Organizational Learning for the Development of Sustainability Culture in Life Science Organizations in Oresund Region

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Main Field of Study: Leadership and Organisation
Degree of Master of Arts (60 credits) with a Major in Leadership and Organisation
Master Thesis with a focus on Leadership and Organisation for Sustainability (OL646E), 15 credits
Fall 2019
Supervisor: Jonas Lundsten, (PhD)
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Abstract

This research sought to understand the role of organizational learning and the experience of the use of organizational learning for the development of a sustainability culture in life science companies. Therefore, the study utilized a phenomenological qualitative approach to find out the perspectives of life science companies and life science non-governmental organizations (NGOs) about the subject matter. Furthermore, this study was exploratory and inductive and used a combination of research methods (triangulation). It was found that organizational learning creates sustainability awareness and engagement which contributes to the development of sustainability culture. This in turn would lead to the organization becoming a learning organization that focuses on sustainability. Government policies, quality management systems and internal standards serve as factors that create awareness of sustainability issues and encourage life science small-medium enterprises (SMEs) to continuously engage in sustainability business practices. It was found that various learning methods can be used internally and externally to learn about sustainability. However it is important that learning that is done externally or on an individual level be shared with the organization in a group or organizational level. The study acknowledged a heightened awareness for more sustainability focused practices within the operations of life science companies, however the financial constraints negatively influence how they prioritize their actions. It also identified how collaborations with life sciences NGOs help facilitate the implementation of a long-term sustainability vision and strategies into life science companies.

Keywords: organizational learning, organizational culture, sustainability culture, learning organization
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<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
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<tr>
<td>CIPD</td>
<td>Chartered Institute of Personnel and Development</td>
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<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<td>ICH</td>
<td>The International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use</td>
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<td>ISO</td>
<td>International Organization for Standardardization</td>
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<tr>
<td>EPA</td>
<td>Danish Environmental Protection Agency</td>
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<td>ENV</td>
<td>Environmental</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Co-Operation and Development</td>
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<tr>
<td>QMS</td>
<td>Quality Management Systems</td>
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<tr>
<td>SME</td>
<td>Small to Medium Enterprises</td>
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<td>TBL</td>
<td>Triple bottom line</td>
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1. Introduction

This section provides the background to the study; the purpose, the problem statement, and the research questions. It also includes the grounds for the study and the previous research which identifies and examines previous literature on organizational learning, organizational culture and their contribution to a sustainable learning organization.

The life science industry has been recognized by the international community to be of exceptional importance for the sustainable and environmentally friendly development in the Agenda 21 agreement (von Giebler, Liedtke, Wallbaum & Schaller, 2006). It has been acknowledged by top-ranking politicians that the sector can provide sustainable manufacturing, greenhouse gas reduction, and increased and novel jobs (Meyer & Lonza, 2011). The potential to contribute to the prevention, detection and removal of damage caused to the environment has been acknowledged in a number of publications (Heiden, Burschel & Erb, 2001; Hoppenheidt et al., 2004). Life Sciences refers to the application of biology and technology to health improvement, including biopharmaceuticals, medical technology, genomics, diagnostics, digital health, food processing, cosmeceuticals, and institutions that are involved in such matters. Biotechnological processes have demonstrated many environmental benefits. Some of these environmental benefits include: greatly reduced dependence on nonrenewable fuels and other resources (which provides energy and resources saving impact); reduced potential for pollution of industrial processes and products; ability to safely destroy accumulated pollutants for bioremediation of the environment (e.g. clean up of oil spills or hazardous chemical leaks); improved economics of production; and sustainable manufacturing process of existing and novel products (Pardo, Midden & Miller, 2002; OECD, 2005). Despite the fact that the life science industry is widely recognized as having great potential for contributing to a more sustainable future; concerns about its application remains.

The life science field has recently evolved to include new scientific areas. This expansion has broadened the scope of biotechnological applications, as well as caused the field to be the focus of much discussion and debate (Henney, 1999). “Cleantech” and “bio-based economies” are solutions that have been proposed to balance economy and ecology and to stop this destructive overexploitation. Cleantech encompasses many different innovative products, processes and services aimed at optimizing the use of natural resources or reducing the negative environmental impact by their use (Meyer et al, 2011). The life science industry generates enormous wealth and influences many significant sectors of the economy such as healthcare; food production and processing; agriculture and forestry; environmental protection; and production of materials and chemicals (Gavrilescu & Christi, 2005; Simon, 2002, OECD, 2005). The industrial applications of the life science industry are primarily driven by economic considerations. The economic and environmental
impact of biotechnology is easily recognizable and highly associated to it in comparison to its social dimension of sustainability (Pardo et al., 2002).

Sustainability is recognized by the United Nations as one of the most important challenges of our time (Glenn & Gordon, 1998; Silvius, 2012). The Brundtland Commission defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987; Silvius, 2012). Porter and Kramer (2011) state that “The capitalist system is under siege. In recent years, business increasingly has been viewed as a major cause of social, environmental and economic problems. Companies are widely perceived to be prospering at the expense of the broader community” (Wales, 2013). Therefore, for organizations, sustainable development involves the challenge to improve social and people welfare simultaneously, while reducing the negative impact on the environment and meeting efficiently the organizational objectives (Sharma, 2009). According to the Chartered Institute of Personnel and Development (CIPD, 2012), the essence of sustainability in an organizational context is “the principle of enhancing the societal, environmental and economic systems within which a business operates.” This introduces the concept of a three-way focus for organizations striving for sustainability. This is reflected also by Colbert and Kurucz (2007), who state that sustainability “implies a simultaneous focus on economic, social, and environmental performance” (Wales, 2013).

The concerns about sustainability indicate that the current way of producing, organizing, consuming, living, etc. may have negative effects on the future. In short, the current business processes of organizations are not sustainable. Therefore, these processes need to change in a sustainable way (Silvius, Schipper, Planko, Brink & Köhler, 2012). Eccles, Ioannou and Serafeim (2011) note that organizations are developing sustainability policies. However, these policies are aimed at developing an underlying “culture of sustainability” through policies highlighting the importance of the environmental and social as well as financial performance. These policies seek to develop a culture of sustainability by articulating the values and beliefs that underpin the organization's objectives (Wales, 2013).

Some claim that sustainability is now among the most significant concerns for organizations and for organizations to survive, let alone be successful through the 21st century, they must become sustainable (Bacon, 2007; Bielak, Bonini, & Oppenheim, 2007; Galbreath & Nicholson, 2009; Pennington, 2014). Costanza et al., (1996) estimated that already over 10 years ago the earth’s ecosystems provided 33 trillion U.S. dollars’ worth of services per year. However, indicators show that the global economy has expanded far beyond what the natural ecosystem can provide. “Cleantech” and “bio-based economies” are solutions that have been proposed to balance economy and ecology and to stop this destructive overexploitation (Meyer et al., 2011). To achieve this, it is important that organizations examine and transform the underlying beliefs which drove their environmentally and socially unsustainable strategies, and to cultivate a culture which will
enable them to change their business and operational practices to those which minimise harm (Edwards, 2009; Molnar & Mulvihill, 2003; Pennington, 2014). Consequently, it is widely acknowledged that business can play a significant role in the development of sustainable societies (Baumgartner, 2008; Baumgartner, 2010) and in reducing deteriorating environmental quality, poverty, social inequality, and in advancing society towards sustainable development (Harris & Crane, 2002; Pennington, 2014).

Due to other underlying factors that make social responsibility specifically vital to the biotechnology sector, there has been pressure for companies to be increasingly socially responsible. Biotechnology is – especially in Europe – the reason for ongoing controversial discussions, which involve numerous societal stakeholders (OECD, 1998; EGE, 2000; COMETH, 2001; European Commission, 2003; Task Force on Science, Technology and Innovation, 2005). According to Simon (2002), there is merely very little done in addressing social responsibility issues in biotechnology. As a consequence, the biotech industry has become challenging to relate corporate social responsibility (CSR) and to display its social sustainability impact. Thus, the biotech industry requires the collaborative learning processes and cooperation of social scientists, natural scientists, and engineers to tackle the lack of knowledge and experience in this area (Simon, 2002). The GRI Reporting Guidelines have identified the following eight aspects as having significant relevance to the social impact of biotechnology: 1) Health and safety; 2) quality of working conditions; 3) employment; 4) education and training; 5) knowledge management; 6) innovation potential; 7) product acceptance and societal benefit; and 8) societal dialogue (Global Reporting Initiative, 2002; von Geibler et al., 2006).

The reputation of companies has become a key managerial concern. As a strategic and proactive measure, companies in many sectors have begun to account for their performance – with respect to the economic, environmental and social dimensions of sustainability. According to Henney (1999), life science companies in their early stages are very fragile entities. Emerging technologies such as biotechnology face particularly high accountability and reporting demands. This can be attributed to the high societal exposure of these emerging sectors, which have not gained broad public acceptance yet (Schaltegger & Dyllick, 2002). Perhaps one of the least addressed issues in ensuring their maturity and growth is the nurturing of their internal identity (Henney, 1999). Built to Last concept highlights that for a business to be successful or ‘visionary’, it has to build its culture around its core ideology from its establishment and as the company expands, this groomed culture will be built upon continuously (Collins & Porras, 1994).

Involvement and ownership are key measures of organizational culture. Ownership creates a greater organizational commitment, a lesser overt control system and therefore improves business effectiveness (Denison, 1990; Ramadan, 2009). According to Denison (1990), the three objective aspects of a business organization's culture are employee training hours, employee participation and talent management because it is assumed that businesses with high levels of employee training, participation and talent management will also be businesses with higher levels of involvement, sense of ownership and responsibility (Ramadan, 2009).
Links between organizational learning and sustainable development have indicated increasing convergence and that organizational learning enables individuals, teams and organizations to better meet the sustainable development challenges and a tri-dimensional and triple bottom line balanced approach to the implementation of sustainable development (Smith & Sharicz, 2011; Naudé, 2012)
1.1 Problem

Despite the rapid development of life science and its numerous benefits, the public still has limited knowledge about life science and its industrial applications (Simon, 2002). The estimates of the global sales of industrial biotechnology products vary from 50 billion dollars to 140 billion U.S. dollars annually (Meyer, 2011). The life science sector is portrayed as an industry primarily driven by economic considerations. It is viewed as a sector that generates enormous wealth and influences many significant sectors of the economy, yet still it focuses more on investors and shareholders rather than the stakeholders and sustainable development. It is quite difficult for ordinary society to evaluate the pros and cons of the life science industry because of the applicability of biotechnological processes in many industries and the sophisticated scientific background. Secondly, the fact that this field works primarily with living organisms brings public concern and skepticism which reiterates the need to show the social sustainability dimension of biotechnology (Pardo et al., 2002). The identification of important social performance aspects tends to be crucial for biotechnology companies for showing action in this area and convincing the society of their subscription to social responsibility (von Geibler et al., 2006; Simon, 2002).

Biotechnological applications in the life science industry has the opportunity to make a positive contribution to society, however companies have yet to tap into their full potential. Through the use of promising innovations in the area of life science or the ‘greening’ of industrial processes (Task Force on Science, Technology and Innovation, 2005), companies engagement with sustainability goals could enhance competitive advantage. This could be further promoted through the use of organizational learning and knowledge sharing systems. This can then target public perception and skepticism by actualizing their contribution to a more sustainable society. Corporate social responsibility is the response of enterprises to a growing pressure of stakeholders, showing increasing interest not only in the economic and environmental but also social performance of the enterprise. Taking on three elements of sustainability (economic, social and environmental) and incorporating into their business practices and culture can create trust among the stakeholders and can be of great value in the long run and in turn create a competitive advantage for the life science industry (Simon, 2002).

According to Henney (1999), the ability for life science firms to intertwine the different perspectives of sustainability, business and science into its organizational culture has a distinctive identity, and it is essential to the success of the organization. There is the need to create an organizational culture that supports sustainable development behaviors, enhances the development of the competencies and knowledge related to sustainability adoption, encouraging learning, innovation and reflective thinking. This culture will create a context where individuals and groups are enabled to recognize crucial information, share knowledge and skills effectively (Hopkins, 2009; Waddock and McIntosh, 2009; Smith & Sharicz, 2011; Morsing & Oswald,
Intrinsic to this undertaking is the effort to honor and respect the contributions of the company’s disparate parts. Inspiring loyalty among employees based upon this sustainability culture is an important foundation for successful growth (Henney, 1999) which can be done through organizational learning.

1.2 Purpose

The primary aim of this research is to reveal the role of organizational learning systems, or lack thereof, and its connection to increasing the incorporation of sustainability initiatives in life science companies’ organizational culture. This research is to describe the experience of small-medium life science companies in Oresund Region with sustainability initiatives and also identify how collaboration with non-governmental organizations’ (NGOs’) or other learning organizations help facilitate the implementation of a long-term sustainability vision in life science organizations. This study will focus on the perspectives of life science organizations which are the perceptions of the object of study - life science companies and also that of life science NGOs to address the aim of the study. This research seeks to fill this research gap in the life science industry to enhance organizations through the incorporation of sustainability based learning systems in comparable organizations in other sectors, to most efficiently align sustainability and learning into the organizational culture.

1.3 Research Questions

R1: What is the role of organizational learning for the development of sustainability culture in an organization?

R2: How do life science organizations describe their experience of the use of organizational learning to incorporate sustainability into organizational culture?
1.4 Previous Research

This subsection deals with previous literatures for the study. It provides a review of existing relevant studies that cover the topics of organizational learning, culture and their contribution to a sustainable learning organization.

1.4.1 Organizational Culture

Culture is seen as a guideline for appropriate behaviors. Researchers agree that culture is learned, interrelated and shared by individuals (Wilson, 2001; Eskebaek, 2013). The concept of culture has been used in organizational theory, which Schein (1990) argues that the problem of defining organizational culture derives from the fact that the concept of culture is itself ambiguous. The formal definition of organizational culture offered in 1984 by Schein states that “organizational culture is the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid. Therefore, “new members have to be taught the correct way to perceive, think, and feel in relation to those problems” (Schein, 1984; Eskebaek, 2013). Later in 2004, Schein states that the concept of culture is the climate and practices that organizations develop around their handling of people, or to the promoted values and statement of beliefs of an organization (Schein, 2004; Eskebaek, 2013; Smith & Müller, 2016).

Successful sustainable companies’ most important asset has been seen to be their organizational culture (Schein, 2010; Smith & Muller, 2016) as it relates to performance (Kotter & Heskett, 1992; Smith et al., 2016), long-term effectiveness (Cameron & Quinn, 2006; Smith et al., 2016) and competitive advantage (Ramadan, 2009; Smith et al., 2016). In a study conducted by Collins and Porras (1994) which analyzed “visionary companies” that have sustained at an average of 100 years to comparable organizations, the research was able to uncover timeless fundamentals that enable organizations to endure and thrive, a concept the researchers entitled ‘Built to Last’. The fundamental value that stood out the most, with 17 out of the 18 pairs exhibiting this quality, were organizations with a strong culture and core ideology that had a sense of purpose and core values beyond just making money. The findings also revealed that it is the organization’s members that preserve the core values, and can be change agents that build on the core values and move the company into exciting directions (Collins & Porras, 1994). Culture therefore gives organizations a sense of identity and determines, through the organization’s rituals, beliefs, meanings, values, norms and language, the way in which things are done. (Smith et al., 2016)

Companies need to learn how to manage, adapt and continuously grow regardless of who is running them and regardless of what the product or service they are selling is (Collins and Porras, 1994). This can be
achieved by having a strong core ideology and becoming what the researchers describe as “visionary companies”. To go further in depth into this concept, there must first be an understanding of what it is meant by visionary company, which they define as “premier institutions, they are widely admired by their peers and having a long track record of making a significant impact on the world around them. A visionary company is an entire institution, an organization... so much more than the leader themselves, as leaders will move on eventually.” Collins and Porras (1994) believe this can be achieved through a cult-like culture and that although the concept of a cult usually gets a bad reputation, these types of cultures in an organization actually encourage companies and employees to become motivated by feeling like they are a part of something big and powerful, and as a result work harder towards their goals.

1.4.2 Culture and Sustainability

Sustainable development means the ability of an organization to maintain viable voluntary activities and/or activities governed by law within business operations (including financial viability) whilst at the same time it does not negatively impact on or affect the social and/or ecological systems in which it operates (Naudé, 2012). An organization needs to address how to change and evolve culture in a way that is appropriate for the particular stage that it aspires to be in order to be effective as it moves forward to more advanced stages. Culture is generally seen to relate to the behavioral norms, expectations and beliefs that its organizational members hold in relation to how their work is carried out. However, the culture of sustainability in an organization is one in which its members hold shared assumptions and beliefs about the importance of balancing economic efficiency, social equity and environmental accountability (Bertels, 2010; Perrott, 2014). In 1994, John Elkington created the terms “triple bottom line (TBL)” in an attempt to create a new language to express what was perceived as an inevitable expansion of existing corporate models, from purely economic values to economic values as a part of managing sustainable conduct. This new model focuses on three parts economic, environmental, and social aspects of value creation— with ambitions to embrace the corporate sustainability objectives expressed in the Brundtland Report (Elkington, 1994; Naudé, 2012). It is unique in that it involves extending focus and activities beyond organizational boundaries to involve collaboration with external entities as the organization responds to issues that have the potential to impact on sustainability plans and activities. (Perrott, 2014)

Eccles, Ioannou and Serafeim (2012) compared a matched sample of 180 companies, 90 of which they classify as High Sustainability firms and 90 as Low Sustainability firms, in order to examine issues of governance, culture, and performance. Findings for an 18-year period show that High Sustainability firms dramatically outperformed the Low Sustainability ones in terms of both the stock market and accounting
measures over a long term period. Overall, the authors argue that High Sustainability company policies reflect the underlying culture of the organization, where environmental, social and financial performance, are important. However, these policies also forge a strong culture by making explicit values and beliefs that underlie the mission of the organization. The boards of directors of High Sustainability companies are more likely to be formally responsible for sustainability and top executive compensation incentives are more likely to be a function of sustainability metrics. High Sustainability companies are more likely to have established processes for stakeholder engagement, to be more long-term oriented, and to exhibit more measurement and disclosure of nonfinancial information (Eccles et al., 2012).

