knowledge reality, the organisation can brainstorm a list of actions that lead to the development of (the kind of)

knowledge required to achieve the vision. Following the brainstorming, a strategic prioritisation (similar to FSSD) should take place. In this step, the organisation asks itself prioritisation questions that guide the selection of the most strategic knowledge-related activities. The questions could be in the form of:

- Does this action lead us towards the Vision?
- Does this action serve as a flexible stepping stone for future improvements?
- Does this action provide an adequate return on investment (economic, social, environmental return) (Robèrt et al. 2015, 55)?
- Does this action help us to achieve at least one of the learning objectives (Von Krogh et al. 2000)?

Then, the organisation can organise the knowledge-related actions in short-term, mid-term, and long-term to ensure stepwise and gradual development towards the knowledge vision (Robèrt et al. 2015, 156). In parallel to KM strategy aiming to realise the KM vision, a good KM strategy also supports the organisation's business processes which are geared according to the business strategy of the organisation (Oluikpe 2012; du Plessis 2007). Ideally, this helps in the realisation of the business strategy as the company's knowledge capital should meet the changing market demands (Chen and Fong 2015). In terms of strategically promoting organisational learning, especially in relation to sustainability, it is useful to transparently communicate sustainability objectives right from the recruitment stage of new employees (Paraschiv et al. 2012). To enhance and capitalise from the employees' openness towards learning and innovation capabilities, a variety of personal and professional learning opportunities should be offered (Paraschiv et al. 2012). However, for the organisation as a whole, it is strategic to set learning objectives to effectively deal with the huge amounts of information available and only develop knowledge that is useful for achieving the organisational learning goals (Thomas et al. 2001). This is especially important for strategic sustainable development since there is a rapidly growing and diverse body of sustainability information available and the organisation needs to only acquire that which helps them to achieve their objectives.

KM for SSD Action Plan

The action plan is like a roadmap for the organisation to progress according to their knowledge vision and strategy. The specifics will depend on the individual situations of the organisations, yet there are some aspects that provide guidance and structure on how to formulate the plan. The plan should include the knowledge vision, strategic goals divided to short-term, mid-term, and long-term, as well as the actions that the organisation has prioritised to be the most important for reaching the vision (Robèrt et al. 2015, 159). In addition, the plan should lay out the detailed activities within the actions, people responsible for the actions and activities, related schedules and budgets, as well as Key Performance Indicators for the actions. Furthermore, the plan should show the answers to the prioritisation questions (Robèrt et al. 2015, 159). This helps to improve transparency of the rationale behind the chosen actions, as well as in creating a learning culture that is strategic about knowledge.

Originally, the model did not mention the action plan, we focused on the vision and the strategy to reach that vision. However, looking at the FSSD levels, we decided that it was adequate to add the action plan, as the list of prioritised actions resulting from the strategy. Sadly, we made this decision after we had conducted the interviews and thus, we were not

able to validate our results with the experts. The State of the Art KM for SSD model will integrate the action plan that is described in FSSD.

3.1.2 KM for SSD Processes

Based on our analysis, we have identified the four following knowledge management processes to be of importance for the Knowledge Management for SSD Framework:

1. Create & Acquire
2. Share
3. Use
4. Evaluate

Create & Acquire

In Create & Acquire processes, the organisation either creates new knowledge in-house, for example through research, or acquires it from external sources like research intelligence services or by going to conferences.

Thomas et al. (2001), in their research exploring the concept of strategic learning, give an example of a learning team which could be sent out to observe at events where the organisation hopes to acquire knowledge. Other aspects of this “strategic learning” (Thomas et al. 2001, 337) are using non-hierarchical and diverse “communities of experts” that come from inside and outside the organisation to provide assistance to the knowledge acquisition and minimise misunderstanding (Thomas 2001, 337). The experts aid the observation team by providing them with a list of questions and areas of concerns they think are lacking in terms of organisational knowledge. Before going to the field, however, the lists are brought to a specialised knowledge centre of the organisation where, together with individual observation team members, they are elaborated with multiple additional questions based on what the team members expect to see in their field studies. The questions are also organised according to different expertise areas. This guidance and preparation help the observation team members to only find what is the most needed and see through the unnecessary information (Thomas 2001, 337.) Then, back in the office, a different team analyses the collected data. They compile an initial findings sheet for which feedback is given. “This feedback, in turn, gets iterated through multiple causal feedback loops that serve to prevent premature closure on the interpretation” (Thomas 2001, 337).

This kind of methods could be useful in a business organisation applying sustainability. For example, such a rigorous process for collecting and analysing data could benefit the supply chain or sustainability managers in international companies who need accurate knowledge about the working conditions in supplier factories or agricultural production sites. Besides, it provides a valuable example of concrete practices which demonstrate how an organisation can focus its efforts on strategic objectives.

Furthermore, “knowledge mapping” (Mohamed et al 2009, 281) is an important practice, mainly for bigger organisations, in the creation and acquisition phase. It is a shared activity where the required, temporarily unproductive knowledge is discovered and made available for those who need it. This also includes ensuring that people can easily reach the experts who possess the sustainability knowledge in the organisation (Mohamed et al 2009, 281).

Knowledge creation, along with acquisition, is one of the core processes to be supported and managed within a corporation. Knowing these mechanisms might prove to be extremely useful for organisations that lack common understanding and shared language of sustainability in general and SSD approach in particular. The practice of knowledge creation implies “making available and amplifying knowledge created by individuals, as well as crystallising and connecting it with the organisation’s knowledge system” (von Krogh et al. 2012, 241). The necessity of knowledge creation, especially in the initial stages of sustainability agenda roll-out, was recognised by all the interviewed experts as well. However, most of the interviewees pointed out at the importance of a context that is comfortable and encouraging enough for all employees to participate in the process. This environment can allow the utilisation of creative potential of employees at different levels of the organisation (Purkis 2016). Interestingly, though, both FSSD practitioners pointed out that when giving training to companies on creating sustainability knowledge, they never operated the term “knowledge creation” but rather appealed to the concept of “capacity building”. At early stages of sustainability roll-out, it is crucial to build the capacity of “core people” of the organisation (i.e. “train the trainer”), later spreading it across the whole organisational structure. Different ways of learning are usually integrated into the process, which are targeted at specific competencies related to sustainability, such as shared understanding of sustainability and ability to apply FSSD in everyday work.

In Nonaka’s SECI model (Kostopoulos 2010; Hoon Song 2011) (see Appendix A) he refers to the knowledge processes of Socialisation, Externalisation, Combination, and Internalisation, which happen within the organisational context “Ba” (Ba is a Japanese concept that roughly translates into English as “space”). Ba is described as being a holistic perspective of organisational culture, structures and technological means situated in physical, mental, and virtual spaces altogether (Nonaka et al 2000). The importance of keeping a systems view of the corporation’s functioning when managing any of the processes separately makes SECI relevant for FSSD organisations. Ba, being a specific context of a particular organisation, creates the basis for interpretation and meaning making (Nonaka et al 2000), which is one of the core pillars of social sustainability. A more detailed description of a preferable organisational context provided in paragraphs 3.1.3, 3.1.4 and 3.1.5, is intended to make the concept of Ba more tangible in order to embrace and track the state of compliance with social sustainability.

Finally, below we list some of the ideas and experiences of concrete knowledge creation & acquisition practices that might be helpful for KM practitioners:

- Identifying and accumulating best practices across the organisations
- “Bottom-up, outside-in” approach
- Cascading effect, i.e. training representatives of different departments followed by them to train the rest of employees
- Uniting experts, practitioners, strategy makers into virtual communities
- Creating a sustainability knowledge database

As a conclusion, the significance of proper context was underlined both in literature and expert interviews. At the same time, neither literature nor experts provided specific guidance on exact State of Art process of knowledge creation & acquisition, both offering a set of various non-systematic suggestions.

Share

Sharing knowledge means to “continuously distribute information necessary for expanding the knowledge base and measuring progress” (Doppelt 2003, 6). Its value depends on how much knowledge is shared inside the organisation, and its external stakeholders. The experts mentioned several benefits around sharing, such as avoiding to “reinvent the wheel”, replicating best practices that already exist within the organisation, making the holders of beneficial knowledge visible to the whole organisation, and making their knowledge available. Consequently, knowledge sharing is highly important for the achievement of learning strategies (Thomas et al. 2001).

The sharing occurs internally and externally, and can take place in three forms: individual, where members of the organisation can explore learning opportunities themselves through, for example, a database; tailored, where the knowledge is aimed at a specific group of people (e.g. Global Reporting Initiative database), through videos about specific topics (e.g. TNS Youtube videos); and mass-market, where the knowledge is transferred both within the company and externally, for example through newsletters or handbooks (Thomas et al. 2001).

Two of the interviewed experts explained that knowledge sharing within the organisation does not only mean that the employees in the organisation are exposed and have access to larger amounts of information. In fact, they agreed that knowledge sharing should be organised and not left to chance. Rather, organisations should create systems with clear, simple, standardised, and even mandatory procedures. Actually, the “most impactful lessons are integrated into organisational routines” by using general existing technologies (Thomas et al. 2001, 341). For example, if too much knowledge is shared with colleagues, clients, or partners, it might lead to an overload of content (Roblek et al. 2014) that will not be used. To facilitate the ‘digestion’ of the shared knowledge, as well as the generation and replication of improvements, experts suggest that dialogue, questions, and ideas should be encouraged. Moreover, the information has to be tailored to the receivers and ‘meet them where they are’ (all interviewees except Hariharan). In the field of sustainability, the knowledge and information sharing must be done in a mindful way, due to the amount of information (the word “sustainable” has 222 million hits in Google search engine) and the different opinions and approaches for the same issues.

