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ENJOY THE READING!

Norwegian University of Life Science, Ås, May 1st 2011

Katja Brattestå

Summary

Markets are creating tougher competition which increases the pressure on organizations to learn and adapt, to be more proactive, and to change faster to stay ahead of competitors. Thus the ability to learn is very important. The notion of the "learning organization" is recognition of the importance to organizations of being able to respond rapidly and creatively to events outside the firm's boundaries. The challenge posed by the consequences that organizations have on the natural environment are among the most difficult that the firm faces. Effective strategies and responses demand that all of the firm's knowledge resources are used. Pressure from society implicitly makes the environment a part of the company's strategy by forcing it to adapt to social demands. The environmental achievements the learning organizations gain are not necessarily rewarded and not proven by a certificate or mark. As evidence of their commitment to environmental performance an increasing number of companies choose to get an environmental certification, if only to satisfy demands from customers and society.

As the number of environmentally certified companies continue to grow it is relevant to look at the effects and consequences this trend has on organizations' ability to learn. This study focuses on the ISO 14001 certification system, which has been criticized for several aspects including being both a "one size fits all" approach to all industries and for including only top management stakeholders. This is not compatible with the more dynamic and flexible approaches supported by the organizational learning perspective. As the study will show, the two approaches, ISO 14001 and organizational learning, have interactions that can lead to cultural challenges and learning limitations.

Learning organizations are dynamic and seem to fit the metaphor of organic organizations. ISO certification appears to be more compatible with mechanistic organizations, which are more rigid and facilitate other organizational aspects than organic organizations. To gain deeper understanding of the interaction effects that an ISO-implementation can have on an organization's learning ability, the paper starts with a theoretical discussion of both environmental standards and learning organizations. This identifies the main differences between the two approaches and sets the stage for a model that combines aspects from both approaches.

To illustrate the effects of a proposed ISO implementation, the oil industry exploration firm, PGS, is used as a case. The firm's learning culture is assessed using an instrument developed

by Di Bella et al. (1998). The initial assumption that this study is based upon is supported throughout the paper, showing several inconsistencies between learning organizations and ISO 14001. The conclusion is that the more learning based the organization is, the more will its characteristics conflict with the aspects facilitated by ISO 14001.

Contents

1.0 Introduction

1.1 Background

Given the environmental situation the world is facing today, resource allocation and protection of the environment is a hot spot on the agenda. A stricter environmental policy confines companies' freedom of action and imposes a maximum amount of emission, quotas and regulations. At the same time there is a development towards greater social responsibility from the industry side, both because of pressure from the government and consumers but also because "the polluter pays" principle is widely accepted and organizations see the global and critical need for enterprises to minimize their negative effect on the environment. As a result, the use of environmental management increases and initiatives such as environmental standards burst. The number of certified organizations is increasing, and in Norway the number of ISO 14001 certified companies have reached over 750. In addition there are other certifications, such as the European standard, EMAS, Green Globe 21, Energy Star and the White Swan to mention a few.

At the same time markets are facing constantly greater competition and the need of being proactive, innovative and ahead of competitors is impending. Therefore it is crucial for firms to cultivate a corporate culture that opens for creative thinking, learning and flexibility, and this is a growing trend among companies all over the world. Such learning organizations often manage downturns and challenges better, because they are more proactive and adaptable and have a culture that facilitates change (Garvin, 2000). Theoretically, adaptable companies with a focus on learning and development, or learning organizations, have no explicit objectives regarding environmental improvement or eliminating the organization's negative environmental impact, as opposed to environmental certified organizations. Instead, a learning organization has the objective that the organization more easily will cope with challenges and adapt to these. Environmental challenges and pressure from society for the organization to take a social responsibility, exposes the organization to an increasing pressure and a need for the organization to adapt. Therefore an environmental improvement or a decrease of organizations negative impact on the environment will be an implicit objective for a learning organization. Nevertheless a learning organization gets no evidence of its environmental achievement through a certification. Based on this, organizations might find that their

achievements are more noticeable and appreciated if they follow and meet the requirements of an environmental standard and gets certified. There is increasing popularity in using environmental standards to attempt to minimize the negative impact on the environment. This is because standards are structured and relatively easy to act in accordance with. At the same time the achievements are more visible with a certification. The result is that organizations face an increasing demand for certifications such as ISO and EMAS by its customers. Some firms solely do business with certified organizations.

This paper follows ISO 14001 and learning organizations - and places them in relation to each other to facilitate an understanding of the differences and further the interaction effects obtained by merging the two as a learning organization with an ISO 14001-certification. The paper points to differences from intervention level in the system, to placing them as organic and mechanistic, to describe the different approach and focus in the matter, to show why it is challenging for these approaches to work together.

1.2 The objective of the paper

ISO 14001 is a world-wide standard designed to fit all industries. To make this possible, the standard is general, but it has also been criticized for being rigid, hierarchical and for only including upper management stakeholders (Moxen and Strachan, 2000). It is therefore interesting to ask critical questions about how the organizational part of ISO 14001 is consistent with an organization's development and culture. It is also interesting to look at what interaction effect you get by implementing an environmental standard in an organization with a focus on organizational and human development together with a focus on ability of being adaptive to more easily follow changes they are exposed to. Based on this, the objective of this paper is to examine how the organizational intervention of an environmental standard, such as ISO 14001, affects the desired outcome of an organizational learning perspective. Accordingly this paper will identify the organizational conditions ISO requires that will lead to environmental management. The purpose of this is to see to what degree these conditions are consistent with the conditions considered desirable to gain an organizational structure that facilitates welfare and a good culture together with ability to change, adapt and evolve new strategies to adapt to any situation the firm faces.

To summarize, this paper examines the interaction effect between an organization's ability to learn, its learning culture, and the adaption of an environmental standard. Are these two trends consistent or working against one another?

1.3 Environmental management

Environmental management is a way of doing business where the environmental conditions are integrated in the business strategy - resulting in a change in attitude and participation among not only the management, but also the rest of the employees (Jørgensen, 2001).

Environmental management contributes by adapting the organization to more easily identify and thereby minimize its negative effect on the environment. At the same time the organization can benefit from this by reducing its costs with a more cost-effective strategy and increase its market value and goodwill through a stronger environmental profile. The focus on the environment is increasing, which pressures the organizations to take part in the process toward a greener profile with less negative impact on the environment.

There are many ways of implementing environmental management. As mentioned a growing number of organizations choose to get certified as a part of their process towards minimizing their negative impact on the environment. However, one might ask to what degree implementing a standard is an effective way of getting an organizational change. As mentioned, Moxen and Strachan (2000) have criticized ISO 14001 for being rigid, among other things. In addition Meadows (1997) characterizes the use of standards as an example of an initiative with low leverage points, meaning to what degree a small shift in one thing can create big changes in everything, and further, that standards do not have this power to generate big shifts. The size of the environmental challenges the world is facing today is of such a character and dimension that it becomes what Rittel and Webber (1973) called "a wicked problem". This means that no matter how effectively an organization is capable of solving problems, the environmental problem is of such a nature that there is no solution to the problem. Wicked problems have no solution such as right or wrong, the closest one can get to right is whether the action or decision is good and not bad (Rittel and Webber, 1973). Based on this the best one can do is experiment along the way and continuously try to take the best decisions that improves the situation the most. Such a mobility and adaptability is what a learning organization strives for and this might lead to a conflict with a somewhat more rigid ISO 14001.