According to Siebenhüner and Arnold (2007), sustainability-oriented values must be integrated into an organization before any sustainability oriented learning processes can take place. It is essential, therefore, to gain sufficient qualifications and receive enough training support. Change processes are doomed to failure unless the members of an organization possess the sufficient ability to learn (Bieker, 2005; Baumgartner & Rauter, 2017). The newer the strategy, structure and processes are to a company, the less compatible they are with the prevailing organizational culture, and the more intensive the organizational change and learning processes needed (Schein, 1997; Baumgartner et al., 2017). Goal-oriented learning mechanisms, the integration of milestones into existing research and development processes, formalized instruments of communication, self-organized working groups, guideline-oriented learning processes and project work for learning processes all illustrate how learning may be embedded in the context of corporate sustainable development (Siebenhüner and Arnold, 2007; Baumgartner et al., 2017).
1.4.3 Integrating Sustainability into Organizational Culture

Epstein and Marc (2010) conducted a research study for the Foundation for Applied Research (FAR) of the Institute of Management Accountants (IMA) to examine how leading corporations integrate economic, social, and environmental impacts into day-to-day management decision making. The research focused on four companies: Nike; Procter & Gamble; The Home Depot; and Nissan North America. These companies have reputations for leading practices in managing sustainability and have high ratings on various indexes on sustainability performance. The authors conducted open-ended, semi-structured interviews with senior managers, business unit and facility managers, geographical unit managers, functional managers, and sustainability managers (Epstein et al., 2010). The study investigated how managers manage social, environmental, and financial performance; and initiatives that facilitate managing social, environmental, and financial performance; and systems and performance measures that they use to facilitate these decisions and at the characteristics of organizations and their environments, their formal and informal support systems and processes (including performance evaluation, rewards, organizational culture, leadership, etc.). The study identified that organizational culture, leadership, and people nurture a company’s drive for sustainability. Although sensitive to stakeholder concerns and impacts, these leading companies are committed internally to improving corporate sustainability performance (Epstein et al., 2010).

There is a growing awareness and acceptance in the society and in the business community of the need to create sustainable and sustaining organizations (Unruh and Ettenson 2010; Perrott, 2014). Organizations are likely to have different approaches to the way they deal with sustainability (Lubin and Etsey, 2010; Perrott, 2014). These approaches may also vary over time. For these reasons, it is useful to introduce the reader to a systematic change model that examines the various phases an organization may pass through on the road to becoming comprehensively sustainable. Dunphy, Griffiths, and Benn (2007) developed the original sustainability phase model which presents a set of six distinct phases that could be used to classify an organization’s approach to how they manage sustainability at a particular point in time. These six distinct phases includes: rejection, non-responsiveness, compliance, efficiency, strategic proactivity and sustaining corporation. Perrott, 2014 proposed the integrated sustainability model in which the economic path of sustainability was added to the original phase model that prior only comprised of human and environmental sustainability. (Dunphy et al., 2007; Perrott, 2014)

In the final phase, the sustaining corporation will have developed the capability to create a business model that provides ongoing and continual economic viability. Such organizations have generally diversified to an extent that avoids lack of continuity of performance of the whole organization. There is ongoing and integrated knowledge capture, storage and dissemination in all aspects of how the organization sustains growth and viability. Continuity of growth and performance is achieved by the means of reliable and diverse
sources of finance and human capital. Stakeholder involvement is ongoing and engagement is a strong and accepted aspect of their culture.

Developing and initiating a sustainable organization forms part of the process dimension of sustainable strategic management. The strategy process concerns the construction and development of strategy (i.e., the ‘how’, ‘who’ and ‘when’ of strategy formation) (Baumgartner and Korhonen, 2010; Baumgartner et al., 2017). In terms of corporate sustainability management, the strategy process must ensure that sustainability issues are integrated across all relevant corporate levels and systems such that the resulting business and societal values may be adequately captured. This means that sustainability issues are integrated into the organizational culture, the strategic goal setting, learning and feedback loops and into the daily activities of the company. Implementing corporate sustainability management requires change and learning processes in any organization (Argyris and Schon, 1978; Baumgartner et al., 2017).

There is an integrated approach to coordinate strategies of the three main streams of sustainability: economic, social and environmental. There is also a well-coordinated sustainability practice with all of the key members of the supply chain, including a focused effort to improve the sustainable behavior of customers and consumers. To achieve continuity of sustainable performance, effective change management is an ongoing and effective capability (Dunphy, Griffiths and Benn., & 2007; Perrott 2014). In this era of competitive pressure, the learning organization has gained popularity as the capacity for change and improvement is linked with learning and to obtain and sustain competitive advantage, organizations must enhance their learning capability and must be able to learn better and faster from their successes and failures, from within and from outside (Marquardt, 1996; Rijal, 2010).

1.4.4 Organizational Learning

Cramer (2005) mentions that transition towards sustainability requires a cultural change in the form of new shared values, norms, and processes, procedures, and attitudes, and a strategic renewal in which the organization integrates the three dimensions of people, planet, and profit in its strategy making. Organizational learning is a necessary concept to understand this transition process. The ability of organizations to effectively process information and influence various organizational actions is fundamental to the process of organization learning (Opoku & Fortune, 2011). Argyris and Schon (1978) defined organizational learning as “the detection and correction of error”. Dodgson (1993) takes an outcome oriented view of organizational learning and describes it as a means to increase the efficiency of the organization by acquiring and organizing knowledge to increase the skills of its organizational members (Dicle & Köse, 2014). Kolb, Rubin, McIntyre (1971) and Revans (1980), developed theories based on experiential learning
and this gave the possibility of incorporating learning at the organizational level. According to these authors, learning happens when individuals critically reflect on their experience (Merrick & Jones, 2001; Dicle et al., 2014).

Organizational learning is the key tool for increasing efficiency of an organization by increasing skills of its members through the acquisition of knowledge (Dicle & Kose, 2014). When members of an organization gain beneficial knowledge and experience, this knowledge is embedded into organizational systems, processes, policies, and procedures (Senge, 1990; Jamali, 2006; Lopez, 2005; Sun & Tse, 2009; Hatch & Dyer, 2004; Easterby-Smith, et al., 2000; Argote, 2011; Argote & Ingram, 2000; Dicle & Kose, 2014). According to Argyris & Schon (1978) organizations learn through their individual members’ actions and experiences. However, only some of the organizations make deliberate attempts towards organizational learning to achieve their goals, while the rest of them, those that do not have proper organizational learning systems, may acquire counterproductive behaviors (Kim, 1993). In a research done by Ramadan (2010), it is found that employee training is the objective aspect of organizational culture that is most strongly associated with the objective outcomes from sustainable competitive advantage (Ramadan, 2010).

As this study primarily focuses on learning for the development of a sustainable culture in organizations, Revans (1980) approach to organizational learning is particularly relevant, emphasizing that organizations will survive and prosper in turbulent times only if their ability to learn from their experience exceeds the rate of change. Revans sees what he calls ‘questioning insight’ as the key to living with change, dealing with the unprecedented— which is what organizations are increasingly being required to do (Merrick et al., 2001; Dicle et al., 2014). The following elements are seen as important to organizational learning processes: a) an organizational culture which not only allows but actively encourages questions by employees at all levels; b) the development throughout the organization of the skills of critical reflection; c) regular and varied opportunities for sharing questions and reflection; d) a continuous search for opportunities for learning from the organization’s ongoing operations; e) taking action based on such learning; and f) critical reflection on the outcomes of action (Merrick et al., 2001). This research will be based on the definition of Ellström (2001), who defines organizational learning as changes in organizational practices (including routines and procedures, structures, technologies, systems and so on) that are mediated through individual learning or problem solving.

1.4.5 Learning for an Organizational Culture of Sustainability

A culture that is developed and characterized by learning from dialogue, experience, questioning, and other knowledge sharing methods is the only way to sustain a competitive advantage over the long term in an increasingly complex environment (Rijal, 2010). Senge et al (1999) states that learning is the pathway to
sustainable development as “sustainable development can’t be achieved without innovation, and innovation is best achieved in a culture that embraces and fosters learning and change.”

Organizational culture is seen as a facilitating element for learning in and from organizations (Marquardt, 1999; Marsick & Watkins, 2003). This direction of a culture in relation to learning is known as a learning-oriented culture or naturally a learning culture. In consequence, it is the type of culture a learning organization should have because as Wang, Yang and McLean, 2007 affirm, “in practice, an organizational learning culture can be a vital aspect of organizational culture and the core of a learning organization” (Jimenez, 2016).

There is a difference between the concept of learning organization and organizational learning, the former being a process and the latter a structure. Although organizations learn in order to achieve their goals, a learning organization is one which is founded on a learning culture and structure. Today, organizations have recognized the importance of adopting a learning structure and use the ability of all their employees at all levels of the organization to survive and prosper. A learning organization engages everyone in problem solving and continuous improvement based on the lessons of experience is the epitome of continuous organizational change and growth. Learning has become a key competitive advantage that determines the power and success of organizations (Shahlayi, 2009; Neshat, Mirhosseini & Zahedi, 2016)

Stevenson (2009) defines competitive advantage as a firm's effectiveness in using organizational resources to satisfy customers' demand when compared to competitors. One of the more well-known definitions of learning organizations is that learning organizations are ‘organizations where people continually expand their capacity to produce the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together (Senge, 1990, p. 3; Opoku et al., 2011). Naudé (2012) also mentions creating a learning organization as a strategy to improve organizational performance and maintain long-term sustainable competitive advantage (Naudé, 2012). Maintaining competitive advantage is a constantly moving target and the source of competitive advantage will shift over time (Stalk, 1988; Rijal, 2010). Existing literature has identified a number of factors that influence the development of learning organization. Fiol & Lyles (1985) suggest that the organization culture, the strategy, organization structure and the environment in which the organization operates influence the development of learning organization. Caudron (1993), Schien (1993), Garvin (1993) and Marquardt (1996) have identified the important role culture plays in creating a learning organization (Rijal, 2010).

In order to create the right culture, sustainability must be embedded in the organizations’ day-to-day decisions and processes (Naudé, 2012). When designing sustainability policies the key is to ensure there is buy-in from everyone. A sense of responsibility can be achieved by articulating what people need to do to support
sustainability. Equipping employees with sustainability information and allowing them to take initiative in sustainable activities can encourage a sense of responsibility and empowerment. Employees must also be equipped with knowledge on how to drive sustainability by providing education and training on sustainability while providing necessary resources to support employee engagement (Smith et al., 2016). In a study on sustainability and organizational culture Haugh and Talwar (2010) states that “sustainability is a long-term goal and should be embedded as being a responsible corporation … sustainability cut across business functions and sustainability training ought to include all employees so that sustainability can be embedded in the shared cultural values of the organization.” They go further to highlight that practical experience of supporting sustainability initiatives substantially increases their knowledge, interest, and commitment and should be integral to training and development (Haugh & Talwar, 2010).

Although a great deal of research has been done on sustainability and organizational culture as individual concepts, little is known about how sustainability can be effectively incorporated into the organization operations (Daily & Huang, 2001). The noted research implies that organizations must ensure that training and experiential opportunities are in place to successfully incorporate sustainability into organizational culture. The concept of culture is also one of the major variable and essential ingredients in the development of a learning organization. Barrett (1995), Hershey et.al (2000) suggest that a learning culture characterized by continuous learning from experience, experimentation, questioning and dialogue, is the only way to sustain a competitive advantage over the long term in an increasingly complex and turbulent environment.
1.5 Layout

The thesis is divided into 7 sections namely the Introduction, Theoretical Framework, Methodology, Presentation of Object of Study, Findings & Analysis, Discussion and Conclusion & Recommendations. The above mentioned sections are discussed below:

The first section (Introduction) provides the background to the study, the purpose, the problem statement, and the research questions. This section also provides the grounds for the study and the previous research which identified and examined previous literature on organizational learning and culture and their contribution to a sustainable learning organization.

The second section (Theoretical Framework) explains the theories used to support our findings in the discussion and analysis section. Three theories were used in this study which are (1) Ellstrom’s Five Factors for Enabling Learning (2) Schein’s Three Levels of Culture and (3) Senge’s Five Dimensions of Learning Organizations.

The third section i.e. Methodology explains and justifies the research design, approach and purpose of the study utilized to satisfy the research objectives. It also was described in terms of the paradigmatic framework, research philosophy and the choice of methodology and research techniques.

The fourth section presents the Object of Study which is the description of the type of organizations included in the study, their structure and purpose, and basic information.

In the fifth section, the Findings & Analysis presented the results clearly and logically in using themes and subheadings. The results were presented in the form of texts and tables. This section summarizes the results or data found into more concise and organized way.

The sixth section (Discussion) provides explanation and interpretation of the results by making comparisons with previous studies and the use of theories.

The seventh section (Conclusion & Recommendations) summarizes the findings, gives general statements as conclusions and lastly provides recommendations targeting the life science industry. This section also presents some new questions for further research and deeper investigation of the topic.
2. Theoretical Framework

This section provides an explanation of the theories used in the discussion & analysis section to support our findings. Three main theories were used in this study which are (1) Ellstrom’s Five Factors for Enabling Learning (2) Schein’s Three Levels of Culture and (3) Senge’s Five Dimensions of Learning Organizations.

2.1 Ellstrom’s Five Factors for Enabling Learning

According to Ellstrom (2001), organizational learning can be defined as “changes in organizational practices (including routines and procedures, structures, technologies, systems, and so on) that are mediated through individual learning or problem solving processes. It is important to create the conditions that would create a more favorable environment to facilitate the balance between adaptive and developmental learning and the integration of learning and work. Based on previous research findings, Ellstrom identifies five factors that are critical for the integration of learning and work. The factors, formally known as the five factors of enabling learning are the learning potential of the task; opportunities for feedback and evaluation; the formalization of work processes; employee participation; and learning resources. These five factors are described below:

1. The learning Potential of the task

Research has shown that different job characteristics such as task complexity (Campbell, 1988; Frese, 1987; Ellstrom, 2011), task variety, and control or scope of action (Frese and Zapf, 1994; Ellstrom, 2001) are important determinants of the learning potential (Ellström, 1994) of a work system (Davidson and Svedin, 1999; Kohn and Schooler, 1983; Volpert, 1988; Ellstrom, 2001).

If a certain work situation offers a high degree of an objective scope of action, a subject may not be able to take advantage of this scope of action because he or she lacks the knowledge or self-confidence to do so. Thus, in addition to the necessary objective job characteristics, the presence of certain “subjective” factors seems to be required (Ellström, 1994; Frese and Zapf, 1994; Hackman, 1969; Ellstrom, 2011). These subjective factors influence the capacity to identify and take advantage of the objective working conditions. Examples of such subjective factors include the subject’s knowledge and understanding of the task and the overall production process (Sandberg, 1994), skills in performing the task, previous experiences with similar tasks acceptance of the task and its requirements, self-confidence, and motivation.
2. Opportunities for feedback, evaluation, reflection: cognitive and motivational functions
Feedback—information on the results of actions—is generally considered to be necessary for learning to occur (Annett, 1969; Frese and Altmann, 1989; Ellstrom, 2011). The functions of feedback are assumed to be cognitive as well as motivational (Ellstrom, 2001). Feedback is a function that depends on the existence of clear goals. Feedback is a relational concept and can only be interpreted and understood with reference to a goal (Frese and Zapf, 1994; Ellstrom, 2011).

3. The formalization of work processes: paradoxical situation.
Formalization, or the issuing of written rules and instructions, is an important measure for standardizing work processes in bureaucratic and Tayloristic models of organization (Mintzberg, 1979). This is mirrored in the demand for detailed documentation of company work processes, which is a central element in international quality standards such as ISO 9000 (Brunsson and Jacobsson, 1999; Eklund, Ellström, and Karlton, 1998; Ellstrom, 2011). A number of researchers in the field of industrial organization view formalization as an important condition for quality development and organizational learning (Adler and Borys, 1996; Kondo, 1995; Ellstrom, 2011). Ellstrom (2001) further defends this by stating that “in a world where attention and time are scarce resources and where many activities compete for both attention and time, standardization makes it possible to reallocate attention and time from routine tasks to more creative tasks. Under certain conditions standardization implies an externalization of previous implicit (tacit) knowledge and procedures as codified best-practice procedures, a process that may facilitate organizational learning (Nonaka and Takeuchi, 1995; Ellstrom, 2011).

4. Employee participation in handling problems and developing work processes:
The idea of participation in problem handling and developmental activities as an important source of (organizational) learning could be found within the quality movement. It could be found, for example, in ideas and tools for continuous improvements (Hackman and Wageman, 1995) but also in different versions of the idea of learning-intensive work systems (Adler and Cole, 1993; Schumann, 1998; Ellstrom 2011). Ellstrom (2001) defines four levels of employee participation:

a. No official participation: Rather, there is an unofficial (private) participation in problem handling and development activities. In this situation, there are no formal arrangements for stimulating or supporting employee access to participation in problem handling or development activities. Experts handle such activities. Under these conditions, some individuals or groups of employees may show signs of withdrawal from any kind of problem handling and others may more proactively engage in “private development activity,” by privately taking authority to define their tasks, make a diagnosis of the problem at hand, and invent their own improvements (Norros, 1995).
b. **Routine-based problem handling:** Employees are expected to handle recurrent, well-defined problems in accordance with prescribed instructions (rules) and without analyses of underlying causes or relations between different events.

c. **Official participation in problem handling and development activities:** Employees are officially invited to participate in problem handling or development activities in order to optimize the system functions within given boundary conditions.

d. **Participation in innovative system development:** Employees participate on a continuous basis and in close cooperation between different groups of personnel in the redesign and development of the work systems and processes, including analyses and redefinitions of the boundary conditions.