Knowledge sharing is a challenging concept that requires balancing between maintaining competitive business advantage while contributing to more systemic change through sharing of sustainability knowledge (Pemberton et al. 2000). Sustainability is the competitive advantage for many companies (Porter and Kramer, 2011; Schaltegger et al. 2013) and, as knowledge might be responsible for such advantage, identifying the risks of losing it to competing organisations is also important (Pemberton and Stonehouse 2000). At the same time, some organisations might be on the fine line between being a competitor and a co-operator, as they may compete and collaborate simultaneously. Roblek et al. (2014, 282) call these hybrid organisations “coopetitors”, a term that may proliferate as an increasing number of companies integrate sustainability into their businesses and want both to perform well financially as well as act responsibly. Sharing knowledge is also a crucial act in creating novel knowledge and capabilities, both within an organisation and with cooperating companies. An example is the Green Chemistry and Commerce Council (GC3), “a cross-sectoral, business-to-business network of companies and other organisations working collaboratively to accelerate green chemistry across sectors and supply chains”, where

companies like Nike Inc., L'Oréal, or Patagonia are members (Green Chemistry and Commerce 2016).

Some practical tools for sharing knowledge within organisations might be in-house virtual profile pages, like Yellow pages or LinkedIn, for employees to access the “know-who” in that organisation (Roblek 2014, 282). The same holds true for large international projects where professionals from different disciplines and collaborating organisations work together and need to identify who possesses the exact knowledge that applies to their part of the project (Roblek 2014, 282). This makes it also relevant for sustainability, as it is a multidisciplinary field which implies a lot of interaction between people of a wide range of specialisations. Other tools and technologies include content management software, different types of portals, working groups, communities of practice, communities of interest, or cross-functional teams (Roblek 2014, 282). In larger multinational organisations some example leverage points for sharing knowledge are: “the role of subsidiaries, network structure, human resources ability and motivation, transfer expatriates, use of communication information technologies, corporate university, or communities of practice” (Claver et al. 2007, 273).

Last, three of five experts underlined the importance of open verbal communication. Such practices as open source developments, communities of experts and virtual communities were also mentioned in the interviews.

In summary, it is clear that sharing knowledge is much more than spreading information. In order to be strategic about it, it should be done in an organised way, using the right procedures. Moreover, the amount of sustainability knowledge can be overwhelming if not managed correctly. Companies will also have to balance between preserving their competitive advantage and cooperating with fellow organisations with the aim of creating valuable knowledge, without risking their business operations.

Use

It has already been mentioned that knowledge is the main source of competitive advantage in organisations (Nonaka 1991; Zheng et al. 2010), but there will be no benefits if the knowledge is not used. Thus, we can state that knowledge application is the source of competitive advantage (Shin et al. 2001), as the usage will positively affect the development and improvement of individuals' competencies (Oyebisi Oyefolahan and Dominic 2013). Similarly, sustainability becomes competitive advantage only when companies apply sustainability knowledge. Hariharan adds that often the lack of knowledge is not the problem for organisations, but rather the lack of ability to use the available and relevant knowledge they already possess. With Sroufe they concluded that replicating the existing knowledge is important to avoid ‘reinventing the wheel’ when familiar problems arise (Hariharan 2016; Sroufe 2016).

However, companies have to be aware that knowledge is “a combination of a process element and information”, meaning that individuals gain knowledge after processing the information, which will differ from person to person and will depend on their capabilities and context (Shin et al. 2001, 336). Due to the nature of knowledge, it might not be enough to establish elaborate communication channels for achieving the desired understanding and correct application among the users. Rather, knowledge should be divided in simpler parts while delimitating the connections between them for easier adoption by users (Shin et al.

2001). In relation to sustainability, Purkis (2016) made a distinction between understanding the eight sustainability principles and applying them, because even if they are understood, the application will differ a lot depending on where and with which purpose they are applied. For example, there is a difference in using them in setting long term goals in the managerial level, or applying them to an aircraft engine manufacturing process. In line with the findings from the literature, Carstedt (2016) talked about how individuals' knowledge and competencies are developed and improved by practice. He stressed the power of 'learning by doing' while recognising that knowing does not automatically lead to practice.

Another crucial aspect in knowledge usage is the individual's motivation to make use of the entire KM system (KMS). Oyebisi Oyefolahan and Dominic (2013) have identified four factors that influence individual motivation to use the KMS: the quality and the easiness of using the KMS; the quality (information accuracy, timeliness, completeness, relevance, and consistency) of the information, as well as its value and applicability to the user's work problems and decisions; the ability to create a knowledge network that will enable good communication, building relationships and belongingness; and a culture that values innovation, as it encourages individuals to address and explore organisational issues based on personal judgment.

Moreover, the researchers state that autonomous motivation is emergent and that it will last only when the individual internalises it because they see benefits in it (Oyebisi Oyefolahan and Dominic 2013). Consequently, for individuals to experience the benefits and internalise the motivation, first they need to use and develop the competencies. For example, the company might install a new intranet throughout the organisation and encourage the employees to use it by explaining all the benefits it will bring. At the beginning the employees will not see the full potential of the new software, because they will not know how to use it. The organisation will have to ensure that they stay motivated to try and build their competences in that first phase and afterwards, if the software is good, the employees will develop internal motivation, and will keep using it because it will be better than the previous option.

In conclusion, both the researchers and experts agree that the use and application of knowledge will materialise the competitive advantage of knowledge management and sustainability. They also affirm that using the knowledge and practicing serves to improve individuals' capabilities.

Evaluate

In scientific literature, knowledge evaluation is rarely mentioned as being one of the key aspects of knowledge management (Tseng 2008). At the same time, research points at increasing "need to integrate KM with performance measurement in pursuit of continuous improvement and organisational goals" (Yiu and Pan 2011, 311). All the interviewed experts also agree that as in many other internal organisational operations, assessment and measurement help to improve the effectiveness of KM initiatives by creating feasible motivators and serving as a "filter" for numerous bits of data and information circulating within a company.

Based on the literature and experts' views, knowledge evaluation was derived to serve two important purposes:

1. Provides a baseline assessment of the current knowledge in the organisation
2. Measures the performance of knowledge management initiatives and strategy as a whole.

Baseline assessment of current reality is utilised in the application procedure of FSSD (ABCD procedure) and is necessary for the implementation of backcasting (Holmberg and Robèrt 2000; Broman and Robèrt 2015). In particular, the two TNS practitioners among our expert interviewees made an analogy between the B-step of the ABCD process and the knowledge evaluation practices. Similarly, this type of analysis can be applied to the knowledge management vision in order to evaluate the current knowledge level of the whole organisation and its particular employees in relation to the knowledge management vision. All experts agreed that during the roll-out of the sustainability agenda, the level of sustainability knowledge throughout the organisation varies to a great degree. A “knowledge inventory”, together with an assessment of the knowledge needs and the organisational capacities, should be considered as a basis when thinking about the rolling-out of the sustainability strategy (Lundholm 2016). The company would also benefit from benchmarking when designing their KM strategy (Sroufe 2016). The knowledge level assessment would include listing “current challenges as well as current assets to deal with current challenges” or those that can assist the organisation in reaching its knowledge management vision (Broman and Robèrt 2015, 7).

Additionally, practising KM for a period of time inevitably generates knowledge assets, or intellectual capital (Kun Chang 2005). Measuring and monitoring knowledge becomes crucial for managers for navigating these assets and making strategic decisions regarding necessary changes and improvements in knowledge management initiatives and activities in order to improve the overall organisational performance (Tseng 2008).

There are several types of measurements to evaluate the performance of KM initiatives. One important consideration outlined by the literature is that knowledge evaluation should include both financial and non-financial measures (Kun Chang 2005; Tseng 2008). Numerous research has shown that measures based on traditional accounting methods are not sufficient for the complex and dynamic organisational environment which results in such non-financial measures as the level of employee trust and stakeholder satisfaction (Tseng 2008). The experts also mentioned both categories: numeric indexes that directly connect KM initiatives with investments and revenues to create their financial value (Sroufe 2016; Hariharan 2016); numeric measurements that use other corporate and personal metrics, indexes and key performance indicators (KPIs) (Sroufe 2016; Hariharan 2016); and qualitative measurements through surveys, trainings, tracking trends and observing of behavioural change. For Carstedt (2016), a feeling-based estimation was the most important one. According to him, in the end, the only way to truly evaluate the success of learning initiatives, one needs to notice the dynamics of innovative “human energy”, and observe the changes in the level of enthusiasm. All mentioned measurement types can potentially be used to evaluate the understanding and use of the sustainability related knowledge throughout the organisation.

To summarise, the knowledge evaluation process plays two roles in the KM cycle: it starts the process by providing a baseline assessment as a basis for further knowledge creation and acquisition and closes the loop by revealing the performance of the organisation. It is important to remember that multiple processes of KM happen at various organisational levels, and the loops and stages repeat and iterate on an ongoing basis.

3.1.3 The role of organisational structure in KM for SSD

Organisational structure plays a large role in ensuring the effectiveness of an organisation's sustainability efforts. The way people are governed affects how knowledge is acquired and distributed, how resolutions are made, and how assets are shared (Doppelt 2003). For example, when the management communicates the organisational goals well and creates a clear link between the employees' work and the organisational goals, the employees can more efficiently work towards those goals because it becomes clearer for them to evaluate the knowledge resources they need (Tseng 2008). This is particularly important for improving organisational sustainability performance where employees are absorbing (potentially) new sustainability knowledge and trying to connect it with new organisational sustainability goals that might vastly differ from goals they are used to. This applies especially to organisations which introduce sustainability for the first time but is equally important for companies with years of experience in FSSD and with ongoing sustainability efforts.

Research points out that traditional organisational structures with hierarchical and bureaucratic systems, often largely based on processes and rules, actually decrease the sharing of productive knowledge (Pemberton and Stonehouse 2000). They kill creativity, experimentation, and development of new ideas and instead of encouraging novel ways of thinking and working, they promote long careers in the same company. Additionally, very hierarchical structures promote power imbalances and bureaucratic hurdles, both which hinder the creation, sharing, and using knowledge strategically in changing conditions (Pemberton and Stonehouse 2000).