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It is therefore interesting to ask in what degree an environmental standard, such as ISO 14001, can be implemented in a learning organization, which is everything but rigid. Will it be flexible enough to allow everything that follows a learning organization, being dynamic, participating and in constant change. As mentioned, this paper is a critical view on a standard's influence on an organization, including its culture, the employees and the desirable structure, to see in what degree standards are consistent with these organizational aspects.

2.0 Theoretical perspective

2.1 Organizational learning

What makes a learning organization different from traditionally, authoritarian and controlling organizations is that learning organizations master various disciplines. Discipline is understood as a field where you need to be in possession of certain knowledge and skills. Peter Senge (1991) describes a learning organization's five disciplines in his book, The Fifth Discipline: The Art and Practice of the Learning Organization. These disciplines are different from traditional organizational disciplines, e.g. accounts, because they are personal disciplines. Each discipline turns on how individuals think, wish, interact and learn from each other:

1. Personal mastery: Goes beyond knowledge and skills, and is also about living the life in a creative way in preference to reactive.
2. Mental models: We are often unaware of our mental models and are therefore not able to see how they affect our behavior - we need to learn to see our inner images of the world to be able to make them objects of scrutiny.
3. Shared visions: To create a shared vision means being able to reveal the shared pictures of the future that encourages genuine willingness to contribute, and participation rather than obedience. It is not a shared vision until it is a part of the personal vision of all the employees of the organization.
4. Team learning: The intelligence of the group can exceed the sum of intelligence of each of the group's individual members.
5. Systems thinking: The five disciplines develop parallel and it is the systems thinking that integrates and melts the disciplines together to one unity of theory and practice. Without systems thinking you are not able to see how the disciplines are connected and how they influence the totality. When each of the other four disciplines is encouraged, we are constantly reminded that the totality can be greater than the sum of each part.

Organizations can only learn if the employees learn, but individual learning is not a guarantee for organizational learning. However, no individual learning is a guarantee for no organizational learning (Senge, 1991). Organizational learning is especially increasing within dynamic industries in constant change (Garvin, 2000). An example of this is industries characterized by technology, where the most successful are those who are always a step

ahead, such as Apple and Google. The ability to change, adapt and solve problems is also an advantage when the environmental issues demand industries to take action and minimize their negative impact.

As already stated, organizational learning has no immediate objective concerning its environmental impact, and thereby no clear directions of practicing environmental management such as environmental certified organizations. However, the abilities a learning organization develop, gives it the ability to notice changes, challenges and threats faster, and thereby come up with a solution or action. The challenge the environment exposes the industry to implicitly make minimization of organizations' negative impact on the environment a goal for the organization.

Learning organizations are characterized as adaptive organizations capable of seeing changes in the society, but also within the organization, and then adapt to these changes continuously. In short, this theory has as its object to learn, learn from experience and incorporate this knowledge in the organization, as feedback to planning processes (James, 2003). Organizational learning can qualify the organization to create, acquire and transfer knowledge and to modify its behavior to reflect new knowledge and insight constantly (Garvin, 2000). According to Garvin (2000), learning organizations are skilled at five main activities; experimentation with new approaches, learning from the experience and best practice of others as well as learning from their own past history and experience, systematic problem solving and transferring knowledge quickly and effective throughout the organization. Learning organizations differ from other organizations by their conscious focus on constant learning and sharing knowledge with the entire organization. This process results in valuable knowledge workers. The process is long term and continuous, and built up by first acquiring knowledge and then sharing this knowledge. This often leads to new understanding and thereby new knowledge. With that, this information is given different interpretations, and finally, this knowledge is stored in the organization for future need. The following paragraphs go more thoroughly into these four components, acquiring, sharing, interpretation and storing knowledge.

Acquiring knowledge
As early as the organization's birth, it possesses a certain amount of knowledge. This knowledge contributes by determining what the organization is searching for, what it experiences and how it interprets what it finds. After birth, the knowledge level increases by

experience, either through a conscious and systematic effort, but usually it happens unconsciously and unsystematically (Huber, 1991). It is also normal for new organizations, as well as old, to learn from best practice of others, their strategy and technology. A part of the organizational learning process is also to transfer knowledge by either buying established companies or by hiring employees from other companies possessing knowledge the organization otherwise would not possess.

Sharing knowledge

The organization's information distribution ability is a determinant of both the existence and width of organizational learning in the organization. Often one section possesses information useful for other sections, without knowing that this information is highly relevant for others. At the same time, the section in need of the information is often unaware of its existence or its whereabouts. Little research is done on the subject, regarding how one actually find one another in practice (Huber, 1991). Two possibilities however, would be to internally transfer employees or using teams compounded of different levels and departments on projects and when working on changes, strategy, goal setting etc.

Interpreting knowledge

Interpretation of information is the process that gives meaning to the information, and develops a collective understanding (Daft and Weick, 1984). The organizational learning ability increases when different comprehensions evolve, because it expands the range of potential behavior, because different understandings result in different actions (Huber, 1991). Additionally Huber (1991) claims that the level of organizational learning can increase when units in the organization understand the interpretation of other units in the organization.

Storing information

The storing of information in the organization is often unsatisfactory. Reasons might be that one does not store information that one does not know will be important for the future, because future needs are not always predictable or possible for the organization to see. At the same time, the organization is not always fully aware of what it knows (Huber, 1991). However, storing of information is vital for a higher level of organizational learning. Both the ability to use and to store information is vital for the efficiency of the organizational memory. The organization's ability to learn is determined by the level of the four steps described above, but it is also determined by how conscious the organization is of its learning and information distribution. Learning on a higher level, or double-loop learning is interesting in

this setting, because on this level it is more likely to find interaction problems between the organizations ability to learn and an environmental standard. This is owing to the focus a learning organization has, which will be more thoroughly described in the following chapter.

2.1.1 Single- and Double-loop learning

All organizations learn in some degree, whether it is conscious or not. An example of learning on a lower level could be when a mistake is aligned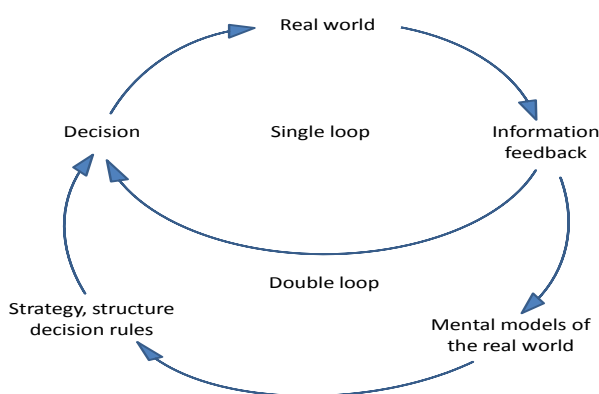 by fixing the mistake, often through a routine procedure, and the strategy is changed, but not the norms (Argyris, 1977). Environmental actions in such organizations will primarily affect the production department, while there is no attempt made to integrate an environmental profile in the entire organization. Learning on a lower level, or single-loop learning, exists in every organization, conscious or not.

Figure 2.1 Double-loop learning

The upper circle in model 2-1 shows a single learning loop. To include the whole circle – that is, to make the existing learning processes more effective, we need to open for double-loop learning, or learning on a higher level.