5. **Learning Resources:**
An integration of learning and work requires a set of working conditions that are good for learning purposes as well as access to adequate learning resources. Learning by experience appears to presuppose explicit knowledge that cannot be acquired by experience. Therefore, systems for work-based formal education and training designed to support informal learning at work are needed (Ellström, 1994; Ellstrom 2011).
2.2 Schein’s Three Levels of Culture

According to Schein (1994), culture can be thought of as: 1) A pattern of basic assumptions, 2) invented, discovered, or developed by a given group, 3) as it learns to cope with its problems of external adaptation and internal integration, 4) that has worked well enough to be considered valid and, therefore 5) is to be taught to new members as the 6) correct way to perceive, think, and feel in relation to those problems. The strength and degree of integration of a culture is, therefore, a function of the stability of the group, the length of time the group has existed, the intensity of the group's experiences of learning, the mechanisms by which the learning has taken place, i.e. positive reinforcement or avoidance conditioning, and the strength and clarity of the assumptions held by the founders and leaders of the group (Schein, 1994). Once a group has learned some shared assumptions, the resulting automatic patterns of perceiving, thinking, and behaving provide meaning, stability, and comfort in that the anxiety that would result from the inability to understand or predict events around one is reduced by the shared learning (Hebb, 1954). Schein identifies three levels of culture in which deciphers the characteristics of an organization that are palpable, normalized through patterns, and perceived through assumption. The figure1 below provides a brief description of these levels.

![Figure 1: Schein’s three levels of culture](image)

Figure 1 Schein’s three levels of culture
1. **Artifacts** - The artifacts of an organization's culture consists of what exists on the surface. The visible products of what one hears, sees, and feels. It incorporates the language, clothing, manners of address, technology, product creations, and style. It is easy to observe, yet difficult to decipher and classify as the symbols are ambiguous (Shein, 1994).

2. **Espoused Values** - Values are initially started by the founder and leader then they are assimilated through group learning. Those who prevail in the group then assume the most influence and become leaders, this influence becomes translated in the shared values and assumptions. Social validation happens through the shared learning of these values (Schein, 1994).

3. **Basic Assumptions** - Basic assumption is when hypothesis becomes reality. It evolves as solutions to a problem is repeated over and over again. Different cultures make different assumptions about others based on their own values. Considering this, as each new member is introduced they come in with their own assumptions. Culture defines what individuals pay attention to, what things mean, how to react, and what actions to take in different circumstances (Schein, 1994).

The method used to understand the culture of an organization should be a direct reflection of the intent of the study. Schein (1994) notes that if the purpose of the investigation is to help a group to decipher those aspects of its culture that may aid or hinder some direction that the group wants to move in, then a speedier process of helping insiders to decipher their own culture can be used.

### 2.3 Senge's Five Dimensions of Learning Organizations

Senge, a Lecturer at the Massachusetts Institute of Technology (MIT) and the founder of the Society for Organizational Learning (SOL), published the book: “The Fifth Discipline: The Art & Practice of the Learning Organization” in 1990 which contains a comprehensive theory based on five principles that should be built into an organization in order to be transformed into a learning organization. The publication of the book, which has been released in all developed countries, has been a breakthrough for the theory of organizational learning in the field of business and a precursor to many evolutions in the operation of organizations and in the field of education. Senge (1990) regards the learning organization as an organization that has adopted learning as an integral element. It is the place where people are constantly expanding their ability to achieve their goals, where new models of thinking are being cultivated. Collective ambition is liberated and people are constantly learning how to learn as members of an organization. It is also distinguished for its systematic thinking, vision, personal competence and group learning (Senge, 1990). It also requires a change of mentality and thinking that will not be limited to learning new tasks but will extend to the development of "creative tension" based on the vision, namely to bridge the gap between where we are, what we want to do and what we can do in order to cover the gap (Senge, et al., 1999; Panagiotopoulos,
Change is a necessity and can be made by overcoming outdated thought patterns (Kofrman & Senge, 1993; Panagiotopoulos, 2018)

Along this line of thinking, the learning organization encourages continual organizational renewal and embed core processes to encourage continuous learning, adaptation and change. (Senge, 1990; Naude, 2012.) Senge (1990) described five core dimensions of learning organizations namely personal mastery, mental models, shared vision, team learning and systems thinking (Naudé, 2012).

Senge's Five core dimensions of a learning organization are described below:

1. **Personal mastery.** ‘Organizations learn only through individuals who learn. Individual learning does not guarantee organizational learning. But without it no organizational learning occurs’ (Senge, 1990).

2. **Mental models.** These are ‘deeply ingrained assumptions, generalizations, or even pictures and images that influence how we understand the world and how we take action’ (Senge, 1990).

3. **Building shared vision.** Peter Senge starts from the position that if any one idea about leadership has inspired organizations for thousands of years, ‘it’s the capacity to hold a shared picture of the future we seek to create’ (Senge, 1990). Such a vision has the power to be uplifting – and to encourage experimentation and innovation.

4. **Team learning:** Such learning is viewed as ‘the process of aligning and developing the capacities of a team to create the results its members truly desire’ (Senge, 1990).

5. **Systemic thinking** is the conceptual cornerstone of the learning organization; it is the discipline that integrates the others and fusing them into a coherent body of theory and practice (Senge, 1994). Systems theory’s ability to comprehend and address the whole and to examine the interrelationship between the parts provides solid framework. The concept of relations, control, feedback and delays are often mentioned in order to “see the whole picture” (Senge, 1994).
3. Methodology

This section will further describe the intent of our study, and the research methods that will be utilized to fulfill the objectives of our research. It will begin with a brief explanation of our research approach, followed by a more in-depth presentation of the qualitative methods used and the philosophy behind the choice of methodology.

3.1 Research Design

This study is exploratory and inductive and uses mixed qualitative research methods (triangulation) to investigate the two research questions. These research methods include: (1) semi-structured interviews with the managers of life science companies and life science/biotech NGOs, (2) review of life science companies and NGOs websites, (3) review of life science organizations annual reports , (4) review of government policy documents governing life science companies operations in Sweden and Denmark and (5) review of international quality standards that life science companies in Oresund region adhere to.

3.1.1 Research Purpose

Research is usually classified based on its purpose that is categorized under three types which are explanatory, exploratory and descriptive. The most vital aspect to take into consideration as a researcher is to choose the one out of these approaches that suits the study's stated purpose the best (Bryman and Bell, 2011; Andersson et al., 2015)

As noted previously, this study is exploratory, thus according to Bhattacherjee (2012, p. 5) exploratory research approach is “conducted in new areas of inquiry, where the goals of the research are: (1) to scope out the magnitude or extent of a particular phenomenon, problem, or behavior, (2) to generate some initial ideas (or “hunches”) about that phenomenon, or (3) to test the feasibility of undertaking a more extensive study regarding that phenomenon.” There is limited literature that covers clearly the subject of organizational learning, culture and sustainability in the field of life science. Furthermore, the business activities of organizations in the life sciences sector does not vividly show sustainability initiatives. According to Saunders et.al (2009), an exploratory study aims at finding new insights and applying research in a new way. In context to this study, researchers have already addressed the subject of connecting sustainability, organizational learning, and organizational culture in many studies. However, this research study applied the existing knowledge and theories to the life sciences sector in the Öresund region. This provided familiarity to the phenomenon in the life science industry and thereby created new insights to the topic which led to the formulation of a more precise problem and development of hypothesis and priorities (May, 2011).
3.1.2 Research Approach

There are two main approaches to make use of when conducting research. The two different perspectives are referred to as deductive and inductive. The use of an inductive approach in this study allows the researchers to look for patterns in the findings using theories based on observations and data analysis results (Bryman & Bell, 2015). The inductive approach involves the formation of theory as a result of the empirical data (Gray, 2009; Bryman & Bell, 2015). Inductive research is based on observations and data collection, after which the data is analyzed to discover possible patterns or relationships. However, it is not accurate to say that an inductive approach does not take any kind of pre-existing theories into consideration. In an inductive study the researcher fluctuates between earlier theories and data to establish consistencies and patterns instead of validating or falsifying a theory (Gray, 2009). According to Ghauri and Gronhaug (2005) we draw general conclusions based on our empirical observations. Though it is important to mention that we cannot be completely certain about inductive conclusions since they are based on a number of observations that could be mistaken (Ghauri and Gronhaug, 2005; Bryman & Bell, 2015).

Given its fundamental nature, exploratory research is often conducted by either using secondary research, formal (e.g. interviews, document analysis) or informal qualitative research (e.g. discussions with employees, consumers etc.) (Appannaiah et al., 2010). Qualitative studies often have an inductive approach. The reason why the qualitative studies usually are approached in an inductive manner is due to the fact they often are less formal than the quantitative studies (Bryman and Bell, 2011; Gummesson, 2000). Studies with a qualitative research approach have their roots in the interpretivism which means that the interpretation of peoples' experiences, thoughts and feelings is in focus (Gratton and Jones, 2010). What this implies is that the data that is collected in a qualitative study should be treated in a manner where it is observed and carefully analyzed, rather than measured and quantified (Andersson et al., 2015). According to Bellamy (2012), Hart (2014), Brown (2006), and Silverman (2015), the qualitative method is a suitable solution to get a deeper understanding of the context and situation of individuals in the culture of their working environment. In this case, the use of qualitative research design allows the researcher to get a more comprehensive outlook of sustainability and organizational learning and culture in the life sciences sector from the perspectives of life science NGOs as well as companies (Silverman, 2015). This study focus was primarily from the managerial perspective.

Moustakas (1994) posits phenomenology as an appropriate tool for exploring and describing shared experiences related to phenomena. Therefore, a phenomenological qualitative approach is regarded as suitable for an exploratory study. Phenomenology is an approach to qualitative research that focuses on the commonality of a lived experience within a particular group of a concept or a phenomenon.
Phenomenological research differs from other modes of qualitative inquiry in that it attempts to understand the essence of a phenomenon from the perspective of participants who have experienced it (Christensen, Johnstone & Turner, 2010). The focus, then, in this type of research, is not on the participants themselves or the world that they inhabit, but rather on the meaning or essence of the interrelationship between the two (Merriam, 2007). The task of a phenomenological researcher is to uncover the essence of the phenomenon that they are attempting to study. The fundamental goal of the approach is to arrive at a description of the nature of the particular phenomenon (Creswell, 2015).

The interview questions were formulated in a manner to provide information on how the perception of sustainability is influenced by organizational learning during the development of the organization's culture (Caldwell, 2017). Perceptions are the way people organize and interpret their sensory input, or what they see and hear, and call it reality. Perceptions define a person’s environment as well as provides a means to make sense of the world. The use of perceptions in this study is important because people’s behaviors are based on their perception of what reality is. For example, employees’ perceptions of their organizations become the basis on which they behave while at work. Individual’s perceptions can be vastly different due to various reasons. Thus, by definition, an individual's perception are neither right nor wrong (Erickson, 2013; Caldwell, 2017).

Perception studies are most often used when one is trying to find out how people understand or feel about their situations or environments. They are used to assess needs, answer questions, solve problems, establish baselines, analyze trends, and select goal (Munhall, 2008; Erickson, 2013). The studies of perception through interviews can identify gaps and provide recommendations to rectify between what is said and what is actually practiced and highlight differences between management and employees in order to pinpoint gaps that may lead to problems. In addition, it also identifies gaps between the company's goals and its actual policies and determines where current programs work and where they fall short (Erickson, 2013; Caldwell, 2017). Unlike human perceptions, documents are stable, “non-reactive” data sources, meaning that they can be read and reviewed multiple times and remain unchanged by the researcher’s influence or research process (Bowen, 2009). Therefore, the use of document analysis requires efficient keyword extraction for meaningful document perception.
3.2 Methods of Data Collection

The methods of data collection used in this study includes semi-structured interviews (primary source) and document analysis (secondary source), more specifically the review of organization’s websites and their annual reports, review of government policy documents governing companies organizational operations in Sweden and Denmark and review of international quality standards. These methods of collecting the data are further explained below.

3.2.1 Semi-Structured Interview

The most appropriate data collection strategy for a phenomenological research is the profound interview. Existing literature (Kvale & Brinkman, 2009; Marshall & Rossman, 2010) coincides in that the phenomenological interview should be open or semi-structured (Padilla-Díaz, 2015). Therefore, in this study semi-structured interview was chosen for data collection. The main focus of the phenomenological interview is the description of the meanings of phenomena (Rubin and Rubin, 2012; Padilla-Díaz, 2015). Semi-structured interviews allow the researcher to address the phenomenon profoundly, providing a space of aperture for the informants to express their experiences in detail, approaching reality as faithfully as possible (Padilla-Díaz, 2015). According to Bryman & Bell (2013), semi-structured interviews allows the researcher to make use of a completed interview guide with specific themes to be discussed or predetermined discussion questions that should be asked. Furthermore, the use of open-ended questions provides the opportunity for the interviewee to elaborate and make clear all of their responses (Bryman & Bell, 2013).

In order to gain a better insight into the sustainability culture of the organization, the perception of the management about sustainability as well as learning systems for sustainability, semi-structured interviews were conducted with the managers of the participating biotech companies and NGOs. Semi-structured interviews were conducted with department managers about current learning systems and communication of sustainability objectives with employees and awareness of formal and informal learning and/or knowledge sharing practice in the organization. The interviews were to be utilized to address R2 which will identify the strategies biotechnology organizations utilize when incorporating sustainability objectives, and the existence of sustainability learning and knowledge sharing practices their work processes. Semi-structured Interviews
with NGOs that implement learning in life science and biotech companies were conducted as a method to
address R1 and to gain the perspective of an external third party.

The samples or participants in phenomenological research are generally chosen according to what is known
as “purposive sampling”. Purposive sampling is characterized by the incorporation of specific criteria met by
the participants at the moment of selection (Padilla-Díaz, 2015). The participating organizations were found
and selected based on the company size and geographical location, which for this research was focused on
SME and Oresund region, to maintain the internal validity of the findings. The participating manager was
selected based on: (1) if a sustainability department existed in the organization, then the sustainability
manager is selected, otherwise, (2) if a sustainability department does not exist, the human resource or
communications manager is selected. In a case where none of the previous situations exists, the personnel
who is most knowledgeable about the company’s sustainability initiatives is preferred and therefore in such
a case it is dependent on the company’s choice.

A total of 11 interviews were conducted, with 5 biotech organizations and 6 life science NGO’s included as
participants. Interviews were conducted by different means: 5 were done on the telephone and 6 were done
in person at the respective business locations. The interviews lasted approximately 30 to 45 minutes each.
Answers were recorded using interview voice recorder from smart phone app and also via note-taking. 9
interviews were also recorded with consent. 2 interviewees preferred not to be recorded.

The initial interview guide (see Appendix A) consisted of 6 sections with a total of 18 questions. It began
with questions for collecting demographic information (M/F, Age), and information detailing employee or
manager, length of employment, and number of employees in the company. The remaining questions were
formed based on Ellstrom’s 5 Factors of Learning in order to give us a better understanding of perception of
the participant. Within each category, each the questions were formulated to align with the three levels of
culture by Edgar Schein. The interview guide was modified based on experience with the first interview and
recommendations from the interviewees which resulted in the formulation of two separate interview guides,
one for biotech companies and the other for life science NGOs with fewer questions. The modified interview
guides (See Appendix A) contained a total of 13 questions which contained 1-2 general questions covering
each of Ellstrom’s 5 Factors of Learning.
Table 1: *Summary of interviews conducted for the study*

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Position</th>
<th>Interview Type</th>
<th>Interview Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO A</td>
<td>Manager</td>
<td>Phone Call</td>
<td>27-05-2019</td>
</tr>
<tr>
<td>BIO B</td>
<td>Manager</td>
<td>Face to Face</td>
<td>05-06-2019</td>
</tr>
<tr>
<td>BIO C</td>
<td>Manager</td>
<td>Phone Call</td>
<td>17-06-2019</td>
</tr>
<tr>
<td>BIO D</td>
<td>Manager</td>
<td>Phone Call</td>
<td>17-06-2019</td>
</tr>
<tr>
<td>BIO E</td>
<td>Manager</td>
<td>Face to Face</td>
<td>25-06-2019</td>
</tr>
<tr>
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<td>Manager</td>
<td>Phone Call</td>
<td>31-05-2019</td>
</tr>
<tr>
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<td>Founder</td>
<td>Face to Face</td>
<td>11-06-2019</td>
</tr>
<tr>
<td>NGO C</td>
<td>Manager</td>
<td>Face to Face</td>
<td>13-06-2019</td>
</tr>
<tr>
<td>NGO D</td>
<td>Manager</td>
<td>Face to Face</td>
<td>17-06-2019</td>
</tr>
<tr>
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<td>15-07-2019</td>
</tr>
<tr>
<td>NGO F</td>
<td>Manager</td>
<td>Face to Face</td>
<td>17-07-2019</td>
</tr>
</tbody>
</table>
3.2.2 Document Analysis

Document analysis is a form of qualitative research in which documents are interpreted by the researcher to give voice and meaning around an assessment topic (Bowen, 2009; O’Leary, 2014; Triad 3, 2016). Document analysis is often used because of the many different ways it can support and strengthen research. It can be used in many different fields of research, as either a primary method of data collection or as a complement to other methods which is illustrated in this study. Documents can provide background information and broad coverage of data, and are therefore helpful in contextualizing one’s research within its subject or field. Documents can also contain data that no longer can be observed, provide details that informants have forgotten, and can track change and development. Document analysis can also point to questions that need to be asked or to situations that need to be observed, making the use of document analysis a way to ensure your research is critical and comprehensive (Bowen, 2009; Triad 3, 2016).

A. Review of Websites and Annual Reports

Annual reports of the participating organizations were utilized to identify the sustainability vision, mission and goals of the organization to provide a benchmark to evaluate the responses from the interview. Furthermore, their websites were thoroughly checked to find information about sustainability, organizational learning and organizational culture to verify the authenticity of the information that the interviews provided. A total of 16 websites and 10 annual reports (11 participating organizations and 10 non-participating organizations) were reviewed. The inspection of the websites were done by checking the company section especially the board of directors, managers, vision, mission, goals and strategy; the products section and the sustainability section. The review of websites and annual reports evaluated the level of sustainability awareness of the life science companies.