Instead, a flatter structure is more effective and agile in enabling employees to feel appreciated, people to work better in teams between company functions, innovation and creativity to happen, and in improving communication between managers and employees (Claver 2007, Pemberton and Stonehouse 2000).

The organisational structure should instead give employees room to manoeuvre and independence to execute. This should happen within boundary conditions and guidelines that are commonly shared and understood. The organisational structure that supports knowledge management for strategic sustainable development should facilitate the shared understanding of common "goals, rules, roles, and responsibilities" that "result in clear strategies and implementation plans" (Doppelt 2003, 6). When applying the FSSD, the sustainability principles (SPs) will serve as boundary conditions that will lead the organisation to strategically embed sustainability. It will be essential for everyone in the organisation to understand the meaning of the SPs to guarantee a coherent application throughout the company.

In terms of power, the literature differed slightly from the experts. Where the literature supported sharing of power, the experts highlighted the important role of leadership in driving sustainability and knowledge management efforts (Purkis 2016; Carsted 2016; Hariharan 2016). In Purkis' view, more important than structure is the leaders' commitment to actively engage employees. However, for a holistic engagement with sustainability, everyone's involvement and drive, also from the bottom-up, is needed (Purkis 2016; Doppelt 2003).

If it is very challenging (as it might be in larger organisations) to alter the organisational structure, "cross-functional project teams or task groups" (Pemberton and Stonehouse 2000,

189) are one mechanism to facilitate communication of knowledge across functions. Another method that would not require structural changes is the encouragement of sustainability and knowledge champions. Having a sustainability champion is a great way to engage others for sustainability (Lundholm 2016), whereas the knowledge champions could “promote knowledge-sharing and replication in their area, or review and approve content contributed by other employees for publication” (Hariharan 2016). Once the positive returns of KM become clearer for these people, Hariharan said, KM will become integrated into their normal work. However, before that, those who initially take KM on board should be encouraged with incentives because it is still additional work for them, taking time from other tasks.

Finally, Purkis and Carstedt shared the view that sustainability should be formally included in people’s jobs, either in job descriptions, reward systems, or otherwise expectations from the recruitment stage onwards. Hariharan saw this similarly from the knowledge perspective, writing that knowledge-performance, particularly knowledge sharing and replication, should be measured and rewarded as part of people’s jobs.

In conclusion, the organisational structure affects how knowledge of sustainability is spread through the organisations. Reducing hierarchy and experimenting with a flatter structure can help to empower individuals and improve creativity by allowing employees to collaborate across functions. However, both KM and sustainability require top management’s support for achieving real progress. Cross-functional project groups, champions, and sustainability and knowledge performance inclusion in job descriptions are ways for supporting KM for SSD without heavy structural changes.

3.1.4 The role of organisational culture in KM for SSD

The organisational culture is the set of values, attitudes and beliefs that guide the organisation and the individuals within (Pemberton and Stonehouse 2000) and is the element with the biggest influence on KM, as it touches on the “why” and “how” knowledge is created, shared and used in the organisation (Zheng et al. 2010). It also answers the why of engaging in sustainability. According to the interviewed experts, both the engagement and learning in the organisation happen around the why question, which is the driving force and direction for the company. The KM processes (create & acquire, share, use, evaluate) heavily depend on the day to day practices inside the company, which are directly influenced by the culture. In experts’ words, developing a culture that will enable and support the optimum environment for KM and the overall (sustainable) organisational performance is a long and complex journey that requires a deep transformation. The alterations will have to navigate the diversity among individuals and will have to consider the local culture where the organisation is based. Moreover, the designed systems might be great, but we cannot forget that they will be implemented and used by imperfect individuals (Sroufe 2016). In the following paragraphs, we are going to talk about the characteristics of those cultures that best support knowledge management for strategic sustainable development.

Leadership creates leverage to change (Lozano 2012), and it is even more powerful when the managers take the lead and steer the organisation towards a culture that will foster good knowledge management practices. The leaders in the organisation have to be “designers, teachers, and stewards” (Senge 1992, 188) and they need to think holistically about the organisation and the wider systems (Metcalf and Benn 2012). It is essential for managers to

understand the imperative nature of the sustainability challenge and the need of sufficient knowledge to proceed with it (Russell and Shiang 2013). If the management is engaged, they will push the organisational practices in their direction and they will not block initiatives that come from lower organisational levels. Moreover, the interviewed experts have declared that, when the executives' commitment is based on a strong belief in the value of KM and sustainability, they build expectations on employees and the organisation in general, and those expectations serve as catalysts for change. During this transformational journey, the leaders and managers will often have to alleviate concerns the staff might have in relation to the changes in the business operations and the potential feelings the more negative sustainability challenge information may create (Purkis 2016). All experts defined leadership as an essential and key element for both the success of sustainability initiatives, as well as the knowledge management. They all agreed that in order to change and implement new actions, it is critical to have the executives on board.

Once the top management understands the need of a good KM system, creating a vision for KM, together with the organisational vision, and inspired by the environment in which the business operates (Pemberton and Stonehouse 2000), will help them to be more strategic. The vision describes the required knowledge, which will be acquired and used by employees, following the knowledge process. Highly educated and qualified individuals, also referred to as knowledge workers, are a crucial component in an organisation, as they "add value through their ideas, their analysis, their judgement, their syntheses, and their designs" (Horibe 1999). John Purkis (2016) emphasised that "creative and innovative ideas come from employees, not managers".

First, the organisation has to believe in human potential and recognise the value of every individual's tacit knowledge (Pemberton and Stonehouse 2000). The organisation should invest in employees by training them to ensure the desired performance on sustainability. Surely, even if there is a lot of engagement and motivation, operational knowledge is needed to implement sustainability (Lundholm 2016). As knowledge has such a high value, attracting and retaining talent becomes one of the priorities in the human resource policies, and training have a well-established cultural value (Claver et al. 2007). Moreover, due to the importance of individuals' intellectual capital, employee engagement becomes an essential factor in creating competitive knowledge and using and sharing it in an optimum way.

Second, the culture has to create an environment where employees feel safe to participate and give their best and are encouraged to do so (Claver et al. 2007; Pemberton and Stonehouse 2000). Some of the characteristics of such cultures are the following: being tolerant with mistakes, encouraging confidence, dialogue, promote learning, participation, trust, empowering individuals, learning by questioning and experimentation, risk taking, creativity, socialisation and community building, and motivation (Claver et al. 2007; Pemberton and Stonehouse 2000; Russell and Shiang 2013; Schrettle et al. 2014). In addition, if employees are aware of the current situation and vision of the company and its environment (Law et al. 2015), they will make more responsible and wise decisions. Most of the interviewees also talked about transparency in relation to the commitment and the knowledge that is being shared, linked to the humbleness of accepting the not knowing. Lastly, the organisation will benefit from a culture that enables good communication and frequent dialogues to effectively disseminate the information and knowledge they create and acquire (Schrettle et al. 2014; Pemberton and Stonehouse 2000; Claver et al. 2007).

In relation to the dissemination, the culture should encourage sharing, replicating, and copying best practices (Hariharan 2016). Employees are often unwilling to share their knowledge or to acknowledge they copied or replicated something because they want to be seen as creative and original individuals. The management has to step in and ensure that the culture supports such practices, instead of wasting time, energy, and resources when the answer to the problem is already in the organisation. As an example, in IKEA they have changed the common business principle “not invented here” to “stealing with pride” (Carstedt 2016).

Experts mentioned methods to ensure that employees start integrating the new practices like celebrating the successes and aligning performance appraisal systems with KM or sustainability practices. For instance, sharing and replication could be awarded with the objective of encouraging those practices until they become part of everyday processes.

Lastly, looking at the environment the organisation operates in, in the field of sustainability, it is not enough if it is only the company itself who engages (Lundholm 2016). Ideally, the supply and value chain will also work to have such an organisational culture where they will have the sufficient knowledge and motivation to move towards a sustainable future. In such a way, this new way of doing business will expand beyond the organisation to the entire industry.

To sum up, the characteristics the organisational culture should have to support the successful implementation of KM are the following: top management commitment and support; employee engagement, involvement, and empowerment; trust; openness and transparency; acceptance of mistakes, failure, and risk-taking; being clear on the why of KM and sustainability; celebration; communication; and rewards.

3.1.5 The role of IT Infrastructure in KM for SSD

Organisational culture and structure may have “the most significant bearing on knowledge management” (Pemberton and Stonehouse 2000, 189-190). However, information technology (IT) infrastructure plays an important role in enabling more effective knowledge management. New and ongoing technological developments, particularly in IT, help in the realisation of new, flatter network structures and open, learning cultures. New information and communication technologies (ICTs) provide the means for knowledge acquisition and creation, sharing, using, and evaluation (Claver and Quer 2007; Pemberton and Stonehouse 2000; Chou 2011). In other words, the knowledge management IT should assist the processes of creation, sharing, and using of knowledge, by making life easier, effortlessly working on people’s behalf behind the scenes (Sroufe 2016). In these lines, Carstedt (2016) stated that IT is more about “Interaction Technology” than Information Technology. It is generally designed to productively organise the knowledge items and act as a tool for transferring tacit knowledge (Chou 2011).

However, although technology can be a useful enabler for KM, KM is not a technology initiative (Hariharan 2016). Multiple companies worldwide have failed to maximise results that knowledge management could provide because they considered KM to be a solely technological program. This also caused the poor return on investment when the newly acquired IT infrastructure did not bring the desired results. Instead, companies should define the areas where they see technology have the highest enabler value and then use technology

to facilitate classification, categorization and storage of content, easy search and retrieval and collaboration among experts in each of your top priority areas. Also, people will need to be willing to adopt and use modern technological developments, otherwise, it will rather be a burden that will take their time instead of helping them (Sroufe 2016).

Faced with changing global trends, companies are under pressure to quickly adapt to the new environments. Not only understanding the markets better or driving innovation, but also establishing intelligible infrastructures that support the more agile organisational structures help organisations to advantageously engage with sustainability (Autry et al. 2013; Roblek et al. 2014). Mohamed et al. (2009) list “knowledge management (KM), ICTs infrastructure, ICT capacity building, and ICT policy”, as important impact areas in holistic sustainable development (Mohamed et al. 2014, 272).