Organizations with double-loop learning will also change the norms. They will have a bigger focus on strategy and action, and have a long term effect (Argyris, 1977). A learning process often starts with a crisis in the organization or in another organization, resulting in a need to act quickly and change structure and systems to adapt to the new situation. It can also start with a conscious proactive process. Double-loop learning requires a more comprehensive training program than single-loop learning. Each employee is an investment that becomes a valuable knowledge worker. Employees on every level are rewarded for ideas and innovative thinking. They are continuously urged to seek new knowledge to be able to see new perspectives (Banerjee, 1998). Additionally they are rewarded when they see that their contribution counts, and that they are a part of development and new processes. When employees take part in the process that affects them through new routines, procedures and work tasks, it is positive that they feel a certain control over and participation in the

development process. This reduces stress and the employees' openness to changes if there are accordance between demand and control (Karasek and Theorell, 1990). Learning organizations arrange for such conditions, where employees' participation also results in the ability to evolve themselves. Involvement in decision and changing processes has been shown to increase job satisfaction (Kaufmann and Kaufmann, 2009).

Learning organizations focus on everyone in the organization participating in processes. This is to prevent exclusion of information, ideas and knowledge that exist in the organization and that can contribute in the process. By making teams from different hierarchical and structural levels of the organizations, you get a result with input from every level, based on a broader knowledge and point of view. Not only do the employees feel that their knowledge and contribution counts, which gives them a feeling of having a meaningful job, but in practice they are actually an important resource for the organization. They are also one of the factors that give a learning organization the ability to innovate and adapt. To achieve continuous information and communication flow, a flatter organizational culture and structure is preferable to a hierarchical structure. Independent of whether there is a conscious focus on learning or not, the general development in industries is toward a flatter organizational structure, in preference to a hierarchical structure with more focus on control and reporting (Hillestad, 2003). This development opens for self-directed teams and decentralization of authority (Hillestad, 2003). It is not unfounded that learning organizations facilitate a flatter organizational structure. Fewer organizational hierarchical levels opens for flexibility in the organization as well as making it easier to be adaptable and pave the way for an overall information flow and effective interaction and communication between departments and competences (Hillestad, 2003). These are conditions that the organizational part of an environmental standard should be consistent with, since they characterize a learning organization, and are conscious, positive and wanted effects of a flatter organizational structure.

A team comprising different hierarchical levels also results in more certainty for the employees regarding the situation in the organization, since they frequently take part in changes, implementation and development of new procedures. When the employees are involved in processes they become aware of changes and the current situation in the organization. This has been shown to increase job-satisfaction, because the employees feel a higher assurance regarding their place of work and employment, which again leads to less

stress (Hellesøy, 2002). When you remove stress owing to uncertainty and a feeling of lack of control, you will at the same time open for a better organizational culture.

A double-loop learning organization possesses abilities to reject and throw out old ways of doing things or old rules and norms rather to maintaining old and safe routines (Banerjee, 1998). This contributes to placing old problems in new light and challenging existing paradigms instead of being satisfied with recycling, or being content with only meeting authorized discharge levels and not going further. The teams mentioned earlier play an important part because critical and innovative eyes from different levels of the organization, creates a much more adequate insight than what the management alone would have had. Working in teams creates an arena were good results are made visible and are rewarded. Positive and negative feedback are given, knowledge and experience are shared and identifying the cause of bad results is also an important task. This way a team activates a set of learning mechanisms (Colbjørnsen, 2002). The teams are therefore a deliberate composition with the intention of developing the employees and further developing new ideas to create a higher knowledge level in the organization. This is consistent with the organizational aspects in ISO 14001, seeing that it is undesirable to change compositions and processes that evidently are profitable for the organization and the employees.

To summarize, desired aspects in learning organizations are mainly the conditions that lead to learning mechanisms, a flatter organizational structure that gives an open flow of information, flexibility and teams made up of people from different levels in the organization. Participation and innovative thinking are key elements in learning organizations. Based on this, the objective is an adaptive and dynamic organization consisting of valuable knowledge workers.

2.1.2 Organizational learning capability

To be able to understand the interaction effect an ISO implementation has on the capacity or processes that maintain performance based experience in the organization, it is essential to identify where and how learning takes place, the nature of what is learned and the structure and process that affect how easy or hard it is for learning to take place. In other words, to identify the learning culture to be able to see which aspects of the culture that possibly conflict with organizational aspects of ISO 14001. DiBella et al.(1998) divide the framework of learning capability into two aspects. First is the *learning orientations* that Nevis et al. (1998) describes as the values and practices that reflect where and how learning takes place and the nature of what is learned. Secondly, *the facilitating factors* describe the structures and

processes that affect how learning occurs and "the amount of effective learning that takes place" (Nevis et al., 1995). How an organization rates on these factors describes the methods that are used to support learning activities. To understand an organization as a learning system, both the learning orientations and the facilitating factors are necessary to provide a complete picture. These two components are also the same as used in the case study of PGS starting with chapter 5, and the next sections give a more thorough explanation of the learning orientations and the facilitating factors.

The learning orientations

Seven learning orientations

	Name	Approach		
1.	Knowledge source	Internal	→	External
2.	Product-process focus	Product	→	Process
3.	Documentation mode	Personal	→	Collective
4.	Dissemination mode	Formal	→	Informal
5.	Learning focus	Adaptive	→	Innovative
6.	Value-chain focus	Design/make	→	Market/deliver
7.	Skill development focus	Individual	→	Group

Figure 2.2: The learning orientations (DiBella et al., 1996)

Figure 2-2 shows seven learning orientations where the organization can identify itself in one of the two poles, or anywhere in between. Organizations might also use a mix of both.

Knowledge source as the first learning orientation is defined as the extent to which the organization develops new knowledge internally or through their competitors or other external sources such as research centers or suppliers. In other words, preferring to be innovative vs. adaptive, or imitating others. Americans often value innovation and look down on imitators, while the Japanese are good at imitating. According to Nevis et al. (Nevis et al., 1995) both innovating and imitating can be good as two opposing styles.

Product-process focus refers to a preference for accumulation of knowledge regarding what the products or services are or emphasis on how the organization develops, makes and delivers its products or services. Japanese companies make considerably more investments in process technologies than U.S. companies do, and this might be a reason for why Japanese

companies are so competitive (Nevis et al., 1995). All organizations invest in both sides to some degree, but the key is to organize for learning in both domains.

Documentation mode as the third learning orientation is divided into personal and collective knowledge. At one pole knowledge is something an individual possess, based on education and experience. The organization looses this knowledge when the employee leaves the organization, because it was not shared. At the other pole knowledge is a social term, with emphasis on sharing and making knowledge a part of the organizational memory, with the challenge of making tacit knowledge communicable.

Dissemination Mode refers to whether the organization has an atmosphere that evolves learning or if the organization induces learning with a structured and controlled approach.

Learning focus as the fifth learning orientation pertains to whether learning is focused on method and tools to better the current practice, or if the underlying assumption on what is being done is tested. This is what Argyris (1977) called single-loop learning and double-loop learning, and further said that performance difficulties often are related to lack of awareness and ability to articulate and see the underlying assumption, and not poor efficiency.

Value-chain focus refers to whether organization focuses the most on internal activities and a "design and make" nature or a more external focus with a "sell and deliver" view. This indicates which learning investment and core competencies that the organization value.