B. Review of Government policy documents and international quality standards

Reviewing governmental policies and quality standards keeps our research study up to date with regulations, technology, and industry best practices. Policy review ensures that policies are consistent and effective in the organizations which participated in the study. This method is especially important for high-risk or highly regulated industries such as life science, biotech, healthcare, public safety, banking, and more because of the massive role and /or impact that they play in the society. Government policy documents governing biotechnology companies operations in Sweden and Denmark and international quality standards that biotech companies adhere to were reviewed to develop a basis upon which to evaluate R1 and R2. The international standards assessed include: ISO 14000 and ISO 17025. The government policies assessed include: Organization for Economic and Environmental Cooperation (OECD) guidelines, International Council for
Harmonization of Technical Requirements for Pharmaceuticals for Human Use (ICH) policies, Environmental Code of Sweden and The Danish Environmental Protection Agency (EPA) Code.

The review of these documents provided data on the level of sustainability engagement of the life science companies.

Upon the completion of this evaluation process all of the data that was gathered were then analyzed and findings were discussed and concluded with recommendations for the organizations to best facilitate the incorporation of sustainability-oriented learning into the organizational culture in order to create a learning organization.

3.3 Method of Data Analysis

In qualitative research, the collection of data tend to result in a very large amount of data such as interview transcripts. Qualitative data could be quite complicated to analyze and there are not any specific rules, unlike for quantitative research where there are clearly stated directions about the data analysis (Bryman and Bell, 2015). Amongst the five approaches to data analysis, the phenomenologist approach was utilized in the current study in order to analyze the collected data.

Data analysis in phenomenology is characterized by the following procedures: epokhé (bracketing), identifying common meanings and essences, “horizontalization” of data, textual and structural analysis (Moustakas, 1994). As a method of research, Husserl proposed epokhé; a word of Greek origin which means doubt. Giorgi (2009) held that the concept of epokhé refers to the suspension or suppression of judgments and the positioning of the researcher with regard to the experiences of the studied phenomenon. This suspension of judgment is a mechanism which ensures objectivity during the process of data analysis in qualitative research. Textual analysis refers to the description of what is expressed by the participants. Structural analysis refers to the interpretation of how it is expressed by the participants.

Phenomenological analysis requires: describing and analyzing the “text” to interpret the “context”. The description, analysis and interpretation of the information obtained through interviews make up the three main steps suggested by Wolcott (2010) for the general analysis of qualitative research. While it is true that both types of analysis (textual and structural) are fundamental in the interpretation of the findings, structural analysis plays a vital role as a fundamental part of the scaffolding of phenomenology because it is the one
that directs us towards common essences and meanings. Structural analysis reflects the intentionality of conscience as a fundamental aspect of phenomenology.

As outlined by Creswell (2013), there are six highly structured steps to elaborate phenomenological analysis:

1. Prior to analyzing the data, the researchers bracketed their previously acquired knowledge about the use of organizational learning for developing a sustainability culture. The goal was to remain open to the data revealed by the study participants. The researchers described his or her own experience with the object of study in order to identify personal judgments and prejudices so that they don’t affect the process of analysis.

2. The researchers proceeded with the “horizontalization” of data. This refers to the process wherein the researchers lists each of the relevant quotes of the studied topic and gives them equal value with regard to the expressions of the group. This is where the textual description begins: what are participants saying? What are the relevant topics expressed by the research participants?

3. The significant statements were then assembled into larger groups of “meaning units” or themes which are sustainability engagement, sustainability awareness and methods of learning for sustainability. This process can be termed as coding which is elaborated below.

4. The researchers wrote a textual description of what happened and what the participants experienced using “ad verbatim” quotations.

5. The researchers wrote the structural description of how the experience happened. This description is built upon researcher reflections concerning the setting and context of the participants’ experience. Imaginative variation is part of this process, systematically imagining possible structural meanings underlying the textual description to illustrate how the experience came to be what it was.

6. Finally, according to the textual and structural analysis, the researcher proceeds to identify the essence of the phenomenon. This often is presented as a long paragraph that describes what the participants experienced with the phenomenon and the context of how they experienced it. What are the common elements repeated in each of the research participants? (Bliss, 2016).

The data collected from semi-structured in-depth interviews were recorded and transcribed. Once the transcripts were reviewed the researchers started to analyze each of them, in terms of coding. Coding can be described as the reviewing of transcripts, and to label, separate, compile, and organize the collected data (Bryman and Bell, 2011). The transcripts were open coded to categorize key themes and identify patterns. Each theme was analyzed to gain a deeper understanding of participants’ perceptions and motivations from
the viewpoints of life science companies and life science NGOs. Likewise, analyzing documents incorporates coding content into themes similar to how interview transcripts are analyzed (Bowen, 2009; O’Leary, 2014). The main themes are: sustainability engagement, sustainability awareness and learning methods for sustainability. These themes are further subdivided which can be seen in the diagram below.

Figure 2: Coding system for the analysis of data
Operationalization is a process where existing theories are broken down into operational terms, which later on are used by the researchers when collecting the data (Bryman and Bell, 2011). Concept refers to the theories that the present study is based upon. Definition of theme is a description of how the researchers of the current study have approached and defined the different theories. The operational definition refers to how these concepts are applied in the present research and the variables are the information that constitutes the foundation for the developed interview guide (see Interview guide) (Andersson et al., 2015).

Table 2: Operationalization Table

<table>
<thead>
<tr>
<th>Themes</th>
<th>Definition of Theme</th>
<th>Operational Definition</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability Awareness</td>
<td>Awareness about the social, economic and environmental dimensions of sustainability</td>
<td>Illustrate how object of study defines sustainability; whether their definition includes the three elements. Point out how the three dimensions of sustainability are reflected in the three levels of culture of the organization by using specific examples.</td>
<td>Schein’s 3 Levels of Culture: -Artifacts -Values -Assumptions</td>
</tr>
<tr>
<td>Sustainability Engagement</td>
<td>Purposeful engagement of individuals in sustainability activities which includes four elements: education, empowerment, a strong call to action, and recognition.</td>
<td>Explain how sustainability is prioritized and incorporated into organizational goals and daily work tasks.</td>
<td>Ellstrom’s 5 Factors: -Learning Potential -Feedback and Evaluation -Formalization -Employee Participation -Learning Resources</td>
</tr>
<tr>
<td>Learning Methods for Sustainability</td>
<td>The process of creating, retaining, and transferring knowledge about organizational sustainability</td>
<td>Outline the methods used to learn about sustainability in the organization. Describe the traits or process of these learning methods using the levels of organizational learning.</td>
<td>Senge’s 5 Dimensions: -Personal mastery -Mental models -Building shared vision -Team learning -Systems Thinking</td>
</tr>
</tbody>
</table>
Finally we can say that wherever is a gap in our understanding and that clarification or explanation will be needed there the phenomenological research can begin in a systematic way with full confidence. Phenomenological research will not necessarily provide definitive explanations but it does raise awareness and increases insight about the phenomena. In this case it raises awareness and insights on organizational learning in the field of life science in order to contribute to the development of a sustainable culture (Astalin, 2013).

3.3.1 Reliability and Validity

When assessing the quality of research studies there are several experienced methods to utilize. The two most commonly used concepts when assessing the quality within research are validity and reliability. Bryman and Bell (2011) discuss several different quality determinants, amongst them external reliability, internal reliability, internal validity and external validity.

Internal validity refers to the truthfulness of whether we are actually measuring what we intend to measure, i.e. how well our idea fits with reality (Neuman, 2011). It means that the instrument measures what it is supposed to measure, that all questions are accurately measuring the concepts they are intending to measure, and that every question relates directly and statistically to the topic. In other words, the right questions are being asked to obtain meaningful usable responses to the research questions. The questions used for the interview were highly specific because each question is related to the theory and study subjects. The desired responses which should be related to sustainability, organizational culture and learning are already known by the authors and were being tested to see if it is applied in the biotechnology sector (Erickson, 2013).

Internal validity in qualitative research entails not only highlighting the similarities and differences between the respondents’ beliefs and experiences, but also identifying the important components for the studied patterns and what mechanisms caused them (Riege, 2003). The internal validity within the current study was established through the utilization of phenomenology theory for data analysis. Additionally, a well-elaborated operationalization was developed and presented which enables the researchers of this study to establish a solid match between the study’s observations and theories during data analysis. Another concern to be aware of before beginning document analysis, and to keep in mind, is the potential presence of biases, both in a document and from the researcher. Both Bowen and O’Leary states that it is important to thoroughly evaluate and investigate the subjectivity of documents and your understanding of their data in order to preserve the credibility of your research (Bowen 2009; O’Leary 2014).
The external validity refers to the generalizability of a study's findings. It is to what degree the findings can be seen as universal across social settings (Bryman and Bell 2011; Host et al., 2012). The external validity within the present study was initiated by the utilization of the concept of triangulation, the combination of methodologies in the study of the same phenomenon (Bowen, 2009). Denzin (1978) identified four basic types of triangulation which are (1) data triangulation: involves time, space, and persons, (2) investigator triangulation: involves multiple researchers in an investigation, (3) theory triangulation: involves using more than one theoretical scheme in the interpretation of the phenomenon and (4) methodological triangulation: involves using more than one method to gather data, such as interviews, observations, questionnaires, and documents (Denzin 1978 & 2006). In the current study, triangulation was obtained by using all four of the previously mentioned forms. In order to seek convergence and corroboration, qualitative researchers usually use at least two resources through using different data sources, theories and methods as well as researchers. The purpose of triangulating is to provide a confluence of evidence that breeds credibility, reliability and validity (Bowen, 2009; Triad, 2016). Corroborating findings across data sets can reduce the impact of potential bias by examining information collected through different methods (Triad, 2016). Document analysis is an important research tool in its own right, and is an invaluable part of most schemes of triangulation (Bowen, 2009).

According to Silverman (2015), reliability refers to the degree of the study findings are independent of bias or distortion of any reason during the process of their production. Reliability refers to consistency, meaning we are conducting our research in such a way that the data is produced under the same conditions throughout the process, and can be repeated by other researchers with similar results (Neuman, 2011). The external reliability can be explained as to what degree a measure is constant over time or to what degree the study can be replicated (Bryman and Bell 2011; Gratton and Jones, 2009). In order to ensure the external reliability of the current study, an interview guide is included in the paper for future potential replications. Additionally, the present study contains a well-elaborated methodology chapter, which enables possible future replication of the research. The internal reliability is the extent to which all elements of an assessment actually are measuring the same construct. This is ensured by the act where the different researcher within a specific study are discussing the data they obtain and make sure that they agree about what they hear and see (Bryman and Bell 2011; Gratton and Jones, 2009). In the current study the researchers obtained a mutual interpretation of the gained information by together in-depth discussing the held interviews before constructing and analyzing the transcripts.
3.4 Limitations

Due to the scope of this research and its noted methodology is important to note the limitations of this study. There is a very minimal amount of data pertaining to the life science industry with respect to sustainability, and even less that include the theoretical concepts of organizational learning. Therefore this research is based on previous research and theories that have been applied in other industries and sectors, which could be noted as a limitation. Due to the time constraints, we chose to limit our study to the network of the Oresund region which has produced a sample size that may be considered as not large enough, however many of the responses were similar and had recurring ideas, which we believe with a larger sample the data would not deviate much further outside of our findings. We also base our data on perception, which is limited to the opinion of the participants. We also would like to note that our focus is limited to the life science industry.
4. Presentation of Object of Study

In this study, the main object of study is life science companies. The criteria for this organization are (1) it should be an SME and (2) located in the Oresund region. However, the study also included life science NGOs such as clusters, science parks in the sample pool collection. The reason for including life science NGOs was to find out their perspective on the subject matter. This was prompted through the process of data collection and the interviews with the life science companies which pointed out the role NGOs play in sustainability learning for them. Furthermore, NGOs were made reference to in the review of life science company’s websites.

The study covers a specific geographical area, the Oresund Region which is a metropolitan region that comprises eastern Denmark and Skåne in southern Sweden. The Scandinavian countries of Sweden, Denmark and Norway are often ranked very high in sustainability performance indexes, performing well in economic, social and environmental aspects of sustainability. They rank in the top from social progress to transparency, and environmental performance to global competitiveness. Although the various performance measurements look at different aspects they form a comprehensive picture of Scandinavian countries being in the lead when it comes to corporate social responsibility (CSR) and sustainability performances (Strand et al., 2015).

The organizations have been chosen within the population of SMEs in the Oresund region. An SME is according to the EU’s definition a company that has between 1 and 249 employees (EU Commission, 2003). Furthermore, according to the European Commission (2015), SMEs comprise 99.8% of all enterprises within the EU and 99.7% within Denmark (European Union, 2015) and 99 % of all companies in Sweden (Tillväxtverket, 2015). Therefore, given the high numbers of SMES, it is relevant in this study to focus on SMEs in the life sciences sector.
5. Findings & Analysis

This section presents the results of the data that has been collected in a summarized form as well as the analysis of the data. The data was compiled and organized to present the contrast of perspective between life science companies and NGOs with respect to organizational learning and sustainability. This data has been categorized into coded themes (sustainability awareness, sustainability engagement and learning methods for sustainability) and presented in the form of tables. The results begin with a general overview table of the findings (Table 3) that are presented and described below. This is followed by a more in depth look into each subcategory and the summarization and description of the document and website analysis findings.

5.1 Organizational and Sustainability Learning Factors: An Overview

Table 3

<table>
<thead>
<tr>
<th>Themes</th>
<th>Sustainability Learning Factors</th>
<th>NGO</th>
<th>Life Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>Long term vision and mission, environmental awareness, trainings,</td>
<td>Minimizing financial risk, best practice, quality systems, long</td>
<td></td>
</tr>
<tr>
<td></td>
<td>connections to NGOs, policy and regulation</td>
<td>term vision and missions, communities of practice</td>
<td></td>
</tr>
<tr>
<td>Engagement</td>
<td>Company size, learning/training, investor interests, competitive</td>
<td>Long-term planning, funding limitations, collaborative learning,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>advantage, Nordic culture, government policies; international</td>
<td>relevance, stakeholders, shareholders, market appeal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>standards (e.g. ISO 14000, ISO 17205, ICH, OECD; ENV code for Sweden</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&amp; Denmark); potential sanctions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning Methods</td>
<td>Trainings, workshops, reading materials,</td>
<td>Meetings; annual reports; team-learning; workshops; government</td>
<td></td>
</tr>
<tr>
<td></td>
<td>seminars, communities of practice, conferences, sustainability</td>
<td>policies; communities of practice, partnerships, conferences,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reference guide/model for startups, government policies and</td>
<td>educational courses, universities, learning resources provided by</td>
<td></td>
</tr>
<tr>
<td></td>
<td>regulations, matchmaking events/meetings</td>
<td>NGOs</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presents a general overview of the different factors that facilitate organizational learning for sustainability in the life science industry within 3 themes: engagement, awareness, and learning methods. Interviews were conducted with management representatives of different life science SMEs and NGOs in the
Oresund region to identify factors that participants perceive to be the main driver for the implementation of learning for sustainability. Based on the semi-structured interviews of the NGOs and life science companies several recurring responses were noted as contributing factors within each of the coded themes.

5.2 The Role of Organizational Learning towards the Development of Sustainability Culture

Sustainability awareness and engagement are two factors found to be vital for the development of sustainability culture. Thus, in order for an organization to become aware and engaged it needs to be continuously involved in learning through various learning methods for sustainability.

5.2.1 Sustainability Awareness

Awareness in general means, knowledgeable, being conscious; cognizant, informed alert (Gafoor, 2012). The concept of sustainability awareness is based on the triple bottom line approach in this research. Many studies that aim to study sustainability and performance in organizations use TBL as their conceptual basis, mentioning Elkington’s proposal as their conceptual reference (e.g. Cinelli et al., 2014; Deng, 2015; Ekins and Vanner, 2007; Krajnc and Glavič, 2005; Pádua and Jabbour, 2015; Hourneaux, Gabriel and Amalia, 2018). That companies aiming for sustainability need to perform not against a single, financial bottom line but against the triple bottom line to encompass an approach that emphasizes economic prosperity, social development and environmental quality as an integrated method of doing business (Elkington, 1998). This definition implies a shift away from the emphasis of organizations on short-term financial goals to long-term social, environmental, and economic impacts (Amos and Uniamikogbo, 2016). Through the interviews we found that all life science companies stated that they are sustainable but we realised that their focus was more on financial sustainability. In addition, the perspective of the NGOs was that life science organizations need to make a more concerted effort to be more sustainable and that sustainability should be thought of at the beginning of their establishment. Table 4 shows the three aspects of sustainability in which life science companies are aware of from the perspective of the NGOs and the life science companies.
Table 4

Sustainability Awareness and Organizational Learning: Life Science and NGO Perspective

<table>
<thead>
<tr>
<th>Environmental Awareness</th>
<th>Social Awareness</th>
<th>Economic Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Responsible material use</td>
<td>Sustainable health</td>
<td>- Minimizing risk</td>
</tr>
<tr>
<td>- Energy saving and sustainable travel</td>
<td></td>
<td>- Best practice</td>
</tr>
<tr>
<td>- Putting pressure on contracting organizations</td>
<td></td>
<td>- Long term goals and objectives</td>
</tr>
<tr>
<td>- Ethical debate</td>
<td></td>
<td>- Investments</td>
</tr>
<tr>
<td>NGO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Energy use</td>
<td>- Working for the overall well-being of humanity as a sector</td>
<td>- Commercially feasible business practices</td>
</tr>
<tr>
<td>- Chemical material use</td>
<td>- Working conditions</td>
<td>- Raw material choice</td>
</tr>
<tr>
<td>- Reduction of pharmaceuticals in the environment</td>
<td>- Supply chain management</td>
<td>- Promoting growth and competitiveness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Marketing Strategy</td>
</tr>
</tbody>
</table>

Interviews were analyzed to identify the factors that the participants perceive to influence life science companies sustainability awareness and engagement with sustainability initiatives, sustainability training, and other learning services they are able to access. The identified factors have the potential to influence life science companies’ engagement with sustainability as they are connected to what types of learning they implement and how they prioritize the subject matter. Based on the interview responses of the participating life science companies and NGOs factors were identified based on the perception of the two organizational types. These factors are listed in Table 5 and Table 6 which are further described below.
NGOs note that due to the policy and regulations in Sweden and Denmark, many life science companies are already implementing more sustainable actions within their operations. The NGOs connection to various life science companies also creates more of an awareness of how they can develop a culture of sustainability within their business. From an external perspective the pressures of the potential environmental impact was mentioned as a factor that influences life science companies’ awareness as well. It was revealed in the interviews that many life science companies are more aware of organizations efforts to become more sustainable and see it as a guiding point to minimize risk and implement best practice. These smaller companies mostly get these types of information through communities of practice.