Several practical benefits of using IT in KM were mentioned by the literature and interviewed experts. First of all, IT will assist organisations in enhancing collaboration and sharing of knowledge. They can establish company-specific knowledge catalogues where employees can find already generated knowledge for their needs. This will save time and ultimately money since many problems that are already solved will not need to be tackled again (Chou 2011). This could help, for example, in research for product development or developing new guidelines for supply chain sustainability if the company already has experience in that. A knowledge network (Chou 2011), or Community of Practice, that is virtually facilitated, would bring workers together from areas where they have special expertise to solve problems and innovate. Databases, in turn, are tools that help in storing, sharing, and using of knowledge. Organisation will also be able to better share best practices, which helps to boost innovative thinking by “raising the bar”, and showcasing what has been done both internally and externally (Hariharan 2016). If the sharing is done transparently, it will help to create a culture where knowledge is openly shared for the benefit of the organisation, instead of individuals protecting their unique and good ideas.

Secondly, IT has a value proposition in reducing complexity and managing tasks (Purkis 2016; Sroufe 2016). Living information systems and software manage complex information for better reporting and decision-making or virtual communication and education where IT for KM can, for example, help build up employees’ competence in sustainability through e-learning. IT systems should allow companies to manage different things simultaneously, for example from the amount of waste produced to the turnover of the employees so that they actually know what the data is and what it says (Purkis 2016). An example is the consultancy Deloitte’s office building in Amsterdam that has highly sophisticated IT system that makes the building very sustainable and increases the productivity of the workers through smart systems that are connected to the building users’ mobile phones (Sroufe 2016).

To conclude, this kind of overall KM system would support the KM processes, which in turn improves the company’s ability to solve issues and as a result helps in developing competitive advantage (Chou 2011) and strategic sustainability.

3.2 State of the Practice of Knowledge Management for Strategic Sustainable Development

In the following section, we will discuss the results of the interviews with companies applying the FSSD. The people we talked to were in strategic decision-making positions

regarding sustainability and KM, so we were able to discuss the organisational practices of KM for sustainability. We realised that, although all of them consider knowledge to be an essential contributor to companies' competitive advantage, none of them is acquainted with, nor use the term 'knowledge management'. In general, they do not have a systematic approach to managing the knowledge about sustainability. Next, we will describe the practical application of the vision strategy, action plan, KM processes, organisational structure, culture and IT infrastructure in the interviewed companies.

3.2.1 Vision

Companies applying FSSD learn about the sustainability principles (SPs), that act as boundary conditions for a sustainable society, and define a vision that is bounded by them. With regards to KM, however, the companies we interviewed for this research do not think about the knowledge they will need in the future in order to fulfil that vision, meaning they do not have a clearly formulated KM vision. Besides, although they focus on training some of the staff on the sustainability challenge, the SPs and the application of the FSSD in order to be able to build the general sustainability vision, they do not think about how to systematically spread this knowledge throughout the organisation.

The companies we interviewed are in different stages in their sustainability journey and the difference could be seen in the strength of their main sustainability visions, as well as the understanding of the success level of the FSSD among the employees (as perceived by interviewees). The first organisation has a clear vision to be fully sustainable and they have identified four focus areas to work on to achieve their objectives. The understanding of the sustainability challenge, adopting a systems view of their operations and impacts, as well as defining sustainability by the SPs, encouraged them to increase their efforts and set higher sustainability goals. The second organisation is in the early stages of applying the FSSD and they are starting to understand the SPs and the use of the framework. They did not have a sustainability vision and since they have developed their sustainability vision for 2050, having the SPs as guidance has helped them in being more efficient in the prioritisation processes. The third company was first introduced to the FSSD in 2008 and has a very clear and ambitious vision to be the most sustainable company in the world within their industry.

However, when it comes to KM, none of the described organisations have any concrete definitions, goals or strategies to ensure that they will have the necessary knowledge to support their practices in the sustainability journey. They neither have a knowledge vision, nor do they think about the knowledge they need to achieve their organisational vision. They only focus on the knowledge they need currently at a given moment and often learn by doing.

Two of the interviewees clearly pointed out that not everyone in the company, including the management, understands what sustainability means. In order to fill that gap, many employees of one company have recently taken the online sustainability course from TNS to gain an understanding of the sustainability challenge. Now, according to the interviewee, they have a common language and can recognise why they engage in sustainability and why it is important.

In conclusion, the interviewed organisations do not have a vision for knowledge and do not think beyond the current knowledge needs. In terms of sustainability, they focus on having the necessary and sufficient knowledge to build their main sustainability vision, but it is not

disseminated equally across the organisation. This shows that companies are behind from the State of the Art Model we developed from what the literature and experts suggest.

Strategy

Regarding strategy, all the companies were in quite different stages, both in sustainability and in knowledge management. The level of knowledge strategicness varied depending on how far the companies were with their sustainability efforts, yet generally, the knowledge activities lagged behind in speed when compared to how much the companies were involved with sustainability. Overall, the companies were, or wanted to be, strategic about sustainability, but were not very strategic in related knowledge management development.

For one of the companies, having a vision and definition of sustainability has helped in strategically prioritising actions and investments. Another interviewee mentioned engaging employees in decision-making through discussions around the purpose and meaning of decisions. They saw this as a good thing from employee engagement perspective, but possibly a challenge from long-term sustainability and business perspective for difficult decision making.

Regarding KM strategy, none of the organisations reported having it formulated. For one company, the concept of knowledge management or organisational learning was new and hence they did not link these to overall strategy or considered creating specific ones. Instead, for them managing knowledge is simply part of general management about making the right decisions based on the right knowledge. When asked about how sustainability-related knowledge is put into practice, they stated that it is factored into strategic decision making. Another company said that managing knowledge strategically is still a developing area, and currently, the responsibility is shared between the human resources department and the sustainability department. The third organisation only aims to incorporate knowledge about sustainability into decision making so that they can invest in the most strategic way. However, they do not have a knowledge strategy and the interviewee found it very difficult to assess what kind of knowledge they need to develop in the process of working towards their organisational vision of 2050.

Additionally, whereas two of the companies considered it important to build the strategy of disseminating FSSD knowledge across the whole organisation, one of the interviewees stressed that not everyone needs the same knowledge level; after the basics, it is more strategic for responsible people to acquire relevant knowledge for their functions.

To summarise, none of the interviewed companies have developed knowledge management strategies for sustainability or related to their business functions. As a result, they do not ask prioritisation questions in regards to strategic knowledge development and they do not apply backcasting either. However, they are all aware that sustainability is a strategic issue and try to develop relevant knowledge to perform well in both business and sustainability even though in ad hoc manner.

Action Plan

As was stated above, while performing interviews, it became clear rather soon that the organisations are neither aware of knowledge management as a concept, nor have they developed a particular strategy for working with organisational knowledge. Having realised this, during the interviews we agreed not to raise the question of a specific knowledge plan as it was irrelevant and could be misinterpreted by the interviewees in a negative way. In order not to risk their trust, we avoided inquiring about the action plan in all three interviews. Semi-structured format of interview allowed us to do so without losing research validity.

3.2.2 Knowledge Management Processes

Create and Acquire

All the companies were proactive (although to varying degrees) in creating and acquiring knowledge and demonstrated the usage of a variety of tools. However, as was pointed out above, they were not particularly strategic about it. Capacity building was not addressed by any of the interviewees either, highlighting a gap between literature and practice. Additionally, the knowledge mapping activity suggested by the literature was not implemented by the interviewees, which point at another gap.

For one of the companies, learning about sustainability is a constant process, taken seriously, and one which involves many people in the organisation. The company uses a software for managing quality related knowledge, yet acknowledges that capturing and storing tacit knowledge of everyone in the company is rather impossible and needs to be balanced with what is productive to store and what is more convenient to leave tacit. The interviewee was unsure to what extent employees retrieve explicit knowledge or work with the tacit knowledge they possess.

The second interviewee said that they have recently started to engage with The Natural Step (TNS). This is in contrast to the one above who has collaborated with TNS for several years already. Due to the industrial requirements they have to fulfil, and the different kinds of knowledge needed for various job positions, knowledge acquisition is often done in the form of training. Their systems view is mostly brought into the company by the leader who also drives the sustainability efforts and is keen on constantly gaining new sustainability-related knowledge.

Similar to the previous company, the third interviewee said that a lot of the knowledge acquisition demand comes from various regulations that the company has to abide by. Additionally, they are ambitious about sustainability and have collaborated with TNS for some years already, collaboration being a major source of new knowledge. For external work related knowledge, they have identified resource pools where they can access knowledge.

Share

The three interviewed companies demonstrated solid awareness of the importance of sharing sustainability knowledge and necessity of adopting it according to the target audience. They demonstrated a rich arsenal of knowledge sharing tools, including those that are embedded in

the organisation's structure and thus have a standardised, often mandatory, nature. However, in terms of external knowledge sharing processes, only one organisation was engaged in them, whereas the other two only demonstrated a focus on internal knowledge sharing flows.

All the companies had a shared understanding that the disseminated knowledge has to be tailored to the recipient. When formulating a message, the interviewees mentioned that one needs to take into consideration, among other factors, the academic background, the knowledge topic, the subject and objective, the professional occupation, the position within an organisation, as well as the country of origin and cultural background for the global organisations. Regarding FSSD-related knowledge, in particular, two of the organisations stated a clear intention to share this knowledge across the whole organisation, whereas for the third one the feasibility of reaching this goal seemed extremely doubtful.

Moreover, all three interviewees pointed out at a variety of formal and semi-formal tools used for sharing sustainability knowledge with the rest of the organisation, such as regular in-person lectures to employees and top management board, basic and in-depth training on FSSD and ABCD, regular publishing of and sustainability reports.