Skill development as the seventh and last learning orientation refers to individual versus team or group learning. Today's network-world facilitate individual learning, but Senge (1991), among others, argues that team collective learning is better for the organization than individual learning is. Both individual and collaborative learning are necessary and not mutually exclusive (DiBella et al., 1996).

The facilitating factors

The facilitating factors are the processes of practices that promote learning, and the more these factors are present, the easier it is for an organization to learn (DiBella et al., 1998). The factors that facilitate learning are explained through model 2-3.

Ten Facilitating Factors

	Name	Approach
1.	Scanning Imperative	External information gathering; awareness of and curiosity about the external environment, in contrast to the internal environment.
2.	Performance Gap	Performance gaps are seen as opportunities, and thus a shared perception of the gap between actual and desired performance.
3.	Concern of Measurement	Considerable effort on measuring and identifying key factors, searching for specific and quantifiable measures.
4.	Experimental Mind-set/ Organizational Curiosity	Support for trying new things; curiosity, "play" with things, accepted "failing" - giving a continuous series of learning opportunities. Changes in work processes, structures and policies are considered learning opportunities.
5.	Climate of Openness	Open communication; problems and errors are shared, not hidden and debates and conflicts are acceptable when solving problems.
6.	Continuous Education	Commitment of quality resources to facilitate learning. An ongoing commitment to education, growth and development of all members of the organization.
7.	Operational Variety	Appreciate diversity by valuing different methods, procedures and competencies.
8.	Multiple Advocates	Multiple advocates and champions exist, by letting new ideas and methods burst from all levels of the organization.
9.	Involved Leadership	Leaders articulate the visions, they are involved in the implementation and in learning initiatives as well as ensuring that a learning environment is maintained.
10.	Systems Perspective	Interdependence within the organizational units and groups and awareness of time delay from action to outcome, problems and solutions seen in terms of systematic relationships among processes.

Figure 2.3: The Facilitating Factors

As mentioned, the ten factors that facilitate learning and the seven learning orientations described above are the same that build the survey developed by DiBella, Nevis and Gould (1998), which will be used in the case study of PGS. This rounds up the theoretical perspective on organizational learning and brings us to the standards. The following section

goes in depth of ISO 14001, and gives a comparison of ISO 14001 and EMAS, to contribute to placing ISO 14001 among optional standards.

2.2 Standards

The objective of environmental standards is to encourage sustainable development and involve environmental management, energy, quality on environmental data and information as well as specific actions. The scopes of the standards differ from national to European and to international standards. This paper deals with the global environmental standard, ISO 14001 and touches EMAS mostly as a comparison helping to place ISO 14001.

2.2.1 ISO 14001 vs. EMAS

The purpose of EMAS, "Eco Management and Audit Scheme", is to stimulate and facilitate a systematic development of the organization's environmental practice beyond the demands of national environmental legislation. EMAS gives official acknowledgement to organizations with environmental initiatives that go beyond what is demanded by law. This means that organizations with high environmental goals, by implementing environmental management systems to reach the goals, are committing themselves to continuous control of systems and results and informing the public of the work (Roseng, 2003a).

The similarities between ISO 14001 and EMAS are many, which have resulted in confusion regarding which standard to choose. Because of this the European Commission formally approved conformity between system requirements in ISO 14001 and EMAS. This means that while ISO 14001 can be considered a standard within the scope of EMAS there are still considerable differences between these two standards, see model 2.4.

ISO 14001 does not demand a given environmental performance or improvement of the environmental impact. Rather it requires commitment to and improvement of the management system and gives structural requirements to the management system (Oluoch-Wauna, 2001). When the standard has its focus on the management system and requires certain structures and circumstances, it interferes with the organizational and cultural situation. This opens for greater possibilities for interaction problems with the organization. This stands in contrast to a

standard requiring an improvement of the environmental impact and leaving the method and structure to the organization. This latter alternative does not necessarily interfere with the organizational aspects of the organization by forcing it to change. Since organizational change is required by ISO 14001, it is important to understand the interaction of this with the organization's learning processes.

	EMAS	ISO 14001
Scope	European standard established under the EC Treaty. A statute which is a part of the legal system of the member states.	Global standard, a product of private people joined together as ISO, with a common purpose. Private document.
Publication of environmental performance	Must make an environmental statement validated by an independent accredited verifier, informing the public of its environmental goals, policy and *achieved results*.	No obligation to provide public information. Only requirement is to ensure that its *environmental policy* is available to the public and that procedures are in place.
Observance with environmental regulations	Demands compliance with relevant regulatory requirements on the environment.	Must identify legal and other requirements to which it subscribes. No compulsory requirement for compliance.
Third party verification	Verifiers are accredited by each member state helping to eliminate joy-riders.	The requirements can be met by self-declaration or by an accredited third-party registrar.
Continuous improvement	Obliged to a continuous improvement of the environmental performance.	Continuous improvement of the environmental management *system*.

Figure 2.4: EMAS vs. ISO 14001

2.3 ISO 14001

The background for the ISO 14000-series was a demand from business managers worldwide to develop uniform rules and guidelines for environmental practice. A group of about 40 international prominent business leaders from ICC's Business Council for Sustainable Development (BCSD) put forward a wish to the International Standard Organization (ISO) for an international standard for environmental management. ISO started developing the 14000-series and introduced the system in September 1996. The intention of the system was to help organizations build and operate a structured and systematic environmental framework in order to ensure continuous improvement of its environmental performance (Roseng, 2003b).

2.3.1 Objectives of ISO 14001

The main objective of the standards is to give a means of independently verifying that organizations have a reliable and comprehensive system for quality assurance that supports the organizations' goal and environmental policy. With such a system of quality assurance in place, ISO assumes that organizations can be confident that they act in accordance with their environmental policy (Moxen and Strachan, 2000). This assumption is made without making demands to the contents of the environmental policy. Customers, and the society in general, are skeptical to the environmental achievements claimed by organizations as well as for the environmental reports the organizations publish (Moxen and Strachan, 2000). It is precisely this distrust that ISO attempts to deal with, together with the lack of a common agreement on how to effectively transform the organizations' environmental policy into organizational behavior. The standard therefore specifies procedures the management can use in the organization to keep the implementation of the environmental strategy under surveillance. As a warranty of this, authorized independent inspectors come to verify that the organization has the mandatory implementation mechanism (Moxen and Strachan, 2000). To achieve such verification, the organization needs to go through defined steps. With that, the organization's environmental management must comply with ISO's principles. Primarily, ISO 14001 is a means to secure that the organization has the mandatory procedures necessary to implement an environmental program.

Management can decide their environmental policy and the content of their programs as well as the specific environmental goals, meaning that they determine the organization's change in its environmental impact. ISO does not interfere in this matter, but influences through the

environmental management system that certified organizations must facilitate. Actually this means that an organization wanting to get certified has no need to reduce its negative impact on the environment, because ISO only make demands on their environmental management system. From an environmental point of view, this is a criticized aspect of ISO, but on the other hand, this is one of the reasons why ISO 14001 receives support from the government, industry and academic communities. The certification avoids problems by not interfering in the established approaches the organization has to the environment, by only interfering in the environmental management system and keeping out of environmental goal setting and pace of improvement. This means that when ISO 14001 is talking about a continuous improvement, it refers to the environmental management system and not the actual environmental impact (Moxen and Strachan, 2000).