### 5.2.2 Sustainability Engagement

One of the formal definitions of the verb engage is to participate or become involved in. The dictionary also describes the state of being engaged as “emotional involvement or commitment” and as “being in gear” (Merriam-Webster’s Collegiate Dictionary, 2003).

<table>
<thead>
<tr>
<th>Sustainability Awareness Factors</th>
<th>NGO</th>
<th>Life Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>Long term vision and mission, environmental awareness, training</td>
<td>Minimizing financial risk, best practice, quality systems, long term vision and mission</td>
</tr>
<tr>
<td>External</td>
<td>Connections to NGOs, policy and regulation</td>
<td>Communities of practice</td>
</tr>
</tbody>
</table>
The emergence of engagement in the organizational context has to do with two converging developments: (1) the growing importance of human capital and psychological involvement of employees in business, and (2) the increased scientific interest in positive psychological states (Schaufeli, 2013). According to the Center for Climate and Energy Solutions (2015), sustainability engagement can be defined as purposeful engagement of individuals in sustainability activities. Over the past decades, countless efforts have sought to identify and overcome these obstacles to cultivate a population that is knowledgeable and active. The organization acknowledges the increasing need for critical analyses and knowledge-sharing to advance behavior-change efforts through innovation and improvements. They go further to identify four main elements that are often affiliated with successful sustainability engagement. These elements include: education, empowerment, a strong call to action, and recognition (C2ES, 2015).

Table 6:

<table>
<thead>
<tr>
<th>Engagement Factors</th>
<th>NGO</th>
<th>Life Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educate</td>
<td>competency; training; conferences</td>
<td>relevance</td>
</tr>
<tr>
<td>Empower</td>
<td>knowledge sharing network</td>
<td>collaborative learning; communities of practice</td>
</tr>
<tr>
<td>Issue Call to Action</td>
<td>competitive advantage; policies and guidelines; potential sanctions</td>
<td>long-term planning; funding limitations; stakeholders</td>
</tr>
<tr>
<td>Recognize</td>
<td>Nordic culture; investor interests; company size;</td>
<td>stakeholders; shareholders; market appeal</td>
</tr>
</tbody>
</table>
In Table 6, factors were identified and categorized within the four elements of sustainability engagement which are educate; empower; issue call to action; and recognize. All of the life science companies noted that as they are an industry with long-term goals based on short-term funding, they must be very responsible and strategic in the way they utilize resources. Due to the size of these companies, the engagement of sustainability with respect to learning is mostly on a collaborative basis, and otherwise strongly based on need or relevance to the required tasks of employees. Almost all NGOs except for one made a point to note the cultural differences of companies that operate in the Nordic region in comparison to other countries as a major factor with respect to the connection with nature. This cultural difference they identified as a direct influence on the policies and regulations of Sweden and Denmark that affect life science companies’ commitment to engaging with sustainability in their business operations. The elements of engagement were used as categories to analyze the factors that influence the engagement of life science companies with sustainability from a life science and NGO perspective.

- **Educate.** The audience must be aware of a problem and/or the opportunity for action before any engagement can occur. Providing accessible and credible information will help avoid dismissal or skepticism, and ensure understanding (C2ES, 2015). Based on information provided on the life science NGO websites, when a life science company becomes a member of an NGO, a fee is paid and learning/networking services are provided of which many are obligatory. Life science NGOs note that the level of competency of sustainability and life science companies active participation in trainings and conferences play a role in an organizations’ engagement with sustainability initiatives. When life science companies were asked about learning methods used, many noted that additional learning opportunities are typically approved and prioritized based on relevance to the project.

- **Empower.** Audiences can respond positively to a call to action if they have the capacity and permission to engage. If there are obstacles to action, the program should seek to empower by illuminating options and setting out a clear path forward (C2ES, 2015). As previously stated by Senge (1999), sustainability is best achieved in a culture that embraces and fosters learning and change. NGOs and their vested interests in influencing firms to become more sustainable are of increasing importance. They are involved in setting up different approaches such as creating voluntary reporting systems and partnering with firms (de Lange et al, 2012). The NGOs that were interviewed explain the mission of their work by creating clusters for sharing knowledge, guiding them and provide space for growth and innovation. Due to the small size of the participating organizations in this study, collaborative learning and communities of practice are strongly encouraged.
**Issue a call to action.** A successful call to action is inviting, clear, and well-communicated (C2ES, 2015). As sustainability has become an increasingly urgent element that organizations have realized as a need to allow for competitive advantage (Ramadan, 2009; Smith *et al.*, 2016), we have found there are sustainability elements that have long been instilled in the life science industry. We have found through the review of policy documents and information provided by NGO respondents that due to legislation and policy requirements, life science organizations in the Oresund region are operating at a more environmentally and socially conscious level than organizations operating outside of the Nordic countries. The Swedish Environmental Code explicitly lists the role and responsibility of organizations that work with bio hazardous materials with respect to social and environmental impact. These guidelines influence the formal work practices of such organizations and create a basis upon which organizations are legally required to engage in sustainable practices. Life science companies mentioned they are dependent on short term financing within long term projects so this is also a driving factor that would further contribute to life science companies’ engagement with sustainability.

**Recognize.** Recognition is a critical element of successful engagement programs. In a feedback-driven culture, people stay more engaged when they have an indication of the impacts of their actions and are given positive reinforcement for changing their behavior (C2ES, 2015). From the perspective of the NGOs, many of the respondents acknowledge that legislation and investor willingness to support companies who are working towards the agenda 2030 are important factors to consider with respect to the engagement of life science companies with sustainability. Some firms may play reputational games and only symbolically maintain sustainable practices, while others value the involvement of NGOs and seek to incorporate their feedback and suggestions to a large extent (de Lange *et al.*, 2012). NGO A and NGO F attributes this distinction mostly to company size and stage of development, as a larger company must incorporate sustainability elements due to its high level of exposure and smaller companies due to its need to operate more efficiently. Many companies prioritize based on shareholders demands and the appeal of potential investors, which has an influence on how companies engage with sustainability initiatives. NGO B also notes that the cultural influence of the Nordic region as a key driver as well, as this region tends to have a more socially and environmentally conscious approach in all aspects of society.
5.3 Organizational Learning Methods for Sustainability

According to Cyert, and March (1992), the creation of knowledge, the retention of knowledge, and the transfer of knowledge, which altogether can be classified as organizational learning, can be conceptualized as formal activities which are a function of experience. In other words, Cyert and March definition of organizational learning is used in this study to define organizational learning methods (Cyert & March, 1992; Odour, 2018). There are various methods which facilitates learning which are shown in Table 7. These organizational learning methods serve as tools to create awareness and engagement of sustainability in the business activities of an organization.

Table 7:

<table>
<thead>
<tr>
<th>Learning Methods</th>
<th>NGO</th>
<th>Life Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal</strong></td>
<td>Unknown</td>
<td>Meetings; annual reports; team-learning; workshops</td>
</tr>
<tr>
<td><strong>External</strong></td>
<td>Trainings; workshops; reading materials; seminars; communities of practice; conferences; sustainability reference guide/model for startups; government policies and regulations; matchmaking events/meetings</td>
<td>Communities of practice; partnerships; conferences; educational courses; universities; learning resources provided by NGOs</td>
</tr>
</tbody>
</table>

Based on the interviews, the learning methods and systems used by biotech companies to learn about sustainability were found and categorized based on whether learning was done internally or externally. Table 7 shows the internal and external learning methods that life science organizations use to learn about sustainability from the perspectives of life science NGOs and life science companies.

All the NGOs responded that they do not know the internal learning methods used by biotechnology companies but are definitely aware of those that biotech companies participate in which they offer to them.
However, two of the NGOs (B & F) suggested government policies and guidelines and quality management systems as possible internal learning systems for Life Science SMEs. The aim of one of the Swedish based NGOs is that following their current study on sustainability engagement of life science organizations, they will provide a sustainability reference guide/model for startups. Another innovative method suggested by a Danish NGO is the match-making meeting which facilitates learning through the development of partnerships and communities of practice.
5.4 Website and Document Review

Through the review of the websites, it was found that the primary objectives of life science NGOs is to create and promote sustainability awareness amongst life science companies (Table 8) and create the environmental settings for sustainability engagement using various learning methods. The learning methods offered by the life science NGOs are elaborated on in section 5.3. With their membership system, these NGOs are able to reach a wide range of life science companies. The evaluation of the websites and annual reports of life science companies reaffirms that life science companies are aware of sustainability but needs to learn how to incorporate and show it to all its stakeholders and the society more effectively. The table below shows the common key information obtained from websites and annual reports (life science) of life science organizations.

Table 8:

<table>
<thead>
<tr>
<th>Key Points</th>
<th>Life Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGO</td>
<td>Life Science</td>
</tr>
<tr>
<td>-Unique growth environment</td>
<td>-Has websites, social media pages</td>
</tr>
<tr>
<td>-Improve sustainability performance</td>
<td>-Annual reporting</td>
</tr>
<tr>
<td>-Raise status &amp; awareness of sustainability</td>
<td>-Provides lots on information on benefits of their product</td>
</tr>
<tr>
<td>-Inform them of the challenges &amp; impacts</td>
<td>-Create health treatments and solutions</td>
</tr>
<tr>
<td>-Deliver Nordic sustainability solutions to the world</td>
<td>-Efficacious, lower cost, safer medicine</td>
</tr>
<tr>
<td>-Offer trainings &amp; hosts conferences</td>
<td>-Shareholder focussed language</td>
</tr>
<tr>
<td>-Facilitates confidence building &amp; interpersonal relation</td>
<td>-Follows regulation and guidelines</td>
</tr>
<tr>
<td>-Catalyze &amp; strengthen innovation via cross disciplinary &amp; international collaborations/partnerships</td>
<td>-Implement quality management systems (QMS) and attain certifications and awards</td>
</tr>
<tr>
<td>-Synergy among educational institutions, companies etc.</td>
<td>-Member of life science NGOs</td>
</tr>
<tr>
<td>-Support development of professional competencies</td>
<td>-Partnerships, collaborations and agreements with other life science organizations and educational institutions</td>
</tr>
<tr>
<td>-Providing awards for sustainability actions</td>
<td></td>
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<tr>
<td>-A call for life science to be sustainable</td>
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<tr>
<td>-Provide solutions for sustainable health care</td>
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<tr>
<td>-Provide feedback &amp; guidelines for change or improvement</td>
<td></td>
</tr>
<tr>
<td>-Has members, pay a membership fee</td>
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</tbody>
</table>
Table 9: Overview of Life Science Policy, Guidelines, and Quality Management Systems

<table>
<thead>
<tr>
<th>Guideline/Policy/QMS</th>
<th>ISO 14000</th>
<th>ISO 17025</th>
<th>OECD</th>
<th>ICH</th>
<th>ENV CODE</th>
<th>SWEDEN</th>
<th>EPA</th>
<th>DENMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Systematic approach</td>
<td>Noise</td>
<td>Odor</td>
<td>Vibrations</td>
</tr>
<tr>
<td>Employee Competence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Safety (e.g. Phototoxicity, Reproductive)</td>
<td></td>
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<tr>
<td>Responsible Sampling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Best practices</td>
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<td></td>
</tr>
<tr>
<td>Quality Assurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Staff training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Quality (e.g. Stability of products, Impurities)</td>
<td>Environmental performance</td>
<td>Hazardous Activity Regulation</td>
<td></td>
</tr>
<tr>
<td>Life cycle perspective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Risk mgmt.</td>
<td>Monitoring operation of organization</td>
<td>Air Emissions</td>
<td></td>
</tr>
<tr>
<td>Systematically improved environmental mgmt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>First to third party assessments</td>
<td></td>
<td>Hazardous Waste Regulation</td>
<td></td>
</tr>
<tr>
<td>Facility Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Life cycle mgmt.</td>
<td></td>
<td>Soil and Water Pollution</td>
<td></td>
</tr>
<tr>
<td>Energy Sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Manufacturing practices</td>
<td></td>
<td>Hazardous Substances Regulation</td>
<td></td>
</tr>
<tr>
<td>Transportation and Handling</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Certification of quality management systems</td>
<td></td>
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</tbody>
</table>

**Overview of Life Science Policy, Guidelines, and Quality Management Systems**

As mentioned previously, it was found through the interviews and website analysis that the life science SMEs follow various rules, regulations and guidelines set up for life science organizations. The data also showed...
that life science companies implement various quality management systems (QMS) and are rewarded by the various certifications for complying with the standards of these quality systems. The interviews showed that because these mandatory policies’ guidelines and QMS cover social, economic and financial sustainability aspects, life science companies tend not to put major focus on organizational learning about sustainability. Therefore, since these standards are already incorporated into their work, triple bottom line framework was used to evaluate the guidelines/policies and QMS as shown in Table 9. The aspects of policies etc. that represented each of the three elements of TBL were summarized into key words and phrases.
6. Discussion

This section provides clear logic explanations and interpretations of the results by making comparisons with previous studies and the use of the theories in order to make it easier for the readers to follow its organization.

6.1 Sustainability Awareness in Organizational Culture

As previously mentioned, Cramer (2005) states that transition towards sustainability requires a cultural change in the form of new shared values, norms, processes, procedures, attitudes and a strategic renewal in which the organization integrates the three dimensions of people, planet, and profit in its strategy making. This supports our reasoning for evaluating the environmental, financial and social awareness aspects in the culture of life science companies (Table 4 & Table 10). Schein (2010) and Smith & Muller (2016) stated that successful sustainable companies’ most important asset has been seen to be their organizational culture. Based on the definition of Schein’s levels of culture, we identified the sustainability awareness traces in the culture from the data we collected through interviews and document analysis which are shown in Table 10.
Artifacts refer to the constructed environment of the organization as well as observable behavior patterns. (Chen and Corritore, 2008). Some of the artifacts from the interviews are presented below.

<table>
<thead>
<tr>
<th>Artifacts</th>
<th>Espoused Values</th>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Energy use</td>
<td>- Reduction of pharmaceuticals in the environment.</td>
<td>- Ethical debate (e.g. testing on animals)</td>
</tr>
<tr>
<td>- Chemical material use</td>
<td>- Putting pressure on contracting organizations</td>
<td>- Sustainable health focus</td>
</tr>
<tr>
<td>- Responsible sampling &amp; quality assurance</td>
<td>- Working for the overall wellbeing of whole humanity as a sector</td>
<td>- Quality or function of the product</td>
</tr>
<tr>
<td>- Safety testing</td>
<td>- Promoting growth and competitiveness of a sustainable life science sector</td>
<td>- Marketing tool</td>
</tr>
<tr>
<td>- Responsible ingredient use &amp; food consumption e.g. Less cow milk</td>
<td>- Long term goals and objectives</td>
<td>- Improve sustainability performance</td>
</tr>
<tr>
<td>- Energy saving and sustainable travel</td>
<td>- Partnerships, collaborations and agreements with other life science organizations and educational institutions</td>
<td>- Provide solutions for sustainable health care</td>
</tr>
<tr>
<td>- Working conditions</td>
<td>- Commercially feasible business practices</td>
<td></td>
</tr>
<tr>
<td>- Supply chain management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Raw material choice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Investments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NGO A mentioned that they try to address energy and chemical material use, working conditions and supply chain management while working with life science companies and this is identified as an effect on the artifacts or behavioral patterns in the culture of life science organizations.

**NGO A**

```
'Yeah, I've been working with the recording impact as collateral, so we have been talking about environmental and social impact of course it's important to work with the environmental like energy, chemical material etc; but also the social aspects both internally like working conditions and logistics overall and also very important in the supply chain management and addressing environmental and social responsibility in the supply chain.'
```

We identified investments and commercially feasible business practices in the interviews of NGO B and NGO C, as economic awareness in the artifacts. NGO F stated that the selection of raw materials is vital for organizations, because it can be very costly for the organization if they choose the wrong raw material that is not allowed to use according to regulations. This is considered as economic awareness in the artifacts.

**NGO F**

```
'I think if they include sustainability from the beginning in their quality systems etc., then it is not a matter of finance and economy. If they include it too late, then it will cost them a lot. So they need to start to choose the right material and work in a right way etc. and then it will not be a cost burden. I think if they do not include it, they will not manage to have the high volumes as they expect. Or they might be stopped cause they use the raw materials which they are not allowed to use or they do not have any information about how to destruction of their products. So it is a need, a must for them in the future.'
```

Based on the interviews, it was discovered that when life science organizations make their choice of travel, they take into consideration the environment and energy savings efforts as artifacts in the culture:

**BIO C:** "We are a virtual company working with a lot of contract organizations in the world. In this sense we do not produce things ourselves. We think about how we affect the environment. We try to save energy as much as possible switching lights, printers etc when not in the office. We try to have as many meetings as possible via skype in order to minimize our travels. But we still travel a lot. We think about how we travel. We try to travel by train. If we do it in Sweden or we try to combine our travels. When it comes to our core business we are working to improve the health so we are in line with one of the sustainability goals and improving the lives of people. Putting pressure on consultancies to work sustainable is our next step."
It was found in the policy analysis that responsible ingredient and energy use as well as responsible food consumption needs to be paid attention to by life science companies in the work practices. Furthermore, other factors that the policy mentioned include responsible sampling, quality assurance and safety testing such as toxicology test, photosafety.

The next level in Scheins’ theory is espoused values which are basically shared views of what is right and wrong, and what are accepted ethics and best practices openly professed by members of the culture (Chen and Corritore, 2008). Mission and vision statements are part of artifacts but how it expressed are part of espoused values in an organization. Bio A and Bio B mentioned that long term sustainability view of finances and investments are coercive factor for them to balance between economic, environmental and social sustainability and if they don’t develop in the direction of sustainability they may face negative effects in the long term on their business. Furthermore, it was found through the website analysis that life science companies mission and vision is to create efficacious, cheaper and safer medicines and health treatments and solutions and to form partnerships, collaborations and agreements with other life science organizations and educational institutions. NGO E mentioned that their mission is to develop the understanding and sustainable use and management of life science sector and they aim to achieve this in collaboration with the surrounding community.