Two of the organisations mentioned the use of intranet. Some other examples of formalised knowledge sharing channels are annual sustainability awards, application of the "cascading effect" as well as using cross-department project teams as a channel to introduce sustainability knowledge. At the same time, all three organisations acknowledged the process of "passing" knowledge from experts to others as a weak point and described it as a non-structured and not well thought through technique.

When it comes to external knowledge sharing, only one of the interviewed organisations used regular public affair events and direct dialogue to share knowledge with external stakeholders. Finally, in addition to formalised tools, the interviewed organisations also applied such mechanisms as informal knowledge sharing (through a novel and youtube videos), social media (Linkedin, facebook, twitter) and organising semi-formal meals and trips.

Use

All the companies touched similar topics around the use of sustainability knowledge. They all use it as part of the everyday work in all levels of the organisation. The decision making and prioritising processes were specifically highlighted as areas where the SPs and the holistic understanding of the system they operate in were taken into consideration. The organisational goals are also assessed against the system boundaries to make sure that the company is moving in the right direction towards a sustainable future. Everyone also agreed that the use of knowledge varies depending on the purpose and the level it is applied in.

Lastly, one of the organisations explained that they are developing processes to facilitate the replication of best practices inside the company, in order to use the existing knowledge in the most effective way. This company focuses quite a lot on the sustainable innovation of their products. Also, two of the companies have KPIs to track employees' performance in sustainability matters, which forces them to apply FSSD knowledge on the regular basis.

In summary, on one hand, the companies use sustainability knowledge in various aspects of their work and even encourage the use through more formal measurements. On the other hand, they do not have any of the formal methodologies that our KM Model suggests, to develop employee's knowledge application capacity and some of them do not actively think about motivating employees to use the KM systems and knowledge.

Evaluate

We asked the companies about the existence of any practices related to the assessment of current organisational knowledge, as well as KM performance evaluation methods, and in general, they have not implemented systems to evaluate knowledge. We talked about KPIs with two of the companies. One has KPIs for general operations and social sustainability-related issues, and the other one has several sustainability-related KPIs. However, they both acknowledged the need for more KPIs or other forms of measure for sustainability. As one of them (trying to explain the importance of sustainability measurements) stated: "you have to measure everything, otherwise you cannot say anything".

Regarding the usage of qualitative evaluation approaches, one of the organisations conducted surveys to assess the current sustainability knowledge level among their employees, but has not done any follow-up activities. Another company reported that most of their staff do not understand what sustainability means; however, this conclusion was made by an interviewee without applying any formalised evaluation process. This last company also has KPIs to reflect the state of required training and, keeps track of which training employees have gone through by using various methods of reporting and recording. However, they still do not have any formalised sustainability-related training that would be part of job requirements and serve to assess and improve baseline sustainability knowledge of all employees, although they acknowledge that there is a need to have them. One interviewee said they are evaluating the options for developing sustainability-related indicators, yet they already measure many environmental impacts such as greenhouse gas emissions.

In general, companies have evaluation and measurement procedures for overall business operations, but lack sets of developed specific knowledge and sustainability indicators to evaluate their current knowledge, as well as the KM performance that the model recommends. At the same time, they all agree that it is essential to measure them in order to estimate their progress and to continuously improve the current practices.

3.2.3 Organisational Structure

In the context of structure, the only unanimous view among the interviewees was that top leadership support is crucial for advancing sustainability efforts within a company. However, only in one of the companies was sustainability mostly driven by the top management, and in the other one, the motivation came from the owner. The latter was the only one with various people responsible for sustainability, from middle managers to the top.

The effect of structure on knowledge sharing was recognised by two of the companies, and one of them considered that they have a relatively flat structure (it should be recognised that this opinion is highly subjective and might not reflect reality).

Dedicated structures to sustainability varied, from established cross-functional sustainability committee to casual, individual responsibility of sustainability. Two of the companies considered it very valuable to have sustainability champions who would share sustainability-related knowledge and drives related initiatives. Only one of three companies explicitly stated that their knowledge activities belong to the HR function and that the sustainability team collaborates with them to ensure the right knowledge development.

In summary, the interviewees perspective on structure varied and it reflects the literature only in recognising the importance of top management engagement for sustainability to go forward, as well as the need for champions (from two companies only). In other words, there is a large gap between the State of the Art and the reality described by the interviewees.

3.2.4 Organisational Culture

Even though the companies are of different sizes and industries, and have engaged with sustainability for different periods of time, they all pointed out very similar characteristics when we asked them questions related to different aspects of organisational culture.

They all consider themselves innovative and problem-solving companies who are leading in their industries. The element they mentioned the most was the importance of top management engagement in sustainability progression. In two of the companies, both family owned, the interviewees stated that the commitment to engage in sustainability comes from above and that hence it is embedded in the DNA of the firm. In the case of the third company, the interviewed person, the plant manager, is committed and engaged to embed sustainability in his domain, but he does not have much support from his superiors. In the organisations where the owners and management are committed to sustainability, managers are open to advice and opinions from the staff who feel safe and encouraged to do so. The sustainability champions mentioned in the structure section were also seen as valuable to motivate and engage employees. Another factor that helps to involve employees is to make the sustainability challenge and related issues as relevant as possible for the individuals, linking those issues to everyday work or life. Two of the interviewees underlined the importance of having a common understanding of the reason why they engage in sustainability throughout the organisation.

All companies believe in human capital and invest time and money in training their staff because they believe that the best ideas and results come from them. Professional expertise is seen as a crucial aspect of the company by everyone and they try to retain the staff they train. They also focus on creating an appropriate environment for the employees to feel trusted and comfortable to participate. Good and direct communication is believed to be a key for success by one of the companies, whether it is in a formal or informal setting. As examples, one of the companies sends the global sustainability manager to the international sites to see how their employees are doing and to meet the people in person; and another company focuses on team building dynamics in their budget meetings in an island where they stay overnight.

They also look for participation outside the company's boundaries. One of the companies is trying to engage with society and the value and supply chains to collaborate within the path to sustainability. Another company has worked with students from two different universities to learn about different sustainability issues and practices, creating a win-win type of

collaboration. Looking at more formal ways of changing the employees' behaviour, a company explained that they have different KPIs related to sustainability.

To summarise, there are many commonalities in the way the interviewees describe the desired cultural characteristics, which agree with the literature and experts' view. They all agreed on the importance of top management commitment, employee engagement, good communication, participation, training, retaining talent, ensuring a safe working space, and having a common understanding of the reason why they engage in sustainability. However, according to the interviewees' responses, they do not comply with all the desired facts yet.

3.2.5 IT Infrastructure

When discussing the role of IT in knowledge management and sustainability, it became evident that the companies' reality is quite different from the literature. None of the interviewees spoke about using IT for supporting flatter organisational structures, for sharing best case practices (except one company who uses IT for storing and sharing specific aspects of their product innovation), for knowledge catalogues, or to productively organise tacit knowledge for transferring to others.

Generally speaking, the interviewed companies use IT for different kind of purposes, ranging from knowledge storing and sharing to performance tracking, and for reporting purposes. Two companies also use technology for sustainability education purposes (TNS e-learning programme). One said to use IT for quality management, and one to access their partner's knowledge resources. One interviewee talked about the plan to start tracking sustainability performance as well.

IT was neither regarded as a supporting tool for knowledge management nor was its use approached strategically by the organisations. Therefore, it can be concluded that there was a relatively large gap between the State of the Art model and the reality of the interviewed companies

3.2.6 The State of the Art Model and The State of the Practice comparison

In this final stage of the results, we compared the State of the Art Model, created from merging the literature on KM and the FSSD with the experts' inputs, with the current KM practices of companies applying the FSSD. With the aim to provide an answer to the main research question and define the role of knowledge management in business organisations applying the FSSD, we assessed whether the organisations are following any of the recommended practices in their everyday operations.

Table 3.2 Comparison of the State of the Art and Practice of KM for SSD

Comparison of the State of the Art and Practice of KM for SSD		
Element	State of the Art KM for SSD Model	Companies applying FSSD
Vision	<ul style="list-style-type: none"> - serves as a central guiding component for learning and supporting the main vision - contains a clear learning purpose and a reachable envisioned future description, including shared knowledge on FSSD 	<p style="text-align: center;"><i>With regards to SSD</i></p> <ul style="list-style-type: none"> - aim to create a common understanding of the organisation's purpose and vision - general sustainability vision gives guidance
		<p style="text-align: center;"><i>With regards to KM</i></p> <ul style="list-style-type: none"> - no KM vision, only focused on current knowledge needs - no shared understanding of the organisation's main vision, definition of sustainability and the FSSD in general within the company
Strategy	<ul style="list-style-type: none"> - supports overall business strategy - includes learning objectives with sustainability focus, backcasting, prioritisation process 	<p style="text-align: center;"><i>With regards to SSD</i></p> <ul style="list-style-type: none"> - integrate sustainability into decision making: having the right knowledge to make the right decisions - balance between business and sustainability performance
		<p style="text-align: center;"><i>With regards to KM</i></p> <ul style="list-style-type: none"> - no specific KM strategy, part of general business strategy. - developing strategic knowledge management
Action Plan	<ul style="list-style-type: none"> - a roadmap to organisation's KM vision that includes a vision itself, strategic learning goals, concrete actions' descriptions and answers to prioritisation questions 	<ul style="list-style-type: none"> - no action plan (assumption made based on interviewees' responses)
KM process: Create & Acquire	<ul style="list-style-type: none"> - requires a proper context encouraging creativity, interpretation, adoption of each other's ideas and meaning making by taking a holistic view on the organisation - the final goal of building employees' capacity for engaging in sustainability - applying concrete knowledge creation & acquisition tools 	<ul style="list-style-type: none"> - no explicit encouragement for adopting others' ideas - two interviewees attempt to create organisational context encouraging systems view, and one meaning-making explicitly - being proactive, but not strategic - no reference to capacity building - having various methods and tools for acquiring and creating knowledge
KM process: Share	<ul style="list-style-type: none"> - adapting content and amount of sustainability-related knowledge depending on receiver and with intention to encourage dialogue, questions, ideas and replications of improvements - establishing simple and standardised knowledge sharing practices - share sustainability knowledge with "coopetitors" 	<ul style="list-style-type: none"> - adapting content and amount of sustainability-related knowledge depending on receiver - having different (both formal and informal) and often standardised tools and ways for knowledge sharing (yet no communities of practice or expert networks) - only one of the three shared knowledge externally, but not directly to "coopetitors"