ISO 14001 is considered an independent means to verify that certified organizations have the systems and procedures necessary to lead an implementation of a challenging environmental program in the organization. In that respect, it can be considered successful. ISO 14001 is designed to make one standard fit all organizations irrespective of industry, country and location. However, this limits the specific demands ISO can set. Based on this, ISO has been criticized for having diluted demands (Bansal and Bogner, 2002).

To summarize, ISO 14001 focuses on the management *process* rather than on the *outcome*. If the organization meets the management system given by ISO, this can be verified by a third party and either the whole or a part of the organization can become certified. ISO 14001's intention is continuous improvement of the environmental management system and its structure consists of five parts that will be elaborated in the next chapter.

2.3.2 Steps for the ISO 14001-implementation

The first major step is the scope. The organization needs to identify its environmental impact, where all interaction between the organization and the environment must be accounted for. The second step is planning. The organization must develop a plan for how to reduce the organization's environmental impact, thereby reducing the changes in the environment caused by the organization. This implies for the organization to develop an environmental policy, set goals, delegate responsibility for the environmental management system, make documentation processes, and finally to change the organizational structure so that the environmental policy

can be effectuated and further, the goals can be reached. When the environmental policy is developed, the third step is to implement it, so that the work towards reaching the goals can start in practice. That implies that the employees affected must be trained and the procedures must be documented. When this is done, the *actual* environmental impact must be identified, and any nonconformance with the goals must be addressed. In the last step the management must evaluate the management system and make the necessary changes. They might reevaluate the entire system, the structure, the goals and the policy, and thereby making a continuous improvement possible (Bansal and Bogner, 2002).

2.3.3 Organizational aspects of ISO 14001

As mentioned, ISO 14001 requires the management system to meet certain structural changes, directing the focus to the management system and not to the environmental performance itself. The assumption is that when a good management system is in place it gives the company the organizational setting necessary to carry out a successful implementation of its environmental policy. The influence that ISO has on a company seeking certification presents a challenge in whether it is consistent with desired organizational aspects, such as increasing organizational learning focused on environmental performance.

Even though the purpose is to facilitate continuous improvement, the organization can scale down their goals if they find them too ambitious initially, or if the costs associated with reducing the negative impact on the environment turns out to be higher than initially calculated.

Scaling down the goals will not go against the principal of continuous improvement, because ISO 14001 focuses on continuous improvement of the environmental management system and not environmental conditions and results (like EMAS does).

In practice this means that organizations' environmental impact does not need continuous improvement. Bansal and Bogner (2002) claim that this is exactly one of the reasons ISO 14001 has been criticized. The only demand is to implement a system that can monitor the organizations' environmental aspects and their achievements without demanding any improvement of the environmental impact. The result is that the organization can get certified even though its environmental impact deteriorates as long as the monitoring system or environmental management system meets the requirements. Consequently, heavily polluting

enterprises can get certified if they meet the requirements for the environmental management system. Regardless of this, ISO 14001 is considered satisfactory worldwide and is associated with environmentally friendly operations, even though it is not necessary to reduce the negative impact on the environment in practice.

Despite the fact that there are no annual emission reduction requirements, it is still required that the organization identifies its initial environmental impact. It is possible that the fact that there is no requirement for continuous improvement attracts organizations looking for an easy way to get recognition for being environmentally friendly. On the other hand, not all organizations are willing to reveal their environmental impact. There may be a number of reasons for this. Organizations may naturally want to avoid the negative attention they risk by revealing their impact if it is greater than society is aware of. It may also be due to the awareness that the environmental impact is greater than expected, and that a certification can result in economical difficulties for the organizations if it wants to reduce its negative impact. At the same time, not doing anything after society becomes aware of the negative impact can give the business a bad reputation. As a result, it can be tempting for organizations with low negative impact on the environment to get certified, while heavily polluting companies with a significant negative impact on the environment, and where the need for action is imminent, may choose not to get certified. This decision may be made in order to avoid revealing its negative impact and as well to avoid costs associated with reducing pollution.

Another factor that indicates that heavily polluting companies do not get certified is that certified companies get a more complete documented history. This is because a disclosure of its negative impact is required. Initially it was the intention that certified companies would not have to be investigated by outsiders, but because it is easier to find paper track from certified companies this results in the fact that heavily polluting companies choose not to get certified, to avoid investigation (Bansal and Bogner, 2002).

Taking the last two paragraphs into consideration, it makes it difficult to imagine ISO 14001 as a crucial or significant contribution to deal with the environmental issue when you actually are not required to improve the impact on the environment together with the fact that heavily polluting companies are given an incentive not to get certified because of the paper tracks.

Moxen and Strachan (2000) claim that ISO 14001's components and mechanisms have a great influence on cognition and action taken by individuals and groups in the organization. By that they mean that processes like perception, learning, analysis and decision taking will be largely

affected by the organizational setting. In addition an ISO-implementation will affect the organizational setting through the changes and adaptations necessary to meet the requirements given by ISO 14001. Thus, for most businesses, an implementation of ISO 14001 means that the certification conditions are strongly influential and long-term and result in fundamental changes that will last for a long time (Moxen and Strachan, 2000).

ISO 14001 encourages and favors a hierarchical organizational structure with centralized decision making, a traditional management structure and a formalized work environment (Moxen and Strachan, 2000). This is to make it easier to meet the requirements of control and overview of the system for the management. Such a structure has more hierarchical levels than a learning organization would facilitate and it is characterized by rules and routines to make reporting and control easier (Hillestad, 2003). Both the tasks of the job and the solution to challenges are more often given from higher levels in a hierarchical organization (Hillestad, 2003), while employees in a learning organizations are more free and encouraged to find solutions themselves. According to ISO it is exclusively management's task to develop the organization's environmental policy. Furthermore, ISO does not encourage involvement from other levels of the organization (ISO, 1995a, p. 8 (Moxen and Strachan, 2000)). This is a direct contradiction to the learning organization concept that uses significant resources on training their employees to, among other things, get involved. ISO keeps middle managers outside the process, and together with the rest of the department they get their responsibilities and methods to carry out their jobs defined by upper management, and their work must be documented (ISO, 1995a, p. 9-12 (Moxen and Strachan, 2000)). ISO 14001 encourages organizations to create a culture that facilitates control, regulation and documentation (ISO, 1995b (Moxen and Strachan, 2000)).

The environmental management system developed in the process of getting an ISO certification will be the entire organization's responsibility to follow and use. Nevertheless, only management and possibly the environmental manager are developing the management system alone, without including the people who will be affected by the changes. That gives the impression that management thinks they are the only ones with the necessary knowledge, ability and creativity to allow innovative thinking and to develop new systems and ideas. Based on this, Moxen and Strachan (2000) criticize ISO for claiming that decentralization, participatory decision-making processes, motivation and facilitating a culture that opens for communication in the organization, are unnecessary elements in the process. A hierarchical

structure does not facilitate such elements, in addition to the fact that management develops the system alone.

Such a comprehensive change which is necessary to come to terms with the environmental challenge, is only attainable if groups from every organizational level investigate their personal processes and norms, in order to identify the norms that do not interact with the new environmental policy and objectives. Finally they can adapt new norms that are consistent with the organization's objective (Moxen and Strachan, 2000). They conclude that ISO 14001 does not fulfill the necessary criteria that the system needs to facilitate a culture that appreciates analysis, self-reflection, honesty and changes. Based on the structure that ISO facilitates, Moxen and Strachan (2000) claim that the ISO standard prevents creative problem solving, which is necessary to implement challenging environmental programs. Additionally, the nature of the organizational changes makes it difficult for management to create such a revolution alone. Key factors that determine the organization's ability to change and adapt, are the direct opposite of factors in a formalized system with a hierarchical structure, which is rather said to be a barrier for exchanging ideas. As a contrast participating decision-making processes, a flat organizational structure, involvement and participation by the employees constitute a part of an organization with the ability to change and adapt (Moxen and Strachan, 2000).