NGO E stated ‘‘...Promotes the growth of a strong and sustainable life science sector... We are spider in the web, part of the foundation X that brings together decision-makers on common issues at the intersection of universities, business and society. X creates the conditions for growth and competitiveness in the region through initiatives, activities and projects within strategic focus areas.’’

Therefore the role of the NGOs is to assist life science SMEs to align their mission, vision and strategic goals with sustainability initiatives, which in turn leads to a change in their culture towards sustainability.

The underlying assumptions of a culture, that is the basic assumptions that are unconsciously shared as “obvious” truths by members of the culture within an organization, are the essence of the culture (Chen and Cynthia, 2008). The way an organization manages its mission, strategy and goals are also shaped by a set of assumptions. Through website analysis, we found that from the NGO perspective that life science companies are making a uniform effort to improve their social performance and provide solutions for sustainable healthcare. The answer of Bio A displayed that they consider the social and ethical impacts of their operations which shows the effect of assumptions and values in the culture.

**BIO A:**
Yeah. Well in general, hopefully. And bringing your medicine to the market is quite complex because of all kinds of recommendations at first of all, if you bring a product to the market, it needs to be safe. So if you
take the tablets, it doesn't kill you and hopefully, uh, well, um, making it better on the basis off the, uh, the sickness that you have a, so that's a good, a good impact. Uh, normally, uh, of course when we're talking medicines, we're talking, uh, testing of medicines on Animals on people that respect. You can say, okay, that's beneficial at the end of the day, but you can also say, well, okay, why do you need to test on animals? Um, um, and of course you can have in a very ethical debate about that. Whether you should stimulate that or not? At the end of the day, for us it is important as a biotech company that we, when we develop a medicine.

Based on the research data we can see that internal organizational learning factors for creating sustainability awareness and for contributing to sustainability culture in life science sector can be attributed to mission and vision statements, quality standards and financial interests. This awareness could be positively benefited through membership with NGOs. Taking into consideration the two perspectives of the NGOs and the life science companies, we can say that although life science companies did not explicitly describe their artifacts, espoused values and assumptions that are sustainability oriented but we were able to categorize them based on Schein’s theory as well as using TBL. Based on the research data we can see that internal organizational learning factors for creating sustainability awareness and for contributing to a sustainability culture in life science sector can be attributed to mission and vision statements, quality standards and financial interests. This awareness could be positively benefited through membership with NGOs. Therefore we agree with a study done by Eccles, Ioannou and Serafeim (2012) which argue that High Sustainability company policies reflect the underlying culture of the organization, where environmental, social and financial performance are important. The study further stated that, these policies also forge a strong culture by making explicit values and beliefs that underlie the mission of the organization.

6.2 Enabling Learning for Sustainability Engagement in Life Science Organizations

Although the elements for successful sustainability engagement were not explicitly determined in the conduction of our study, we are able to identify how the participating companies have made efforts to increase engagement with sustainability through enabling learning. According to Ellstrom’s theory of Enabling Learning (2011), an organization must consider certain factors to create an environment that facilitates learning. Ellstrom (2011) explains that this can be achieved by creating the conditions that would create a more favorable environment to facilitate the integration of learning and work. This favorable environment can be achieved through the implementation of Ellstoms five factors of enabling learning in these organizations which are learning potential; feedback and evaluation; formalization; employee participation; and learning resources. NGOs believe that it is only a matter of time and scale before the learning potential is actualized, with NGO F stating:
NGO F:

“I think they will be forced to think about sustainability in the future but they are too small to think about that now. It depends on the type of biotech. If you are talking about Pharma Company, they are developing drugs so they might probably not get so big in the future. Maybe if you are talking about the medical device companies, they may probably get bigger in the future. You should ask the companies if they are med tech or Pharma Company.”

When considering the Oresund region, the cultural values can be also noted as a contributing factor to the learning potential. Taking into account the closeness to nature and considerable legislation in place within the Nordic countries that promote sustainable values. These cultural distinctions have allowed the Nordic countries to be seen as industry leaders, however the field of biotech is still lagging behind the other sectors in sustainability engagement. NGO B highlights this in this interview response:

“Why are we front-runners when it comes to sustainable healthcare? Culture, politics, legislations. Yeah. We want to do the right thing. Everyone has a relation to nature. The first EPA in the world. Long traditions on doing things. Trust used to be, but maybe nothing more. But they're saying this is the Nordic goal.”

NGO A explains how they believe company size plays a role in this as well, noting that smaller companies may have not actualized the impact of their operations in comparison to larger companies.

“I think it mainly has to do with in some way with the size of the business s, um it’s a good question because I think if you are more of an established company and then you have more established organization to address these questions so you are working with these questions more, but I also think. That the size of the company, the thing is the customers or clients or stakeholders are interested in the company working with sustainability, they need to address the questions. But sometimes it could also be hard to see the impact if your organization is small, it’s hard to know where the main impact occurs, but if you are working with a large organization then you realize you have to work with these questions.”

Life science managers that were interviewed frequently stated that due to these organizations reliance on short-term funding, companies must always maintain a more long-term perspective in their operations, which creates a need for feedback and evaluation. This is because of the nature of the process of introducing products to the market, Interviewee BIO A, explains this stating that:

“So basically in everything that we're doing, we're always looking at long-term perspective, by, of course, making sure that we can sustain operations for a long period of time. And that normally goes hand in hand with the financing of the company. And that is not only [retracted]. Basically all biotech companies have, I
would assume the same kind of thinking on sustainability and thereby making sure that the company actually can well, uh, finalize or at least can progress its efforts towards goals and objectives...biotech companies as I mentioned is always long term. Although it doesn't always work long term because you need to also guarantee to find financing for long term and that is not always easy... So all our employees are very long-term focused because they know it will take maybe 10, 11 years before a product is ready. On the, on the other hand, the money that we are normally getting is maybe applicable for one to two years.”

This long term thinking allows for a more favorable environment for the engagement of sustainability in biotech organizations, and the result is that they have more opportunity to re-evaluate their processes to integrate such concepts into their business practices to most effectively maximize resources and minimize risk. Employee feedback and transparency is also very important within these companies as well with BIO A going on to say that:

“Our best way of making sure that our employees do understand long term perspective that's short term financing is simply to be very transparent and talk about it...it's also fair to say that uh, people in general would like to have enough low security about their job. Um, so the only thing that we actually actively apply is being very transparent on how we are doing, uh, how things are progressing.”

Agenda 2030’s increasing convergence to legislative and investor interest influences the formalization of work processes for sustainability. The implementation of policies in legislation such as the Environmental Code of Sweden, and regulation standards like ISO 17025 (See Table 9) demand life science companies within this region to operate in a highly responsible manner with respect to public health and environmental implications. Simultaneously these companies also operate on short term financing and rely on consistent investment funding to survive. The focus of life science companies is mostly on funding, product development, and acquiring knowledge that is directly related to formal work tasks, which can potentially work for or against their favor. When speaking with interviewee NGO A they mention their findings on how this becomes an after-thought in biotech companies.

“I think the ones that I have spoken to, some of them have along the way realize that their product can be sustainable. Ones that I have spoken to, they have more addressed and things like quality or function of the product and then realize they have to work with, environmental issues to gain their certificate later on.”

With respect to the implementation of learning and work processes of biotech organizations and the impact of operations on the environment, there was little reference to the full awareness or prioritization of sustainability outside of implications with respect to the end user of the product.
Company size is a very important factor that contributes to encouraging the environment of learning in these organizations. The companies that participated in our study all ranged from 3-50 employees, and many of them noted that the size and closeness of the project teams with other colleagues and management helps facilitate the sharing of knowledge and collaborative learning. This factor also attributed to many of the life science respondents noting the encouragement of employee participation in the handling of work processes and feedback. BIO D and BIO A mention the importance of this in their interview responses:

**BIO D**

“We have a philosophy about what we want to create, the mission. That is something internally that we discuss and we integrate the philosophy throughout our team. We have strategic days and internal meetings our long term goal”

BIO A attributes this as a cultural characteristic of life science companies due to the average size and closeness of most companies within this sector.

**BIO A:**

“Yeah, I think, I think it's very important. I mean, we are fortunate in general that is good with, with biotech companies. Biotech companies are normally small companies... And so smaller companies I believe, uh, have, have a good opportunity or have maybe a better opportunity to work closer together than maybe a big company can do. We are in one location, so it's quite easy to find your colleagues and ask him or her something...and the project teams that we are having here internally and of course the management of the company, we are all in the same location. So for us it is actually relatively easy and, but also of course very important that we collaborate with each other on a day to day basis.”

Outside of internal collaboration and knowledge sharing, life science companies do provide employees with access to external learning resources that are approved and provided based on relevance to the project. Typically this would be in the form of attending conventions or registering to attend a course of study. Many life science respondents noted this very rarely is applied to courses about sustainability, although some companies are more aware of its usefulness and encourage employees to take such coursework. From the NGO perspective, they believe that they are not as informed as they should be, and are in the process of developing a system in which companies within their networks could have easy access to sustainability knowledge that is most relevant to the life science industry.

**NGO F:**

“They have very little knowledge and that is why I am on the board OF NGO A the company that Daniel is working for. We are also running a project together with NGO A and COMPANY S in Sweden in order to
develop a handbook/cookbook on how start-up companies can work in a more sustainable way and to think in a more sustainable way. We try to include that in all types of meetings we have at NGO F. We have workshops but not on a regularly basis but hopefully it will be in the future.”

Life science companies in the Oresund region have the potential to bring the industry forward by incorporating sustainability values into business operations, however many engage with this later on in the process, which can be less cost effective and increase risk. These delays in addressing environmental issues in the product development can be addressed by collaborating with the NGOs who have access to the relevant information to assist life science companies, however almost all participants except for one were aware of these services being made available. By becoming engaged in the NGO member networks companies can expand their access to the resources that could enhance the competitive advantage and enable a learning environment within the organization.

6.3 Organizational Learning Methods: Individual, Group and Organizational levels

Change processes are doomed to failure unless the members of an organization possess the sufficient ability to learn (Bieker, 2005; Baumgartner & Rauter, 2017). Learning occurs through individuals, teams/groups and inter/intra organization (Crossa, Lan & White, 1999). According to Odour (2018) in every organization, there are basically three levels of organizational learning:

The individual level: Learning at the individual level entails getting a person cumulative or new ideas and information belonging to his environment, understanding them, interpreting and experimenting them and then, adjusting his behavior in terms of obtained results using conceptual and cognitive processes (Odour, 2018).

According to Ellstrom’s definition of organizational learning, organizational learning logically implies individual learning, but not vice versa. Thus individual learning is viewed as a necessary but not sufficient condition for organizational learning to occur (Ellstrom, 2001). Learning individually is way to develop competences and knowledge of employees, especially in the area of sustainability. For example, BIO C stated "I took a course and it was about how we can use it while selecting organizations. I will try to implement the learnings from this. The course was identified of our CEO who asked me to take it."

These acquired knowledge and competencies can be applied by the employee to their daily work tasks as well as be used in feedback sessions to coworkers. Therefore, the development of employees is vital in order
for the organization to learn and grow together. Personal mastery is encouraged in the life science industry for example through the complete coverage of the expenses for their individual employees to take external courses on sustainability. This can also be an incentive for employees to share knowledge gained externally. BIO C also stated:

"It is paid by the organization so it was an external organization. If you are focusing on biotech companies none of them will have internal capabilities to do it internally."

However, possession of potentially valuable knowledge within an external learning environment does not mean that an organization benefits from this knowledge (Szulanski, 2000, Dewhurst et al., 2004) and consequently it is necessary to develop a relational learning process in which organizations transform the tacit and explicit knowledge of employees and clients into customer capital (Rodrigo and Cegarra, 2002, Dewhurst et al., 2004).

The group level: When individuals share and interact with other individuals what they have learnt at the individual level, it becomes group level learning. Here, individual share their learning with other individual, interprets together, and obtains a group assumption. The essence here is on communication. A study done by Reagans, et al. (2005)about group learning concluded that increased experience working together in a team promoted better coordination and teamwork (Odour, 2018). For learning to be effective in an organization, the knowledge that is encouraged must be related to the business. More so, individuals in an organization should be working together rather than learning individually. Shared learning enables companies to increase their staff quicker and solve problems more efficiently. Employees regularly engage in sharing and group learning based on common interests, mutual trust and collaboration in external organizational learning methods. A common response from the life science companies was team learning that is the organization learn together as a team and the importance of team collaboration was stressed. Specifically, the knowledge that is acquired individually or externally by employees are shared through team meetings. For example, BIO C stated that during meetings, she shared the information obtained from the sustainability course that she took externally.

Organizational level: When groups come together to share their knowledge they have acquired through the process of communication, these learning are now transformed into an acceptable instructions for all organizational members and will be made accessible to everyone who needs them (Amir-Kabiri, 2006; Odour, 2018). There are three main factors that trigger the study of organizational learning using the organization as a unit of analysis.

First, is the organizational knowledge memory, which defines the major processes it uses to acquire knowledge (Metcalfe & Gibbons 1989; Odour, 2018). Secondly, in the aspect of technological development,
emphasis should be placed on core competencies of individuals and groups (Pavitt, 1991; Prahalad & Hamel 1990; Odour, 2018). Finally, there should be routines which operationalize the organization memories and knowledge bases (Nelson & Winter, 1982; Odour, 2018).

In the Oresund region, life science NGOs have a crucial role to play in the organizations learning about sustainability in the life science sector. As mentioned previously, a relational learning process is necessary in organizations in order to efficiently inculcate employees knowledge and competencies in an as well as customers attributes into business artefacts, espoused values and assumptions. In this study, life science NGOs has been shown to be competent in facilitating that relational learning process. In order to facilitate this learning process, membership systems have been organized whereby the SMEs pay a fee to become a member and to receive access to the NGOs knowledge base, contact network and facilities (e.g. learning resources, office space, meeting rooms, labs) which was indicated through document analysis and interviews. Furthermore, the NGOs provides opportunities to form local and international collaborations and partnerships with other companies, NGOs and educational institutions; identify research areas, define projects; and utilize the platform to spread and gain knowledge about sustainable products, service innovations, working standards etc. Below are a few quotes from the interviews that support role of the NGOs:

NGO C: ‘The mission: MVA is committed to realizing the potential of ‘NGO’ by facilitating networking and knowledge-sharing, collaboration, analyzing challenges and potentials and mobilizing support from key opinion leaders.’

NGO D: ‘Growth via innovation and new collaborations. Function as a catalyst and facilitator in the Danish innovation support system’

NGO E: ‘NGO E promotes the growth of a strong and sustainable life science sector. We make life science more competitive. We are spider in the web, part of the foundation NGO E that brings together decision-makers on common issues at the intersection of universities, business and society. NGO E creates the conditions for growth and competitiveness in the region through initiatives, activities and projects within strategic focus areas.’

It was found that life science NGOs raises the status, awareness and engagement of sustainability through various organizational learning methods. It raises awareness by ensuring that the companies learn about the three dimensions of sustainability. Furthermore, it educates, empower and calls to action and facilitate recognition of sustainability initiatives. These organizations create pressure and call upon life science companies to work more sustainably. Although all the NGOs urge their members to be sustainable, it was found that some work directly with sustainability whereas some indirectly with it. Specifically, those working directly with sustainability have their mission, vision, strategies and goals that completely align with
sustainability such as NGO A. Those that work indirectly on sustainability (NGO B, C, D, E& F) have to a great extent incorporated sustainability into their mission, vision, strategies and goals and collaborate with NGO A. Based on the interviews we can conclude that both the NGOs and life science companies have a shared long term vision which one of Senge’s five dimensions of a learning organization. It was found that a common goal that connects all these organizations together is achieving sustainable healthcare which was explicitly pointed out by the NGOs. This shared vision can be used as a common foundation amongst life science organizations for creating sustainability awareness and engagement towards the development of a sustainable culture of a learning organization. Table 11 shows how the levels of learning can be connected to Senge’s five dimensions of learning.
Table 11:
The connection between levels of learning and Senge’s five dimensions of learning

<table>
<thead>
<tr>
<th>Levels of Learning</th>
<th>Senge’s Dimensions of Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Personal mastery</td>
</tr>
<tr>
<td>Group</td>
<td>Team learning</td>
</tr>
<tr>
<td>Organizational</td>
<td>Systems thinking, mental models, shared vision</td>
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</table>

Organizations should focus on learning strategically (Lima and Filion, 2011) and this is best done by ensuring that learning is aligned with the goals of the company. Whether the organizational learning methods to achieve sustainability are internal or external, both types are beneficial to the organization, the community and the individual employees. They are powerful vehicles both for sharing knowledge and achieving business results. Organizational learning help drive strategy at all levels of the organization and support faster problem solving both locally and organization wide. They also more rapidly diffuse practices for operational excellence and cross fertilize ideas and increase opportunities for innovation (Allee, 2000). A learning framework must be developed and this framework must make use of suitable and adaptable learning practices. Individual and team learning should continue to be promoted through existing practices like training sessions, workshops, short courses, to name a few. In other words, learning within organizations needs to be retained, documented and shared in the organization (Chanshi, 2014). Through this strategic learning process where the whole organization participates in the shared/Team Learning, creates the unique Mental Model and Shared Vision that Senge described in his five dimensions of learning. In addition, if an organization starts to work on System Thinking to identify common problems, its employees need to understand the Mental Models and possess the Shared Vision of the organization. Thus, the utilization of all five of Senge’s dimensions are important since they are interlinked.

According to these authors (Merric & Jones, 2001; Dicle et al., 2014) learning happens when individuals critically reflect on their experience. Thus, this study created an opportunity for the participating life science organizations to reflect on their sustainable business practices. Organizational learning creates sustainability awareness and engagement which contributes to the development of a sustainable culture. This in turn leads to the organization becoming a learning organization. It was found that various learning methods can be used internally and externally to learn about sustainability. However it is important that learning that is done externally or on an individual level be shared with the organization in a group or organizational level. The
The role of organizational learning is to raise the status, awareness and engagement of sustainability in turn this will reduce public skepticism in the life science industry.