	- applying diverse knowledge sharing tools (e.g. virtual portals, communities of practice)	
KM process: Use	- formal methodology should be applied for gradual development of employees' knowledge application capacity - build motivation to use existing knowledge	- no formal methodology used for developing employees' sustainability knowledge application capacity - one company was developing ways to encourage usage of best existing knowledge
KM process: Evaluate	- baseline assessment of currently possessed knowledge - knowledge management performance evaluation using numeric, including financial, and qualitative measurements which would motivate and filter	<i>With regards to SSD</i> - use of KPIs for general operations and some sustainability related aspects - believe that there is a need to evaluate
		<i>With regards to KM</i> - no general knowledge evaluation systems - no assessment of current sustainability knowledge
Structure	- flatter structure with less hierarchies and divisions - commonly shared boundaries and conditions - strong leadership in sustainability knowledge adoption - sustainability knowledge champions - establish cross-functional project teams or task groups	- shared view that strong leadership is needed for sustainability knowledge development - only one company considered having a fairly flat structure, yet the interviewee was not sure if knowledge barriers existed - two companies recognised the importance of knowledge/sustainability champions - one company had special cross-functional sustainability team
Culture	- clearly manifests "why" and "how" of learning and embraces sharing and replicating values. - engagement of top management; openness to new ideas and change - employee engagement: belief in everyone's potential and safe environment for participation - talent creation and retention - celebrate success; openness and transparency; acceptance of mistakes	- only one interviewee emphasised the "why" and "how" of sustainability learning in their company - varying levels of openness from top management for new ideas - clear understanding of the top management's importance on sustainable development. - when commitment from the top, culture becomes more welcoming and safe for feedback and improvements - strong belief in employees' potential - no explicit encouragement towards accepting mistakes
IT Infrastructure	- ICT being an important enabler of all KMS elements - A variety of applications useful for supporting and improving KM for SSD	- no use of IT to support flat structures, knowledge catalogues, artificial intelligence Tacit knowledge organisation - IT for non-strategic knowledge storing and sharing, performance tracking, reporting, quality management, access of partners' knowledge resources - potentially, for tracking sustainability performance

The interpretation of results presented in this section can be found in the following chapter.

4 Discussion

Corporations are seen as potential key players in strategic sustainable development, yet they lack the necessary knowledge to tackle the issue in a proactive and strategic way. The FSSD was designed to strategic plan for sustainability and has proved to be very useful for organisations. With our research, we aim to find the role of KM in companies applying the FSSD, as a potential support for better integrating sustainability into the core of the business and its practices. For doing that, we developed the following research questions:

Main Research Question (MRQ):

What is the role of Knowledge Management in business organisations that apply FSSD in practice?

Supporting Research Questions (SRQ):

- 1. What is the State of Art of Knowledge Management for Strategic Sustainable Development?*
- 2. What is the State of Practice of Knowledge Management in business organisations applying FSSD in comparison with the State of Art?*

4.1 State of the Art of Knowledge management for SSD

The State of the Art Knowledge Management, with merged results from both literature and the interviewed experts, presented both surprises and expected arguments. The literature's and the experts' views aligned the most in regards to culture and IT infrastructure for knowledge management. It differed mostly in KM processes. One of the key things that the results seem to tell us is that the work on classification and definition of many KM concepts by researchers has not translated pragmatically into the use of the experts and practitioners. Another realisation that emerged highlighted the challenge of communicating the value of KM, from theoretical concepts into practice. Next, we will discuss some of the commonalities and differences more in depth.

Generally speaking, the cruciality of having a vision was shared by the literature and the experts. Especially those experts who are used to FSSD (3/5 of the interviewees), underlined the importance of vision, especially in the context of sustainability and its shared understanding. This is probably because vision is a fundamental component of FSSD.

The finding that both researchers and the experts agreed on the importance of KM strategy was not surprising. This might again be due to the strategy being a large part of FSSD. Interestingly, backcasting was not recognised by KM literature but stressed by the experts which could be because of the expert's' background in FSSD. Similarly, the experts supporting employee engagement more than KM literature might speak about their practical experiences as managers or management consultants in witnessing positive results of employee engagement.

Within KM processes, experts did not mention learning events and "communities of practice". The reason for this might be a practical business setting where there is not enough time to spend such an effort solely on learning preparation and analysis. The terms may seem too abstract and not provide any direct financial value that could be measured, and hence are

uncommon for the experts. Capacity building, supported by the experts yet absent in KM literature, might reflect the applicability and potential impact of knowledge creation and acquisition (especially in the context of sustainability) being more important to experts than simply describing what these terms are. Sustainable development does not happen without conscious effort, and probably that is why the experts valued individuals' capacity to act on the theoretical terms of knowledge acquisition and creation.

Tailoring knowledge sharing according to the receiver was one of few commonalities showing interviewees' understanding that employees have their individual tasks and performance metrics requiring different knowledge. In terms of differences, the experts did not talk about the idea of sharing knowledge to 'coopetitors'. This is probably because it might be very difficult to assess the extent of another company's competitive threat and partnership benefit. This might become much debated topic in the future when the ethics of sustainability, suggesting maximum sharing, contradict with the increasing competitive advantage that many companies see sustainability offering.

In using knowledge, an interesting difference was in experts valuing 'learning by doing' yet literature not mentioning this. One might think 'learning by doing' might be difficult to define, and definition is important in academia. In terms of commonalities, building motivation for using existing knowledge was an interesting yet paradoxical one. Paradoxical, because, based on our personal experience, in modern western management cultures, representing ⅔ of our interviewees' work contexts, individualism and individual innovativeness seem to be encouraged over the usage of others' ideas. From a sustainability standpoint, it sounds entirely practical to share the best case practices in order to scale the successful sustainability activities.

As companies assess and communicate value through metrics and indicators, it was surprising that knowledge evaluation and measurement is not explored further in literature than where it stands now. Besides, there were noticeable differences in how experts perceived and understood knowledge evaluation. This emphasises the wide range of existing options to approach the topic. Therefore, we believe that these findings support our argument of merging the FSSD's baseline analysis method into knowledge management for strategic sustainable development.

In the context of structure, it surprised us that the experts did not mention flatter structures supporting KM for sustainability. In literature, however, this was a fairly agreed argument. We thought that the experts have perhaps not witnessed many organisations with flat structures as it is quite a new concept; besides they must be aware that changing an organisational structure takes a lot of time. In contrary, the experts stressed the need for strong leadership in spreading sustainability knowledge and efforts. This was surprising because they have simultaneously supported the notion of participatory environments, something that may sound conflicting with strong leadership. However, we realise that these are not necessarily mutually exclusive, since a strong leader can also inspire the adoption of sustainability while encouraging the involvement and participation of employees. Collectively, however, we have been convinced by the research on the structure and the experts' perspectives that structure should definitely be taken into account when crafting a state of art KM for strategic sustainable development.

In terms of culture, literature and experts were mostly unified in the importance for productive KM for sustainable development. This might be because the effects of culture on

overall productiveness are possibly recognised in the working areas of the experts. FSSD does not explicitly talk about culture, but the literature and the experts' perspectives confirm that culture is a fundamental element to consider when designing a knowledge management strategy for strategic sustainable development.

Similar to culture, the views on IT infrastructure were very similar, which was not surprising. IT is seen as an enabler of KM processes by both the academics and the experts, and hence companies should approach the investments to IT strategically and not consider it having only inherent value. Hence we believe that the role of IT is to make matters easier and reduce complexity (also supported by some of the experts) that sustainability may bring. IT plays an important role in KM for SSD and hence should be taken seriously, yet strategically.

4.2 State of the Practice of Knowledge management in FSSD organisations

Due to the fact that the field of knowledge management was rather new for us, we did not have any particular expectations or predictions concerning the degree to which KM is operationalised in the interviewed companies. However, very early in the process of interviewing the organisations, we came to realise that the interviewees were not aware of the concept nor did they relate any of their practices and operations to it. This significant difference between existing theoretical knowledge and its practical applications was somewhat surprising to all of us. Consequently, we avoided asking direct specific questions regarding knowledge management to the best of our skills and tried to identify the presence of KM elements that were unconsciously implemented by the organisations.

As companies did not consider knowledge management as a separate focus area, it was not surprising that they lacked the KM vision and strategy, as well as the action plan. Nevertheless, it is important to note they seem to have the necessary foundations for KM implementation. There is a shared intention of all organisations to spread basic FSSD knowledge throughout the whole organisation and reach out for the majority of employees to share the overall vision, and all the companies have developed their sustainability strategies. We find it interesting that although the pitfalls in organisational knowledge are quite obvious and knowledge is clearly recognised as a crucial asset, companies do not address them by using elements from FSSD (including backcasting and prioritisation process).

Regarding the knowledge-related processes, the findings reflected the state of the art features. Both knowledge creation and sharing processes proved to be quite developed in the companies' practices as well as literature, although did not explicitly focus on sustainability and were not very structured and strategy-oriented. Being proactive, yet not strategic, on acquiring and sharing knowledge reminds us of the way organisations often approach sustainability. However, such approach is hard to justify in times when complexity is widely acknowledged to be present in all spheres of society. In terms of sharing practices, the finding that the interviewees were not acquainted with the terms "coopetitor" and "capacity building" was rather predictable, yet troubling as it pointed out at more examples of potentially useful theory not being introduced into practice.