While ISO 14001 deals with the problem as exclusively the management's responsibility, the environmental challenges, like other challenges, are a concern for the entire organization in a learning organization. These two approaches are very different by nature, which will show in their results. With such a different approach, the intervention level in the system will also be different, based on Moxen's and Strachan's (2000) assertion that ISO prevents creative problem-solving, while the conditions identified as key factors for creative problem-solving are factors that also are appreciated in learning organizations.

This last section has pointed at organizational aspects in both ISO 14001 and desired aspects in learning organization. The next section takes this comparison further in order to place these two organizational aspects relative to each other to a larger extent.

3.0 Discussion of the theoretical perspective
- ISO 14001 vs. Learning Organizations

Based on the theoretical perspective on what learning organizations and ISO 14001 are, in chapter 2, this section will go more in depth with identifying differences of the two approaches and further point out challenges with an implementation.

3.1 Structural and strategic characteristics

All organizations learn to some degree, whether it is consciously or not. An example of double loop learning is when, as shown in model 2-1 on page 12, the information you are given goes through mental modeling. The purpose of the mental model is to see the real world from different perspectives through thought processes. The intention is to represent the surrounding world, the relationships between different parts and the organization's intuitive perception about their own acts and their consequences. The mental model provides the foundation for the individul's or organization's interactions with the real world. It provides a template through which information is selected and processed for action. An important issue is the extent to which mental models are tested and kept flexible in the face of challenges. The problem with ISO is that it seems to require a relatively rigid approach to dealing with mental models and this will limit the organization's ability to respond creatively and appropriately to environmental issues.

In comparison to a more short term focus in the inner single loop learning circle, double-loop learning helps the organization to adapt its behavior and define its approach to solving problems and gives the organization a longer perspective and more insight into the surrounding world. This emphasizes the importance of systems thinking and adopting a holistic view on our surroundings, which was introduced in chapter 2. A learning organization and thereby an organization with a deliberate focus on learning, uses the double loop learning. There are several differences between these two learning circles, as shown in model 3-1. A fully generative organization, with all the characteristics of the right side of the model, will result in an unstable organization with too many changes and too much critical questions. Therefore a learning organization is not equaled to a fully generative organization, but lies somewhere in between the two poles - adaptive vs. generative, leaning towards generative.

Strategic characteristics		
Characteristic	**Adaptive**	**Generative**
Core competencies	Better sameness	Meaningful difference
Source of strength	Stability	Change
Output	Market share	Market creation

Structural characteristics		
Structure	Bureaucratic	Network
Control systems	Formal rules	Values, self control
Power bases	Hierarchic position	Knowledge
Integrating mechanisms	Hierarchy	Teams
Networks	Disconnected	Strong
Communications flow	Hierarchical	Lateral

Figure 3.1: Adaptive vs. Generative

On the other hand behaviors and characteristics that ISO recommends for organizations wanting to certify, is more similar to the adaptive side of the model, giving the characteristics of single loop learning. This shows differences between the ISO requirements and typical aspects of a learning organization.

3.2 Intervention levels in the system

The environmental work in learning organizations and ISO-certified organizations also differs when it comes to the environmental performance and the scope of change these two organizational systems result in. As mentioned in chapter 1.3, Meadows (1997) writes about places to intervene in a system in one of her articles. The choice of intervention level gives different results, allocated different leverage points. The places in a complex system where the slightest change in one thing can lead to changes of the entire system are given higher leverage points. This might be an entire economy, a company or an ecosystem. Meadows (1997) divides her range from low to high leverage. Low leverage is small, often easy, actions giving a little effect, or only effect on a short term. High leverage, on the other hand, is an action that is difficult to accomplish, but if succeeded this results in significant changes on a long term. The wanted interventions in a system are those given high leverage points, because such changes are revolutionary enough to give adequate changes or a sustainable development. Taking this into consideration, it is interesting that Meadows (1997) uses

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standards as an example on low leverage, and thereby places standards at the end of the list with the least ability to create changes as shown in model 3.2.

Places to intervene in a system
9. Numbers (subsidies, taxes and *standards*)
8. Material stock and flows
7. Regulating negative feedback loops
6. Driving positive feedback loops
5. Information flows
4. The rules of the system
3. The power of self-organization
2. The goals of the system
1 The mindset or paradigm out of which the goals, rules, feedback structure arise

Figure 3.2: Places to intervene in a system (Meadows, 1997)

Meadows (1997) claims that numbers (No. 9, standards) can be important, but only in the short term and for those standing directly in the flow, but they rarely change behavior. Standards will probably not change a chronically stagnant system, nor stabilize a wildly variable system or break a system that grows out of control. This can be illustrated with the interest rate, which is placed under number 9, numbers, together with standards. Despite the constant adjustment of the interest rate, this has not made business cycles disappear. Nor will more money spent on the police make crime go away; the problem is more complex than this. This means that, according to Meadows (1997), environmental standards such as ISO 14001 can be necessary but not sufficient. They intervene in the system on a level that is not deep enough to achieve lasting change, or a so called sustainable development.

The environmental challenge is what Rittel and Webber (1973) called a wicked problem - a problem without solution. When it comes to low leverage initiatives, such as standards, they are hopeless on wicked problems, because they don't have the power to lead to big and lasting changes. It is necessary with actions that intervene on a deeper level with a long term perspective.

Organizations with management systems that focus on using high leverage initiatives have a stronger position for learning and adapting to the environmental challenge. One might argue

that learning organizations focus on initiatives intervening on a higher level than ISO 14001 seems to do. This is because learning organizations use a long term perspective, focus on learning and have the purpose of challenging existing paradigms (Banerjee, 1998). These are all conditions for higher level initiatives. Still, this is not the same as saying that learning organizations in general get high leverage points, because challenging existing paradigms is not the same as actually changing them. Rather this means that their focus is on a deeper level than ISO 14001. Banerjee (1998) illustrates this point by saying that actions like recycling, source segregation and power saving are insignificant when facing such a complex problem as the environmental challenge. These actions are the kinds of initiatives that ISO-certified organizations implement.

3.3 Mechanistic vs. organic

Courtright, Fairhurst and Rogers (1989) described interaction patterns in organic and mechanistic systems. The organic system is much like a learning organization and the mechanistic system is similar to the ISO-system. ISO as well as mechanistic systems are characterized by hierarchical control to a greater degree than organic organizations, and are therefore more suited for a stable environment (Courtright et al., 1989). Organic organizational forms are characterized by a more dispersed control, just like learning organizations, and further more suited for unstable conditions and a changing business environment, because innovation and task accomplishment shift to the most knowledgeable part of the organization regardless of hierarchical status (Courtright et al., 1989).