7. Conclusion & Recommendations

In this study we sought to understand the role of organizational learning and the experience of the use of organizational learning for the development of a sustainable culture in life science companies. It was found that many companies are aware of the need for a higher level of competence in order to become more engaged with sustainable business practices. In order for life science companies to prioritize and fully integrate sustainability into the culture of the company they must be more aware and engaged with sustainability initiatives, which will result in an increase in the implementation of learning for sustainability. This can be achieved through the effective use of organizational learning in their internal operations. Therefore there is a continual connection and influence on the culture within these three themes. There is a heightened awareness for more sustainability focused practice within the operations of life science companies, however the financial constraints of the limited funding they receive negatively influence how they are able to prioritize the implementation of these actions. This can be mitigated through collaboration with life science NGOs that have been actively seeking companies to share sustainability knowledge and strategies to maximize these companies potential and reshape how the industry is perceived by society. Many companies could take advantage of these services, but from our data we have concluded that many of these life science companies are unaware of these networks that the NGOs provide.

With respect to the questions proposed for this research, the data has allowed for a better understanding of the role organizational learning has in the process of developing a sustainable culture in the life science industry. Based on the interviews we can conclude that in life science NGOs and companies, long term vision and mission are the common point and main organizational learning driver for contributing to a sustainable culture. Senge et al (1999) states that learning is the pathway to sustainable development as “sustainable development can’t be achieved without innovation, and innovation is best achieved in a culture that embraces and fosters learning and change.” In order to create the right culture, sustainability must be embedded in the organizations’ day-to-day decisions and processes (Naudé, 2012).

The influence of culture and policy in the Oresund region has been identified as one of the most important factors enabling learning for sustainability. Many NGOs stated that life science companies in this region are
held to high standards of practice due to strict government regulations, and are operating in a more sustainable way than they actually recognize, however there is still room to grow. This study may highlight that the factors of culture and policy can be viewed as an integral enabling factor and attribute to Ellstrom’s *Five Factors of Enabling Learning*. Through this study we were able to make a connection between Senge’s five dimensions of learning within the three levels of learning (individual, group and organizational) found in an organization. Building a shared vision is one of the five core dimensions for a learning organization and such a vision has the power to be uplifting and to encourage experimentation and innovation (Senge, 1990). NGOs see the potential of this which is why they primarily believe in a shared vision for sustainable healthcare amongst life science companies. Repeatedly interviewees mentioned their long term mission and vision for working towards sustainability, and in relation to the three dimensions of sustainability, life science companies’ mainly underlined importance of the economic aspect. However, through the analysis of the company websites and interviews, artifacts and values were able to be identified that prove that life science companies are trying to show that they are working towards a more sustainable culture.

Some main goals in sustainability research are to better understand why and how firms decide to adopt more sustainable practices (Lange, 2012). This study reveals how life science companies implement and prioritize learning systems to best suit their needs, and what factors influence this. These factors have a connection to the awareness and engagement of life science companies with respect to integrating sustainability into the organizational culture. There has not been much research in the field of life science in reference to organizational learning and sustainability, this study can be used as a starting point for future research to go more in depth to find the connections between these two factors and potential benefits in the sector. More in depth research needs to be done on how collaborations with NGOs can impact the culture of life science organizations. Culture becomes the vital catalyst that influences all members, including the leaders themselves. Schein (2010), confirmed this intertwined relationship between organizational culture and leadership, by suggesting an ongoing interplay in which the leader shapes the culture, during the early stage of the organizations life cycle and the creation of its unique cultural profile and value system. Then as time passes and the organization develops, the leader himself becomes affected by the dominant culture outcome (Ogbonna & Harris, 2000, Dajani et al, 2016). In this study the research questions did not focus on the impact of leaders on organizational learning and building a sustainable culture, however this study pointed out a potential area of research.
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Appendix I: Interview Guides

Below is the original interview guide prepared before starting the collection of data.

Semi - Structured Interview

Key: 1- Artifacts ; 2- Espoused values ; 3- Basic Assumptions

A. Background
1. What is the organization and position that you work with?
2. What is the company sustainability long term goals/ vision?
3. How does it display that vision? Is part of your company core ideology?

B. The learning Potential of the task
1. What kind of procedures are in place to help employees learn about their work tasks?
2. How is your organization incorporating sustainability into the vision and mission?
3. How does the organization encourage work-based learning of employees about sustainability?

C. Opportunities for feedback, evaluation, reflection: cognitive and motivational functions
1. Does your company engage in sustainability reporting? How is this being done?
2. How are employees able to reflect on work processes and actions?
3. How is feedback given to employees? Does it include sustainability issues?

D. The formalization of work processes: paradoxical situation.
1. How does your organization keep the visibility high and reinforce the idea that achievements in sustainability are meaningful for the company? How are sustainability objectives incorporated into employee work tasks? How are the employees who are sustainability experts organized in the company? How does the company manager make the economic case for sustainability to employees?
2. How does your work task contribute to sustainability goals of your company?
3. How does your work task show that your organization values sustainability? -How has the company products identified and activated their long-term sustainable purpose?

E. Employee participation
1. Does your organization co-create sustainability practices with employees at all levels? How is that done?
2. How does the organization facilitate bubbling of ideas for sustainability?
3. How important is collaboration with employees in your organization with respect to achieving sustainability goals?

F. Learning Resources
1. What are the formal and informal learning resources used to create employee awareness and engagement of sustainability? How your department does provide access to learning resources needed for employees to learn about sustainability?
2. What are the systems and processes that exist in your company for employees to integrate sustainability into their business decisions?
3. Are the learning resources in the organization sufficient to ensure high employee performance and development? How can it be improved?

The interview guide was modified after the first interview. We then developed two interview guides - one for life science NGOs and the other for life science companies. The questions are written in the order they were asked to the interviewee. The questions were categorized again using Ellstrom’s theory and Schein’s three levels of culture.

Modified Interview Guide for Life Science NGOs

The purpose of this interview is to analyze the engagement of small-medium life science, healthcare and/or biotech organizations with sustainability initiatives and the role of NGOs to incorporate learning systems that introduce these initiatives into their organizational culture. Furthermore, it aims to find the impact of organizational learning systems, or lack thereof, and its connection to increasing awareness and engagement to sustainability initiatives.

A. Background
1. What is the organization and position that you work with?
2. How many years have you been working with the company?
3. What is the size of the organization?
4. What country are you based in?
5. What is your organizations vision and mission?
6. How does your organization plan on achieving this?
7. What is your personal definition of sustainability?
B. The learning Potential of the task
8. How is sustainability incorporated within your organization?
9. What methods of learning do use to teach companies, especially those in life science and biotech industry about sustainability?

E. Employee participation
10. Does your organization collaborate with other organizations in other regions/countries towards achieving sustainability goals?

C. Opportunities for feedback, evaluation, reflection: cognitive and motivational functions
11. Have you found that life science/biotech companies are using sustainability in their business practices?

F. Learning Resources
12. What learning resources do they use internally and externally to improve sustainability awareness and engagement of their employees?

D. The formalization of work processes: paradoxical situation.
13. What factors influence the implementation of sustainability in life science/biotech companies?
Modified Interview Guide for Biotechnology Company

The purpose of this interview is to analyze the engagement of small-medium life science, healthcare and/or biotech organizations with sustainability initiatives and their use of learning systems to incorporate these initiatives into their organizational culture. Furthermore, it aims to find the impact of organizational learning systems, or lack thereof, and its connection to increasing awareness and engagement to sustainability initiatives.

A. Background
1. What is the organization and position that you work with?
2. How many years have you been working with the company?
3. What is the size of the organization?
4. What country are you based in?
5. What is your personal definition of sustainability?

B. The learning Potential of the task
6. Is there a sustainability long term goals/vision for your organization? How would you describe this?
7. Does your organization consider the impact of their operations with respect to society and environment?

E. Employee participation
8. How does the organization encourage work-based learning (workshops, conferences, learning resources) of employees about sustainability?
9. How important is collaboration with employees in your organization with respect to achieving sustainability goals? External organizations?

C. Opportunities for feedback, evaluation, reflection: cognitive and motivational functions
10. How is feedback given to employees? Does it include sustainability issues/KPIs?
11. Does your organization engage in sustainability reporting? How is this being done?

D. The formalization of work processes: paradoxical situation.
12. How are employees able to reflect on their work processes and actions?

F. Learning Resources
13. How does your organization provide access to learning resources needed for employees to learn about sustainability?
Appendix II: Interview Transcript Excerpts

Interviews were conducted with life science non-governmental organizations and life science companies. The interview transcripts are provided below in which we first start with the NGOs followed by the life science companies.

A. Life Science Non-Governmental Organizations

1. NGO A

Speaker 1: just questions about the study that you're doing. Um, so who would you say that most of the life science and biotech companies that you’ve been speaking to, do they have, do they incorporate sustainability and the, the business practices?

NGO A: No, I think the ones that I have spoken to, some of them have along the way realize that their product can be sustainable. Ones that I have spoken to, they have more addressed and things like quality or function of the product and then realize they have to work with, environmental issues to gain their certificate later on.

Speaker 1: so you would say there's a lot of work that needs to be done in the area of incorporating sustainability in life science companies.

NGO A: Yeah. Yeah. Um, I think so too.

Speaker 1: Um, do you work with, um, uh, like other centers because I knew there was one, um, center for sustainable healthcare in the UK. Have you had any programs with them or any workshops or anything? Yes, I think some Oxford.

NGO A: Yeah. Yeah. And we have a project right now with them that I think my, my boss is more, yes. We have a lot of, um we know them Very well. Yeah. So we have been performing projects them perfect with them. Um, they have been part of our conferences mental health care. So, um, no my, when my connection to them look, we are having a dialogue with on the 12th.

Speaker 1: Um, you spoke about environmental impact. Do you discuss also about the social impact?

NGO A: Yeah, I've been working with the recording impact as collateral, so we have been talking about environmental and social impact of course it's important to work with the environmental like energy,
chemical material etc; but also the social aspects both internally like working conditions and logistics overall and also very important in the supply chain management and addressing environmental and social responsibility in the supply chain.

NGO A: Yeah, I think it mainly has to do with in some way with the size of the business so, um its a good question because I think if you are more of an established company and then you have more established organization to address these questions so you are working with these questions ore, but I also think. But the size of the company, the thing is the customers or clients or stakeholders are interested in the company working bit, sustainability And they need to address the questions that sometimes it could also be hard to see the impact if your organization is small it’s hard to know where the main impact occurs, but if you are working with a large organization then you realize you have to work with these questions.

2. NGO B

NGO B: Think if you're looking at it, for example, cytotoxins or cell toxins or you have a cancer treatment, it's really, really expensive. It's something that can cost hundreds and thousands of dollars to treat the patients each day. So both bad for environment. It goes out with the urine then the mutagenic creates a bio-hazard, etc. Etc. And we have now held one place in Sweden where you can clean their wastewater from pharmaceutics actually, but it's the first in the world. So the rest of the world you are, they were hard times that you can have like platinum and just having that metals you know it's very bad for environment and it's also very bad for those working with cancer patients.

NGO B: They can get cancer themselves by working with the cancer patients. Yeah. So why do we have it? It's expensive. It's bad for the environment. It's bad for staff. Yeah. We have it for patients. So this is the difference between working with these issues in healthcare compared to the industry. If you're working with cytotoxins to sell toxins to a manufacturer, like Volvo cars, it will be then be forbidden since 1973 and no doubt about it, and we're not allowed to use it, but the things they would use, are probably not as good. But you're not allowed to use that. That's why we have, you know, paint today that are not as good as paint 20 years ago because you get to rid of it. But here you can choose something that's risky and your patients. So this sustainability work to work here.

NGO B: Something different is making is as good as possible for stuff. Can we have closed preparation for cytotoxic and we have human boxes. Can we have these that we have at one company that could glue together to waste so it doesn't get out in the air, et Cetera, et. And how do we take care of the waste as good as possible? And here we have to, yeah, in Sweden, areas of Texas, in the US, there is a patient's fee or whatever you do. So this is the difference. And working on sustainability and healthcare versus the industry. Exactly. Yeah. So that's where the company, the companies are doing and things on life science. They are here, but then also
who can work with a, so it will be a discussion for that. The vinnova project the world's most sustainable healthcare 2030 that you can do.

NGO B: In the US for example, there are NGO. Yeah. And they only have, health care hospitals in them for example. But we think you need to have all this [sectors] on board to, to make these happen to companies and the state and the enterprise and also a development, those kinds of things. So we tried to include all of these organizations. Those NGOs are very important looking in, in UK/US English speaking, even France, Germany, but not so much in Sweden and the Nordics is when legislation's driven rather than an NGO driven. A Swedish organization doesn't understand that. That's in most of the world these issues are NGO driven. Yeah. I think not legislation driven.

NGO B: Yeah. We, we, uh, one guideline is that needs to be leading the project. With vinnova, we identified that if you are looking at the hospital that sector that is behind are life science and med tech. Those clean tech building construction companies are way ahead. But you look at our company, our Nordic and life science company to a life science company elsewhere in the world, they're probably way ahead but not compared to other sectors. So if we look into agenda 2030 the worlds most sustainable in healthcare then we need to raise, they are already pretty high on the international scale but they still need to go way ahead in the life science and med tech. So we want for the first guideline, we have workshops in four different cities in three days in life science and med tech clusters and accelerators and companies and so on.

NGO B: This is why we do workshops here, regarding this on all Nordic countries, uh, to find out why. Why are we front-runners when it comes to sustainable healthcare? Culture, politics, legislations. Yeah. We want to do the right thing. Everyone has a relation to nature. The first EPA in the world. Long traditions on doing things. Trust used to be, but maybe nothing more. But they're saying this is the Nordic goal. They're saying and it's declining very fast. So they said this is really bad for the Nordics, but we used to have trust in someone called you and said, Hey, I want to borrow money. You say, yeah, sure. People didn't lock their doors. Yeah. So they say this is the Nordic goal of that is the same way if the politicians tell you to do something, we do it. Very strong legislations um, and also politicians can trust to make decisions.

NGO B: No, but it's the opposite. When they put down a call, we want to buy equipment and the hospital has a list of things the company must follow and that list has gone so huge that, in some cases zero companies can also, that's cool. I think I'll, yeah. So when do a procurement to them don't get an answer because the demands are so high. So this is actually gone in some cases too far because Johnson and Johnson won't change their world production due to one hospital in the north of Sweden. But on the other hand, uh, when in a project called PVC- free blood bags, uh, the PVC blood bag industry said the Nordics, France and
Germany had demands on the uh, PVC free blood bags. Then we change the world, production because standard, they don't want to have two different productions lines for this.

NGO B: But you need that and you, you don't need us Swedish hospital, you don't meet Sweden, you need the Nordics, France and Germany. That's big enough.

NGO B:And this is also might be interesting, this is an interview with all the sustainability managers on all the Nordic hospitals. What is the importance of different things and the state just today, how good are we and what would we invest in the next so you could do this in different ways. But everyone thinks that, that the importance now is reduction of pharmaceuticals in the environment. Yeah. But it's hard to do something about it.

3. NGO C

Speaker 1: What is your organizations vision and mission?
NGO C: The vision is to be a well-known and respected member driven contributor to the realization and positioning of ‘NGO’ as the most competitive and vital life science cluster in northern Europe. The mission:MVA is committed to realizing the potential of ‘NGO’ by facilitating networking and knowledge-sharing, collaboration, analysing challenges and potentials and mobilizing support from key opinion leaders.

Speaker 1: How does your organization plan on achieving this?
NGO C:This new strategy intends to provide a roadmap for the coming years and states that MVA shall be a member-driven network organization, focusing on strengthening the regional life science environment through intensified efforts in four strategic areas: Networking which means for us to connect, share and learn; Collaborating which Let's make our NGO stronger; Analyzing The state of NGO and Communicating which means speak up for NGO.

Speaker 1: What is your personal definition of sustainability?
NGO C: To act in a way that sustain resources for future generations

Speaker 1: How is sustainability incorporated within your organization?
NGO C: During our daily work and during our networking events we try to choose sustainable solutions by reducing paper waste, not using plastic bottles for water, reducing food waste, recycle plastic, food waste, and paper.
Speaker 1: What methods of learning do you use to teach companies, especially those in life science and biotech industry about sustainability?
NGO C: We will have sustainability on the agenda at several of our meetings and we are assisting companies who offer sustainable solutions with reaching out to the ‘NGO’ community.

Speaker 1: Does your organization collaborate with other organizations in other regions/countries towards achieving sustainability goals?
NGO C: We collaborate with all our member organizations of which several have reaching sustainability goals on their agenda.

Speaker 1: Have you found that life science/biotech companies are using sustainability in their business practices?
NGO C: Yes, many have it as an important part of their business practices, but it does not stand alone it will have to be commercially feasible.

Speaker 1: What factors influence the implementation of sustainability in life science/biotech companies?
NGO C: I think it would be pressure from society and employees and a sense of "it is the right thing to do".

4. NGO D

Speaker 1: What is your organization's vision and mission?
NGO D: Growth via innovation and new collaborations

Speaker 1: How does your organization plan on achieving this?
NGO D: Function as a catalyst and facilitator in the Danish innovation support system

Speaker 1: What is your personal definition of sustainability?
NGO D: Something that lasts and adapt as the environment changes

Speaker 1: How is sustainability incorporated within your organization?
NGO D: NGO has an award called ECEI Gold label. The "Cluster Management Excellence Label GOLD - Proven for Cluster Excellence" of the European Cluster Excellence Initiative acknowledges cluster organizations that demonstrate highly sophisticated cluster management and that are committed to further improve their organisational structures and routines for the benefit of an even higher performance. Some of
the indicators related to sustainability are: LifeLong Learning Aspects for the Cluster Management Team, Stability and Continuity of Human Resources of the Cluster Management Team, Stability of Cluster Participation, Clarity of Roles – Involvement of Stakeholders in Decision Making Processes, Direct Personal Contacts between the Cluster Management Team and the Cluster Participants, Degree of Cooperation within the Cluster etc. See indicators for ECEI Gold label.