Concerning the use of knowledge, the fact that neither theory nor practice take it much into consideration is a worrying signal for us. Since knowledge gains value only if it is applied, we find it extremely important that theorists, practitioners, and managers address the issue as

soon as possible. Finally, the lack of well-established theoretical methodologies to address knowledge evaluation influences the practical sphere that depends on scientific developments. As the interviewed companies clearly proclaimed the need for more relevant metrics and KPIs, we believe that this is an important area for the KM researchers to focus on.

We identified a clear distinction between foci made in literature and experts and the interviewees from companies, in relation to the KM elements of culture, structure and IT infrastructure, opening a vast room for further discussion. Moreover, we observed that, instead of taking an overview on the underlying principles of organisational functioning, the interviewees emphasised the engagement of top leadership as the most crucial starting point for any initiatives, including KM. This last finding raises a lot of questions on the actual current status and power of corporate leaders. Possibly it illuminates an important tipping point of organisational transformation. The role of leaders and their decisions, as well as the factors that influence them, can be a fruitful area to step into for future knowledge management research. In addition, looking at the position of the global sustainability manager and the power it has in relation to the overall business operations, we believe that such job should be at a strategic level. We have argued that sustainability should be integrated into the business strategies, thus we find it crucial to reflect this understanding in the company's structure by having sustainability managers in strategic positions. Furthermore, we realised that the two companies with top management commitment are family owned. There is not enough evidence to draw a conclusion, but there could be a relation with the fact that family owned companies might be more interested in the long-term existence than those who must focus on short terms profits in order to comply with the shareholder demands.

Overall, knowledge management in the interviewed organisations is neither considered to be a priority nor implemented in its fullest potential. Discussion on the possible reasons of knowledge management being in such a stance, as well as suggestions on how these could be addressed, is provided in the next paragraph.

4.3 Role of Knowledge Management in organisations that apply FSSD

The comparisons and analyses of answers to the SRQ 1 and SRQ 2 concluded that currently companies applying FSSD do not have any structured system to manage their knowledge in general, and sustainability knowledge in particular. They do possess certain KM elements that we have described in the model, but not having a structured and strategic approach results in single practices, unable to utilise their full potential. As was mentioned above, although we did not expect any particular methods of KM in the companies, we were rather surprised by the limited knowledge and acquaintance of the interviewees with the concept. All sources (literature, experts, and companies) affirmed the value of knowledge in business performance and, according to the analysis for the State of the Art Model, from a knowledge-based view of companies, knowledge is the main factor of competitive advantage in firms. Therefore, it was unprecedented to see that current company practices do not reflect the theory. We have stated that the poor presence of KM processes might be the result of the lack of awareness about the existence of KM and the benefits that it can potentially offer. At the same time, it remains unclear who is "responsible" for raising organisational awareness and whether apparent concept's obscurity questions its overall usefulness. As a result, we have

concluded that the current role of KM in companies applying the FSSD is very limited, almost non-existence, in comparison to what it could have been if it were applied in its entirety.

Throughout the report we have discussed that knowledge and KM can serve as leverage points in sustainability and business matters, as it helps organisations to understand and manage the complexity of the current situation, as well as the information and competencies needed to navigate it. We have witnessed in the interviewed organisations that it is a challenging and long process to make everyone in the company aware and knowledgeable about the sustainability challenge and the role of the organisation in moving society towards a sustainable future. It is a transformational process for the company, where they have developed a vision of necessary knowledge and skills bounded by the sustainability principles and it requires changing the mind-set and learning to do business accordingly in the organisational level. If implemented during this process, KM would ensure that the organisation possesses the necessary knowledge to go through all the steps, by providing a clear vision and identifying the processes and enablers that will facilitate the right and efficient use of information and knowledge related to sustainability and FSSD in particular.

We have also emphasized the key role of corporations in sustainable development. The power, influence, and reach of companies in the global society is immense, which means that changing the business environment into more sustainable endeavours will create huge positive impacts in society and the environment. According to our research, even when companies applying FSSD gain a clear understanding of what sustainability means, they still do not have any comprehensible instructions to guide them in the process of integrating this knowledge. As applying FSSD first of all implies a great amount of knowledge to be embedded throughout the whole organisation, developing a holistic knowledge management strategy can be a rational first step when rolling out this initiative. Therefore, the definition of sustainability and the strategic guidelines offered by the FSSD, combined with a strategic KM system, will provide organisations the clarity and tools they need to move strategically towards sustainability.

The urgency of the sustainability challenge requires the whole society to change course as fast, and in the most efficient way, possible. Companies are an essential aspect of such change. It is crucial that they stop the “business as usual” practices and strategically engage in sustainable alternatives, to both cut the negative environmental and social impacts and start creating positive change. Moreover, a systemic view is vital to be proactive and not to only focus on solving specific problems in specific subsystems. The same perspective should be used for companies, complex systems that operate in bigger systems. Having a proper well-established and overarching KM system with a vision that supports the company’s overall sustainability vision will ensure that the organisation stays within the system boundaries and that it always has the right knowledge in the right places to be as efficient as possible.

4.4 Validity

Our research in phase I-A, aimed at the development of a generic KM for SSD model, is well-grounded in peer-reviewed literature. However, it is important to note that some of the elements included in the model are supported by a bigger number of articles than others. One of the reasons behind it is the time constraints of the project. Besides, whereas certain elements were thoroughly explored by science, areas like knowledge usage and evaluation are relatively new and lack significant input from researchers. Although this does not

necessarily lessen the validity of the above-stated points, the findings might not reflect the state of the art of the mentioned model elements. The validity of phase I-B could be reinforced by including more perspectives of professionals working directly with knowledge management.

With respect to state II of the research, one aspect that may detract the credibility of our findings is the fact that we only interviewed one person per company. This means that many of our conclusions about these organisations are based only on one representative's opinion. However, they all occupy high management level positions and have worked for many years in their companies, and therefore we assume they have a fairly holistic understanding of the organisations' reality. For future research, it would be interesting and beneficial to interview people in different positions, as well as examine policy documents related to KM in order to gain a more thorough understanding of the role and potential of KM in the target companies.

One of the potential credibility challenges we have is the small sample size of three companies. The strength is that they represented different company sizes and different industries, allowing a certain degree of generalisability. However, this does not outweigh the need for future research that covers either a wider scope of companies in different industries or targets a specific industry with a bigger sample size.

4.5 Future research

Throughout the research, a number of future research areas were identified during the findings at different research stages and the team discussions around them.

KM for sustainability and practical implications of KM in organisations: In our view, these are the two most obvious fields to look into, as there is a general lack of empirical research. As it was mentioned above, sustainability is an essential but relatively new sphere which introduces a lot of new knowledge and increases the complexity of internal operations. Knowledge management seems to have a lot of potential to assist corporations in dealing with this complexity with a set of long developed tools and methodologies. For this, one option would be to make a case study in organisations that have developed a thorough internal knowledge management system. Exploring how KM initiatives are introduced over time, how theory is applied in practice, and other related aspects can establish the link between science and practice and thus, enhance the role of KM in organisations' transition towards sustainability.

Sustainability related knowledge sharing: when analysing the knowledge sharing between organisations, and especially when we came across the figure of "coopetitors", we were faced with a dilemma. Knowledge is considered as the most important and valuable element for competitive advantage, so it is understandable if companies will not be willing to share it with the competitors. According to logic, they will only share with cooperators, where there is a win-win situation. However, we may also consider that sustainability-related knowledge should be treated differently because of its benefits for society. One could even state that sharing such knowledge is a moral obligation, as the private use may hold up the necessary global changes we need to face the sustainability challenge. Future research could further develop this discussion by looking at the balance between the overall good and the businesses' competitive advantage.

Sustainability knowledge evaluation. Measuring and evaluating practices are very common in the business environment, yet they are very little developed in KM activities, both in the state of the art and the state of the practice. During the KM process, it is essential to measure the current organisational knowledge and the KM performance in order to keep improving the practices. KM evaluation can serve as KM value creator, thus, we think that research should be done in this field to provide organisations with the right methods of measurement and evaluation.

Capacity building in organisations: This theoretical concept is widely discussed in the literature and most experts built up on it. Still, none of the companies seem to use it. If we make an analogy to our own research, it might be interesting to analyse the reasons behind the lack of capacity building terminology and practice in organisations, regarding the value that it might bring them.

Sustainability knowledge use. The lack of thorough research in knowledge use has been stated in the discussion. We believe that there is further research needed around the process of knowledge use, as it is where the value of knowledge becomes tangible. Guidelines on how to best use the knowledge or ensure that it is used will be valuable for organisations in making their operations and strategies more sustainable.

5 Conclusion

In this thesis, we explored the role of knowledge management (KM) in companies that apply the Framework for Strategic Sustainable Development (FSSD). To do this, we developed a thorough understanding of what knowledge management is in general, how it applies to sustainable development, and how do the knowledge management and sustainability experts see it. We based our understanding of academic literature about knowledge management, knowledge management for sustainability, and on the views of experts who we interviewed.

For our research, we targeted business organisations because of their contribution to the sustainability challenge. When organisations engage with sustainability, the overall complexity they have to manage increases because they also need to consider social and environmental complexity, in addition to the complexity of the market. Integrating sustainability into business strategy is a well-recognised way for organisations to strategically move towards sustainability while still maintaining their business objectives.

According to the knowledge-based view, knowledge is the key element for competitive advantage in companies. Knowledge management is identified as a tool that can help organisations to manage their knowledge resources to integrate sustainability into their business strategies and improve their business performance. Managing knowledge strategically can help to better navigate the increased overall complexity. Merging the FSSD, which is a framework designed for organisations to strategically move towards sustainability, and the best practices of general knowledge management, could help organisations that integrate sustainability into their business strategies.

First, we conducted a thorough literature review to understand the current state of KM as well as the FSSD. This helped us to identify the most crucial theoretical elements for KM for strategic sustainable development (SSD). Secondly, we interviewed both KM and FSSD experts to understand their perspective of the practical considerations for KM for SSD. Thirdly, we compared the findings of the literature to the views of the experts and, by merging the most mentioned theoretical and practical considerations, we developed the State of the Art KM for SSD model. Fourth, we interviewed organisations that apply FSSD to understand the State of Practice of KM for SSD in these organisations. Finally, we compared the State of Practice with the State of the Art KM for SSD to analyse the gap between reality and ideal KM for SSD.