The organizational aspects of ISO can be recognized in mechanistic systems through a one-way or top-down communication, where managerial instructions dictate what subordinates do. In such organizations there is also a higher level of conflict between managerial ranks, based on competition for resources, and top management resolves the case (Weick and Browning, 1986). In organic systems however, top management is not necessarily a part of conflict resolution because the center of control is problem specific, therefore the conflicts are localized, and handled and negotiated locally. The mechanistic systems show higher levels of conflicts because they don't negotiate and reach an agreement locally like organic systems, but the solution is made by top management without making peace and agreement between the parties. An example of an organic system is team self-management (Courtright et al., 1989), which is also typically in learning organizations. The thought behind this is to give

authority to the team, previously reserved for management, such as decision making, control of activities and choosing work procedures (Cummings, 1978). The research of the paper by Courtright et al (1989) also confirms what previous research has shown, that an organic system involves more two-way communication, more advice than orders and decisions from top management, and a general style in favor of consultation rather than command.

This perspective also contributes to support the assumption that it is challenging to implement a mechanistic system or an ISO-system into an organic system or learning organization. At least this leads to changes that are less participatory and flexible, which again has negative effects on systems dynamic, ability to change, adapt and innovate.

Now that ISO 14001 and learning organizations have been placed in relation to each other in several different ways the differences are clear enough to point at potential challenges when implementing organizational aspects of ISO 14001 into a model of a learning process. To summarize this chapter, the main differences are assembled in table 3-3. This gives a simplified picture of how learning in the organization is affected by an ISO-implementation and identifies problematic behavior of a system over time.

ISO 14001	Organizational learning
Centralized decision-making	Participatory management-style and flexible decision-making
Hierarchical organizational design	Organizational design that facilitates communication flows all ways
Formalized work environment	Fluid communication patterns
Emphasizes importance of rules, regulations and procedures	Emphasizes importance of confidence and freedom to each individual
System of inspection to ensure that procedures are being followed (ISO 1995a, pp 11-12 (Moxen and Strachan, 2000))	System for ongoing education to create innovative workers

Figure 3.3: ISO vs. Organizational Learning

A repeated main difference between the two is the marked division between the upper and lower levels of the recommended authority structure, which is a defining feature in ISO, while in learning organizations these differences are indistinct to facilitate innovative thinking and decision-making at lower levels.

4.0 Model building

The model, based on Spears' model (1993), developed in this chapter is gradually assembled to explain the organizational learning process and how an ISO-implementation can affect it. The model starts with one learning circle showing the learning process, and is gradually built to include the limits to learning and finally the possible effect of an ISO-implementation.

Learning is a complex process and a weakness of the model is that it is far from covering all the different aspects that contribute, limit or in some way influence the learning process. However, the model is kept simple to ease the use but still covering the most important aspects needed in this context.

Figure 4-1 is a causal loop diagram showing collaborative learning in a reinforcing circle. Willingness for public reflection is a key aspect, attaching the four loops in the three next models.
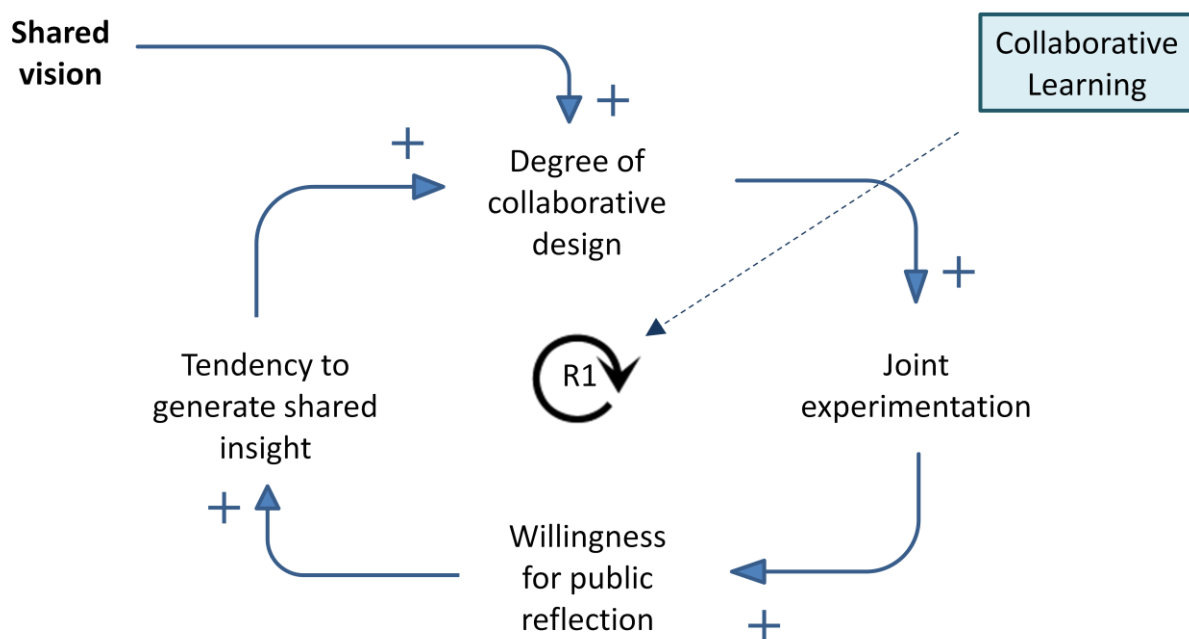
Figure 4.1: Team learning

To start with the bottom of the model, an increase of the willingness for public reflection in the organization, results in a positive effect on the *tendency to generate shared insight*. In other words, the more people in the organization talk, the greater is the tendency for shared insight. This means that people in the organization understand each other and understand why people have an opinion and a point of view, but does not necessarily mean that they agree.

The more people understand each other, the easier it is to cooperate, hence the positive effect on *degree of collaborative design* on the upper part of the loop. In addition, a shared vision among the employees strengthens the cooperation ability, because the employees are working in the same direction with a common goal. This is the same that Senge (1991) emphasizes as one of the five important disciplines to facilitate learning in an organization. As the model shows, this results in a higher degree of collaborative design.