Speaker 1: What methods of learning do you use to teach companies, especially those in the life science and biotech industry about sustainability?
NGO D: New meeting formats, e.g. Bioagora. You can look at it at www.bioagora.dk. It is uh a Biopeople's annual signature matchmaking event. A great way to meet up and share knowledge, get inspired and maybe establish new relationships and collaborations.

Speaker 1: Does your organization collaborate with other organizations in other regions/countries towards achieving sustainability goals?
NGO D: Yes. Lots of collaboration.

Speaker 1: Have you found that life science/biotech companies are using sustainability in their business practices?
NGO D: Not literally. It is not visible but they are trying.

Speaker 1: What factors influence the implementation of sustainability in life science/biotech companies?
NGO D: science, regulatory and investments.

5. NGO E:

Speaker 1: What is your organization's vision and mission?
NGO E: NGO E promotes the growth of a strong and sustainable life science sector. We make life science more competitive. Everyday. The overall goal of NGO E is to contribute to the vision of 70,000 new jobs in 2050. Of these, at least 3,500 jobs will be created in the life science sector.

Speaker 1: How does your organization plan on achieving this?
NGO E: we are spider in the web, part of the foundation NGO E that brings together decision-makers on common issues at the intersection of universities, business and society. NGO E creates the conditions for growth and competitiveness in the region through initiatives, activities and projects within strategic focus areas.
Speaker 1: What is your personal definition of sustainability?
NGO E: Creating today's need without destruction for future generations. At the same time creating up to date growth and prosperity for the wellbeing of all!

Speaker 1: How is sustainability incorporated within your organization?
NGO E: Agenda 2030
NGO E stays focused on Agenda 2030 and sustainability goals for a sustainable regional development. In 2018, the organization was directed against several of the sustainability goals.

Speaker 1: What methods of learning do use to teach companies, especially those in life science and biotech industry about sustainability?
NGO E: Seminars and spreading awareness.

Speaker 1: Does your organization collaborate with other organizations in other regions/countries towards achieving sustainability goals?
NGO E: Our network is broad and we are always informed and knowledgeable about the organizations in Life Science Industry.

Speaker 1: Have you found that life science/biotech companies are using sustainability in their business practices?
NGO E: It is inevitable trend, and yes, they are trying to do a good practice.

Speaker 1: What factors influence the implementation of sustainability in life science/biotech companies?
NGO E: The constant need of development of prosperous new mechanisms and methods, the overall wellbeing of the whole of humanity, the gathered knowledge regarding the nature and sustainability in all aspects, not just ecological.

6. NGO F

NGO F: It would be good if you divide the information under size and what stage of development— if they are commercial or in the developing phase. You know start up companies do not usually follow ISO which is the legislation that you have to follow if you are a big company. Start up companies and developing companies need to know more about these (gave examples of two startups that are following ISO which is not a normal thing) It is also important to follow-up what type of ISO they are following.
Speaker 1: What methods of learning do use to teach companies, especially those in life science and biotech industry about sustainability?

NGO F: They have very little knowledge and that is why I am on the board of NGO A the company that Daniel is working for. We are also running a project together with NGO A and COMPANY S in Sweden in order to develop a handbook/cookbook on how start-up companies can work in a more sustainable way and to think in a more sustainable way. We try to include that in all types of meetings we have at NGO F. We have workshops but not on a regularly basis but hopefully it will be in the future.

Speaker 1: Does your organization collaborate with other organizations in other regions/countries towards achieving sustainability goals?

NGO F: Yes. We collaborate with different NGOs and biotech companies regarding workshops and developing this guidance for startup companies.

Speaker 1: Have you found that life science/biotech companies are using sustainability in their business practices? On a scale of 1-10 with 10 being the highest level of sustainability, what level do you think?

NGO F: It is too low. They need to think about it in an earlier stage. Level 3 on scale of 1-10.

Speaker 1: How long do you think it will take them to get to a higher level of sustainability?

NGO F: I think it is quite fast if they are aware of. It might also be that some of them are thinking but do not address it and they do not use it in their marketing. So they need to be aware of how important this is to customers. They should use it as a marketing tool.

Speaker 1: Can you tell me about the legislation that they follow?

NGO F: ISO 14001

Speaker 1: What learning resources do they use internally and externally to improve sustainability awareness and engagement of their employees?

NGO F: Some of the companies have what you call an environmental policy. Another way is that biotech companies need to have a quality system. In the quality systems there are regulations about the need to educate their employees about sustainability. Honestly, I have no idea how they have addressed that. I think
that is an interesting question to ask the biotech companies regarding their quality systems if they have that included. As a suggestion, Quality systems are an important aspect to follow up with biotech companies for your thesis.

Speaker 1: What factors influence the implementation of sustainability in life science/biotech companies?
NGO F: Customers that I think more. Also the customers demand it. It is not only the product should be nice.

Speaker 1: How about finance?
I think if they include sustainability from the beginning in their quality systems etc., then it is not a matter of finance and economy. If they include it too late, then it will cost them a lot. So they need to start to choose the right material and work in a right way etc. and then it will not be a cost burden. I think if they do not include it, they will not manage to have the high volumes as they expect. Or they might be stopped cause they use the raw materials which they are not allowed to use or they do not have any information about how to destruction of their products.
So it is a need, a must for them in the future.

NGO F: I think they will be forced to think about sustainability in the future but they are too small to think about that now. It depends on the type of biotech. If you are talking about pharma company, they are developing drugs so they might probably not get so big in the future. Maybe if you are talking about the medical device companies, they may probably get bigger in the future. You should ask the companies if they are med tech or pharma company.
NGO F: Size and what stage they are. If they are a start-up, or scale up or a commercial company. I think if they are a commercial company and they have products they will more think about the sustainability. So it is not only the size. It can also be a small company that has outsourced most of its priority.

Speaker 1: Any more information you want to provide?
NGO F: It is very important you try to understand what type of company it is, the size of the company, how mature the company is when you make your evaluation of the results

B. Life Science Companies

1. BIO A

Speaker 1: We’re actually would try to find out what’s the definition of sustainability in the biotech industry. So you can elaborate on, tell me what is sustainability in terms of your, uh, your company?
BIO A: Oh, of course I can do that. Uh, well as I already introduced, normally biotech companies, they need to be there for the long term. Uh, if they get money for finding the right molecules for, for instance, treatments of cancer. Uh, they know that they will, uh, needs quite a lot of time before they actually can have maybe that drug ready for marketing approval. So there's always you can say and a level of sustainability in the company to make sure that the short term goal or objectives, are met before actually the company already gaps maybe some external financing. So basically in everything that we're doing, we're always looking at long-term perspective, by of course, making sure that we can sustain operations for a long period of time. And that normally goes hand in hand with the financing of the company. And that is not only [retracted]. Basically all biotech companies have, I would assume the same kind of thinking I'm on sustainability and thereby making sure that the company actually can well, uh, finalize or at least can progress its efforts towards goals and objectives.

Speaker 1: Okay. You mentioned a lot about finance and funding. Um, in your company, the sustainability focus more on or in biotech industry, does it focus more on the financial aspect or does it involve something to do with like the people, this, the stakeholders, the environment, anything.

BIO A: Well. If I really put a simple, at the end of the day, if we do not have financing, um, I'm of course we still care a lot about our people, well you may enter a yarn up in a situation where you cannot pay salaries. Um, so of course we, we think about the people, the people in, in, in a biotech company and I hope in in all kinds of companies are the most important assets if I may call them assets, uh, because they, those girls and boys to do something that makes the company attractive or the product that they are making attractive etc etc. But of course like any other, business, you need to have income as well to operate the business and biotech companies normally get income through investments, whereas a company that makes shoes, they probably get an income by selling those shoes as soon as possible. So capital is maybe a more actual points on a day to day basis for biotech company than a point for a shoe company.

Speaker 1: Okay. You spoke to, spoke about the employees, the impact on employees and the income. Have you can see the outside of your workforce, for example, maybe the customers that you're providing the medicine for.

Speaker 1: Who Do you see the, the medicine that you, you produce produce has an impact on the environment?

BIO A: Uh, that's a good question. Only environment. You mean with respect to pollution and that kind of stuff?

Speaker 1: Yes, it can be pollution.
BIO A: Yeah, well in general, hopefully. And bringing your medicine to the market is quite complex because of all kinds of recommendations at first of all, if you bring a product to the market, it needs to be safe. So if you take the tablets, it doesn't kill you and hopefully, uh, well, um, making it better on the basis off the, uh, the sickness that you have a, so that's a good, a good impact. Uh, normally, uh, of course when we're talking medicines, we're talking, uh, testing of medicines on Animals on people that respect. You can say, okay, that's beneficial at the end of the day, but you can also say, well, okay, why do you need to test on animals? Um, um, and of course you can have in a very ethical debate about that. Whether you should stimulate that or not? At the end of the day, for us it is important as a biotech company that we, when we develop a medicine

BIO A: Uh, the medicine should work. Of course, it should do something positive for the patient that is suffering from a specific illness like cancer for instance. But on the other hand, it also needs to be safe. And that is of course, as I said, the good thing, uh, but of course development and drunk is very capital intensive and it needs a lot of testing. A so you can also say at the end of the day, bringing a medicine to the market, I'm not sure she should be security pay for it. It's quite expensive. I mean this weekend, um, there was a new drug approved and its going to be marketed that drug, is a drug for in specific children's muscle illness that will cost the treatment, two and a half million dollars per treatment. That's one treatment. Uh, and then of course you can always say is that a good thing for you environment or not. Um, it is very, it's a very good thing for children suffering that kind of disease because they basically can be treated course it, it, it comes within with a price tag off 2.5 million, at least in the US. And that is of course also money that can be maybe used for other purposes. And so I think it is both positive and negative. It depends a little bit. Who are you asking.

Speaker 1: Okay, okay. Depending on the stakeholder.

BIO A: Yeah, absolutely. I mean let's say if you are sick, I mean serious, serious sickness, then you hope of course that there was a medicine on the market that you can take so you become better. So you will be very positive about this new medicine or medicine that you're taking. The medicine however that you are taking is costing society half a million Swedish crowns per year. Um, that half million can also be used for something else. And so it's, it's always a matter of okay, which stakeholders will be benefiting from this, which stakeholders, well, will potentially be suffering from their suffering is maybe not the right word. So it depends very much as you correctly state on the stakeholders.

Speaker 1: Okay. It's fine. Let's move on to the next question, which is how does, how does your company encourage work based learning of employees about sustainability?
BIO A: Well, we do encourage you very strongly work based learning because I mean we are in an organization that has been around for 18 years roughly. Um, we needed to invent the wheel many times. Uh, so we apply very strongly a learning by doing kind of mentality in the company, uh, because we know that if you learn today, you will also use that activities let's say in five to 10 years from now. Again, biotech company as I mentioned is always long term. Um, although it doesn't always work long term because you need to also guarantee find financing for long term and that is not always easy. So all the one earns our employees are very long-term focused because they know it will take maybe 10, 11 years before a product is ready. On the other hand, the money that we are normally getting is maybe applicable for one to two years.

BIO A: After two years we need to find new capital through capital raising. Uh, so it's, it's, it's very strange actually that on the one hand you are very long term focus because of your product development. On the other hand, you always have in the back of your hat that okay, it's great that we have money in the bank but we only have money in the bank for maybe one half to two years. So they are by the long term perspective is of course well hurt a little bit because if you don't have money you can still be very long term perspective. But if there's no money, there's no job too who perform.

Speaker 1: Yeah, it's a continuum. Understand. Um, so what ways do you, um, do you encourage your employees to learn about sustainability? Like is there a community where they can participate and discuss about, um, sustainability or other training programs that you attend? Conferences or anything of that sort?

BIO A: Uh, I'm more aware of those conferences, uh, specifically on sustainability. Uh, our best way of making sure that our employees do understand long term perspective that's short term financing is simply simply to be very transparent and talk about it. Um, people in biotech companies are maybe more than average risk willing, so they are willing to take risks. Uh, but on the other hand, it's also fair to say that uh, people in general would like to have enough low security about their job. Um, so the only thing that we actually actively apply is being very transparent on how we are doing, uh, how things are progressing. Uh, are we in, in, in a situation where we need to be a bit more conservative on our spending. Um, this is the way basically how we try to inform our colleagues in, in yeah. How we are doing and whether we can sustain the business for a longer period of time or potentially see some roadblocks on the way that may have an impact on sustainability.

Speaker A: Okay. Um, how important is collaboration with employees in your organization with respect to achieving sustainability goals?
BIO A: Yeah, I think it's very important. I mean, we are fortunate in general that is good with, with biotech companies. Biotech companies are normally small companies. I'm pretty sure you have looked at a number of biotech companies. They probably have between five and 50 employees. You have a course, a couple of bigger ones that is roughly the number. And so smaller companies I believe, uh, have, have a good opportunity or have maybe a better opportunity to work closer together than maybe a big company can do. Um, we are in one location, so it's quite easy to find your colleagues and ask him or her something. Um, and the project teams that we are having here internally and of course the management of the company, we are all in the same location. So for us it is actually relatively easy and, but also of course very important that we collaborate with each other on a day to day basis.

Speaker 1: Okay. Um, what about external collaborations with other organizations or nonprofit organizations?

BIO A: Yup. That's what, that's also important. The biotech industry is a global industry. So although we are based in Denmark, we are not necessarily consider our end customers being Danish. Uh, if we are developing a drug for cancer, we hope that many patients in the world can use that particular drug. So that, that also means that, um, and you may have seen that on our website. Uh, we, we have a number of collaborations with pharmaceutical companies. We have a number of collaborations with research institutes in, in the UK, uh, cancer research technologies, uh, Institute of Cancer Research. So although we have good expertise, uh, we are only, well, 45 people. So we cannot do without any of our collaborations, um, when we are developing medicines and they need to be tested and we need to go to another company that can do actually those tests because we don't have any animals here at our location and in Copenhagen. So we outsource, yeah. Basically a 50, 60% of our activities to two companies that actually can do work for us. Uh, one example is for instance, our drugs on, on, on animals and specific, uh, disease models.

2. BIO B

BIO B requested interview not be recorded.

3. BIO C

BIO C:BIO C is a very small company, we are 3 employees.

Speaker 1:Do you have some code of conduct for the organizations that you are working with?
BIO C: No, we don’t have a code of conduct at the moment. This is something we need to develop.

Speaker 1: Does your organization have a long term goal and vision in terms of sustainability?

BIO C: Yes we do, but it is not written. It is verbal thing that we want to work sustainable. We think about it when we travel and when it comes to electricity.

Speaker 1: Does your organization think about the impact of its operations on society and environment?

BIO C: Yes, we do think about it.

Speaker 1: Can you explain it?

BIO C: We are a virtual company working with a lot of contract organizations in the world. In this sense we do not produce things ourselves. We think about how we affect the environment. We try to save energy as much as possible switching lights, printers etc when not in the office. We try to have as many meetings as possible via skype in order to minimize our travels. But we still travel a lot. We think about how we travel. We try to travel by train if we do it in Sweden or we try to combine our travels. When it comes to our core business we are working to improve the health so we are in line with one of the sustainability goals and improving the lives of people. Putting pressure on consultancies to work sustainable is our next step.

Speaker 1: Can you tell us about the profile of the organizations you work with?

BIO C: We work with different types of organizations. We work with manufacturing organizations. They do produce our pharmaceutical. We also work with organizations that conduct our pre chemical studies.

Speaker 1: How is your collaboration with these organizations in terms of sustainability goals?

BIO C: We have to look at several things when we contract an organization. The key priority for us always be their competence and expertise in what we are doing. Very few organizations have competence to do it. In the end unfortunately sustainability is not a priority for choosing to work with an organization. But of course we want to see that they also work sustainable.

Speaker 1: Internally does your organization encourage employees to work with sustainability focus?
Do you have workshops, conferences, learning resources for sustainability?

BIO C: No but I have taken a course in sustainability to understand how we can use it.

Speaker 1: How are you putting into action?

BIO C: I took a course and it was about how can we use it while selecting organizations. I will try to implement the Learnings from this. The course was identified of our CEO who asked me to take it.

Speaker 1: Is it provided by your organization or did you take it personally?

BIO C: It is paid by the organization so it was an external organization. If you are focusing on biotech companies none of them will have internal capabilities to do it internally.

Speaker 1: Does your organization engage in sustainability reporting?

BIO C: We don’t do sustainability reporting but when we grow we will do it in the future.

Speaker 1: Did you share the information with your colleagues?

BIO C: Yes.

Speaker 1: Could you give me another example that you have learnt and you put it into action?

BIO C: The only example is from the course is how we will select contract organizations.

4. BIO D

BIO D: We have been working with oats since 25 years. Our founder and owner has discovered the technology to do liquid oats. He was a professor of food and nutrition at Lund University. Our mission is to work completely with food concepts with scientific verification and very focusing on prevention health.

Speaker 1: What is your personal definition of sustainability?
BIO D: Everything you can do uhh, think less and that impact less. Less impact is important. Yes.

Speaker 1: Do you sell the products using a sustainability focus?

BIO D: We believe everything we do cause an impact on sustainability. We actually believe in a sense we work with sustainable health. Meaning that if we can invent a product at an early stage of life, you will feel better and have a more sustainable life, a longer life. You slow the risk in life where you have taken more medication. We use less cow milk…

Speaker 1: Balance between financial and environmental and social sustainability

BIO D: We are run and owned by Regal brothers and that also set financial setup to be long term. We have a long term sustainability view of finances and investments. If you do not see that long term aspect then you are not right investors.

Speaker 1: How does the organization encourage work-based learning

BIO D: We have a philosophy about what we want to create, the mission. That is something internally that we discuss and we integrate the philosophy throughout our team. We have strategic days and internal meetings our long term goal.

Speaker 1: External activities and collaboration

BIO D: very important. We collaborate with students from universities. We collaborate with a company in Norway.

5. BIO E

BIO E requested interview not be recorded. Noteworthy, BIO E suggested NGO A as an organization that help with organizational learning of sustainability.