The results reveal a large gap between companies' KM practices and what the ideal model suggests. The interviewed companies are proactive about knowledge and fragmentarily apply certain KM elements in their practices. Yet, their general approach to KM is not strategic.

In terms of strategic progress towards sustainability, our State of the Art model suggests that the companies could do a lot more from KM perspective to drive sustainability and hence decrease their contributions to the sustainability challenge. The key recommendations would be to develop knowledge vision that is aligned/designed to meet the knowledge needs of their organisational and sustainability visions. Additionally, they should create a KM strategy by using the backcasting process, to ensure the selection of the most strategic knowledge development activities.

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Interviewees

Experts

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Companies

Borgeryd, Anna. Interview by Rita Aldabaldetrekü, Juuso Lautiainen, and Alina Minkova. phone call. Karlskrona, April 21 and 22, 2016.

Kullberg, Claes. Interview by Rita Aldabaldetrekü, Juuso Lautiainen, and Alina Minkova. phone call. Karlskrona, April 14, 2016.

Nordin, Ingela. Interview by Rita Aldabaldetrekü, Juuso Lautiainen, and Alina Minkova. Skype call. Karlskrona, April 20, 2016.

Appendix A

According to Nonaka's model (SECI) (Kostopoulos 2010; Hoon Song 2011), knowledge creation occurs in four interrelated modes:

- *Socialisation*: converting tacit knowledge of some individuals into tacit knowledge of others which happens by going over shared experiences through observation, imitation, and informal meetings. It results into the establishment of shared mental models, creative dialogue, and mutual trust.
- *Externalisation*: expressing tacit knowledge into explicit through formal meetings and collaborative work assignments focusing on using language, symbols, metaphors, and analogies to foster collaborative dialogue. It results into documenting skills and codifying information gained in everyday experience. Moreover, while externalising knowledge it is extremely important to have a vision to anchor the created knowledge.
- *Combination*: turning explicit knowledge into more complex bits of explicit knowledge to create a systematic representation of knowledge. Middle managers and computerised databases serve as a medium for this process. The main role of managers is to constantly link and evaluate the knowledge being created with regards to vision, objectives, strategy and organisational' performance, whereas technology facilitates it.
- *Internalisation*: transforming explicit knowledge into tacit through experiential learning, i.e. learning by doing, simulations, or reflecting on and experimenting with created explicit knowledge. The tacit knowledge gained at this stage can start a new loop of knowledge creation.

Appendix B

The table below provides a summary of the main features of each element of both KM for SSD Model versions. The second column contains the description of the element derived from knowledge management and/or SSD literature, whereas the third mentions features that were added after interview analysis. Following the comparing part of each element there is a section that presents the summarised characteristics of the State of the Art model element. Squares where a certain characteristic falls into both second and third columns signify that it was both mentioned in the literature and touched upon by the experts.

Generic KM for SSD Model		
Element	Generic KM for SSD model	Experts
Vision	<ul style="list-style-type: none"> - in line with the organisation's overall vision - contains envisioned statement for future knowledge - provides guidance and direction 	
	<ul style="list-style-type: none"> - the most crucial component - applied to management processes 	<ul style="list-style-type: none"> - states a clear purpose for knowledge - minimum knowledge of FSSD across the organisation should be part of the vision - facilitates the understanding and sharing of the sustainability vision - KM avoids unrealistic sustainability visions by raising awareness about current sustainability knowledge
State of the Art KM Vision		
<ul style="list-style-type: none"> - serves as a central guiding component for learning and supporting the main (organisational) vision - contains a clear learning purpose and a reachable envisioned future description, including shared knowledge of FSSD 		
Strategy	<ul style="list-style-type: none"> - includes backcasting - geared to business strategy - relevant learning objectives 	
	<ul style="list-style-type: none"> - integral part of business strategy - includes prioritisation process - communicate objectives at recruitment stage 	<ul style="list-style-type: none"> - employees should be involved in goal setting - employees should be engaged to achieve goals through metrics - sustainability should be present and touched upon in learning objectives
State of the Art KM Strategy		
<ul style="list-style-type: none"> - supports overall business strategy - includes learning objectives with sustainability focus, backcasting, prioritisation process 		
Action Plan	<ul style="list-style-type: none"> - serves as a roadmap - includes a vision, strategic goals, concrete actions' descriptions, answers to prioritisation questions 	<ul style="list-style-type: none"> - points were not validated by expert interviews (for more explanation please refer to section 3.2.1)
State of the Art KM Action Plan		
<ul style="list-style-type: none"> - a roadmap to organisation's KM vision that includes a vision itself, strategic learning goals, concrete actions' descriptions and answers to prioritisation questions 		

KM Processes: Create & Acquire	- proper context encouraging information interpretation and meaning-making; the context is created by taking a holistic view on the organisation	
	- in-house knowledge creation & applying external sources - direct observation followed by analysis - diverse “communities of experts” - sustainability “knowledge mapping” - SECI for sustainability knowledge creation	- the context should harness creativity and encourage adoption of the ideas of others - building capacity - various tools: best practices, cascading effect, “bottom up-inside out” approach, sustainability knowledge database
State of the Art Create & Acquire Knowledge process		
- requires a proper context encouraging creativity, interpretation, adoption of each other's ideas and meaning making by taking a holistic view on the organisation - the final goal of building employees' capacity for engaging in sustainability - applying concrete knowledge creation & acquisition tools		
KM Processes: Share	- distinction between individual, tailored and “mass market” knowledge - well-established, simple and standardised knowledge sharing practices - proper amounts and relevant themes of information - tools: communities of practice, virtual portals	
	- sharing sustainability knowledge with “coopetitors” - tools: virtual profile pages, software, communities of interest, cross-functional teams, communication information technologies, corporate university	- intended to encourage dialogue, questions, ideas as well as replications of improvements - tools: open source developments
State of the Art Share Knowledge process		
- adapting content and amount of sustainability-related knowledge depending on receiver and with intention to encourage dialogue, questions, ideas and replications of improvements - establishing simple and standardised knowledge sharing practices - share sustainability knowledge with “coopetitors” - applying diverse knowledge sharing tools (e.g. virtual portals, communities of practice)		
KM Processes: Use	- knowledge application as a major source of competitive advantage - formal methodology for gradual development of knowledge application capacity	
	- four factors determining motivation to use KMS knowledge: quality and ease of using, quality of content, networking ability, innovative culture	- lack of ability to use knowledge as a major challenge for companies - using knowledge existing in organisation - learning happens by doing
State of the Art Use Knowledge process		
- formal methodology should be applied for gradual development of employees' knowledge application capacity - build motivation to use existing knowledge		
KM Processes: Evaluate	- baseline assessment of currently possessed knowledge - evaluation of knowledge management performance using both numeric and qualitative measurements	
	- developments in KMP measurements field	- creates feasible motivators and information filters - there are always different levels of sustainability knowledge within organisation - absence of measurement methods

State of the Art Evaluate Knowledge process		
<ul style="list-style-type: none"> - baseline assessment of currently possessed knowledge - knowledge management performance evaluation using numeric, including financial, and qualitative measurements which would motivate and filter KM initiatives 		
Organisational Structure	<ul style="list-style-type: none"> - flatter structure with less hierarchies and divisions - commonly shared and understood boundaries and conditions - cross-functional project teams or task groups 	<ul style="list-style-type: none"> - crucial role of leadership in sustainability knowledge adoption - sustainability knowledge champions in either informal or formal structure - bonuses and employee rewards
State of the Art Organisational Structure		
<ul style="list-style-type: none"> - flatter structure with less hierarchies and divisions - commonly shared boundaries and conditions - strong leadership in sustainability knowledge adoption - sustainability knowledge champions - establish cross-functional project teams or task groups 		
Organisational Culture	<ul style="list-style-type: none"> - clearly manifests “why” and “how” of learning - engagement of management; openness to new ideas and change - employee engagement created by: belief in everyone’s potential and a safe environment for participation - valuing, creating and retaining talent - celebrate success - openness and transparency, acceptance of mistakes 	
	<ul style="list-style-type: none"> - good communication with frequent dialogues 	<ul style="list-style-type: none"> - developing a culture should be perceived as a long transformative journey - strong sharing, copying and replicating values - engaging supply and value chain in culture transformation
State of the Art Organisational Culture		
<ul style="list-style-type: none"> - clearly manifests “why” and “how” of learning and embraces sharing and replicating values. - engagement of top management; openness to new ideas and change - employee engagement and empowerment: belief in everyone’s potential and safe environment for participation - talent creation and retention - celebrate success; openness and transparency; acceptance of mistakes, failure and risk-taking, trust, communications, rewards. 		
IT Infrastructure	<ul style="list-style-type: none"> - Concrete applications: sharing best practices through knowledge catalogues, knowledge networks, virtual communities of practice, sustainability knowledge databases and many other 	
	<ul style="list-style-type: none"> - Information and Communication technologies enable and enhance all the rest of the KM elements - Technologies examples are: intranets, extranets, groupware, intelligent databases, document systems, workflow software, knowledge-based systems 	<ul style="list-style-type: none"> - IT as a valuable enabler of sharing, communication and dealing with complexity - E-learning being a valuable tool for KM for SSD - IT should serve KM, not vice-versa
State of the Art IT Infrastructure		
<ul style="list-style-type: none"> - ICT being an important enabler of all KMS elements - A variety of applications useful for supporting and improving KM for SSD 		



Master's Programme in Strategic Leadership towards Sustainability
Blekinge Institute of Technology, Campus Gräsvik
SE-371 79 Karlskrona, Sweden

Telephone: +46 455-38 50 00
Fax: +46 455-38 55 07
E-mail: sustainabilitymasters@bth.se