Finally, when the collaborative design is increasing, *joint experimentation* increases as well. Good cooperation and communication facilitate a confident culture which allows experimentation, trial and failing. In an organization that is aware of the fact that experimentation results in learning and therefore has a positive attitude, you *facilitate willingness for public reflection*. This is because an employee in this kind of organization, is used to ideas and experiments being positively accepted and rewarded.
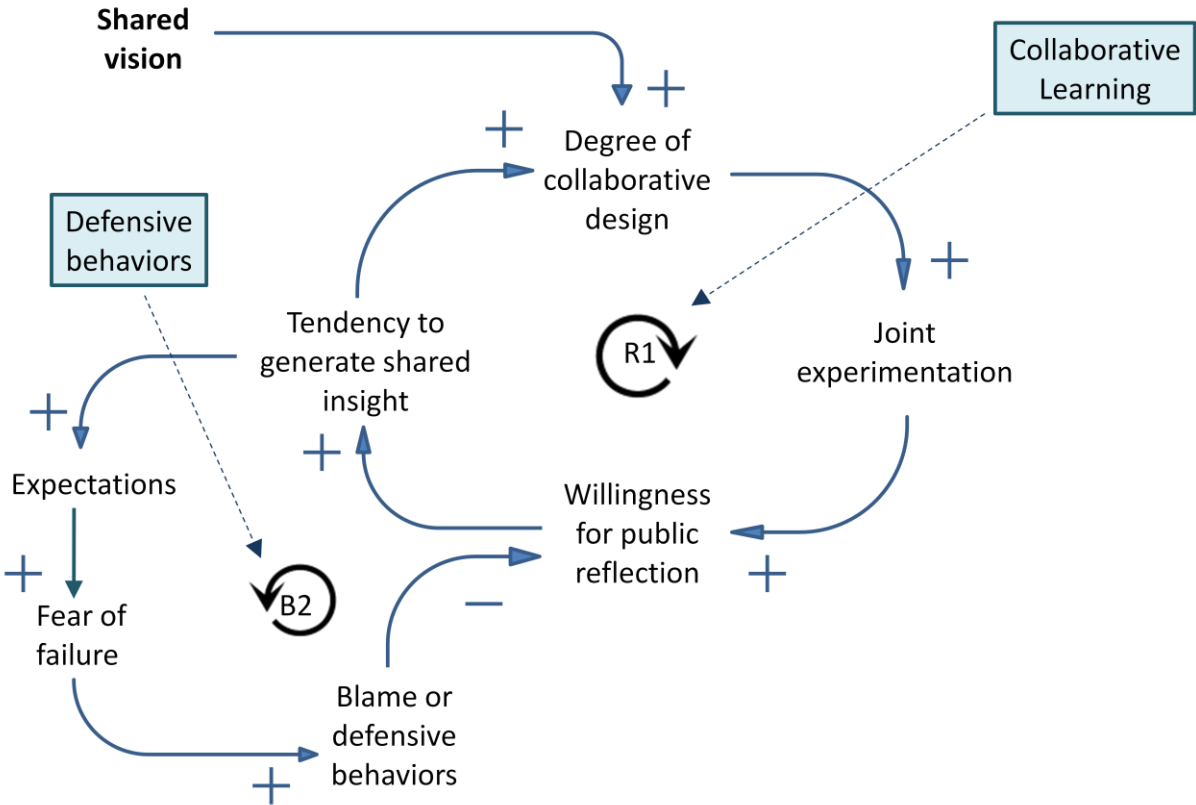

Figure 4.2: Limits to team learning, defensive behavior

In model 4-2 the first balancing aspects are added, showing the consequences of a defensive behavior on the original learning loop. The more dominant these aspects are, the greater the

negative effect on willingness of public reflection will be, resulting in less learning. The stronger the original reinforcing loop is (R1) the higher the success of experimentation, communication and learning is - leading to a continuous increase of *expectations*. The greater the expectations are within the group, the higher the drop will be if failing. Hence, the higher expectations - the greater the *fear of failure* is. The fear of failure leads to fear of getting *blamed* and therefore a *defensive behavior*, which again makes it easier to reduce the willingness of public reflection. By not talking and display ones views, the risk of failing and not meeting people's expectations are reduced, hence, no need for defensive behavior.

In model 4-3 yet another balancing loop affects the learning capabilities, and shows how willingness to communicate can be a limitation to team learning.
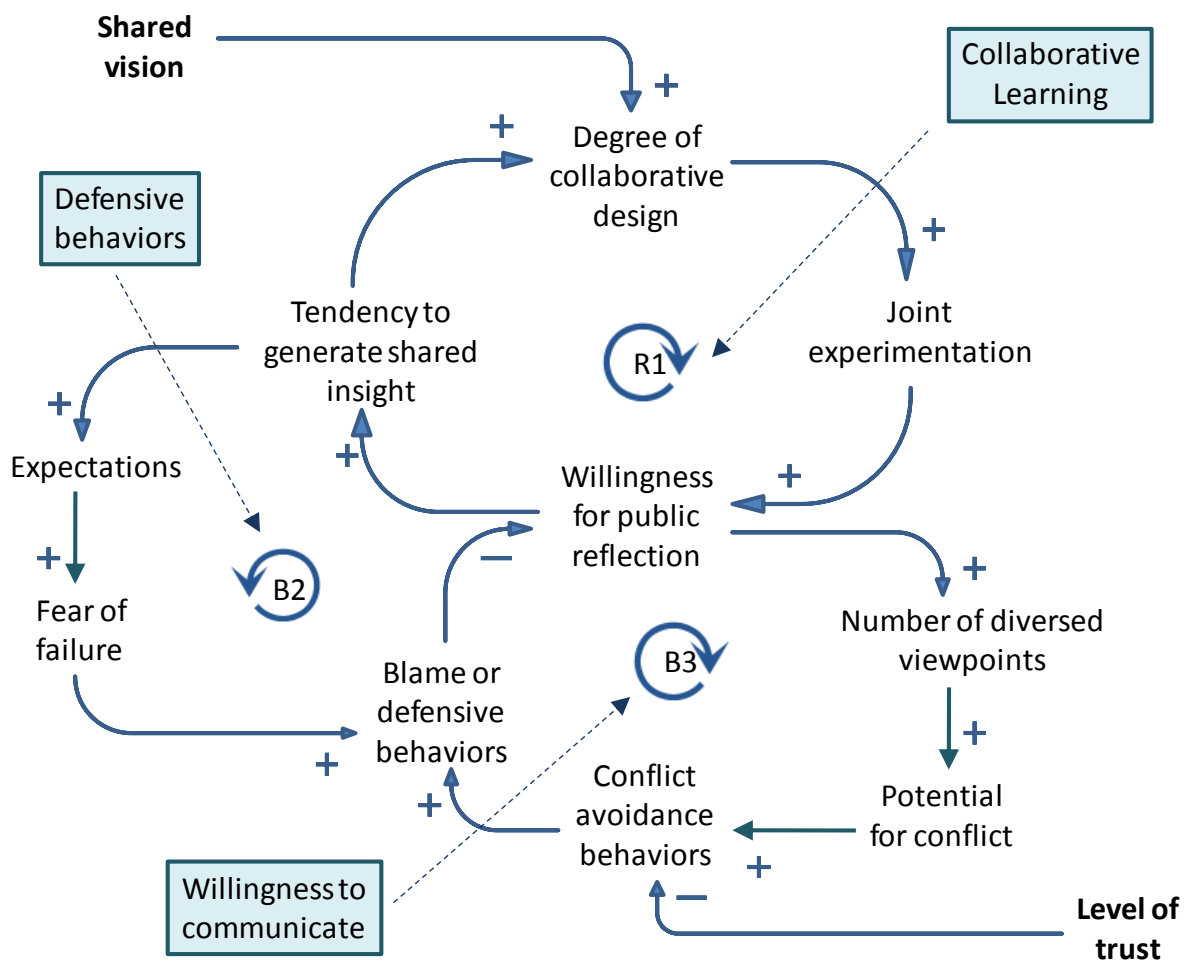

Figure 4.3: Limits to team learning, willingness to communicate

A high willingness for public reflection can also result in a *higher number of diverse viewpoints* because people, regardless of point of view, are not afraid of talking and sharing

their thoughts and ideas. Diverse viewpoints tend to result in a higher level of conflicts, at least the *potential for conflicts* increases. Most people avoid conflicts if possible, therefore this situation results in *conflict avoidance behaviors*. Still, if there is a high *level of trust* in the group this reduces the conflict avoidance behavior. Because people trust each other and feel safe in the group, they are not afraid of being blamed or exposed. If the conflict avoidance behavior still is increasing, *blame or defensive behavior* also increases as a defense mechanism. As a result willingness to communicate decrease to avoid conflicts.

Figure 4.4: Limits to team learning, interpreting actions
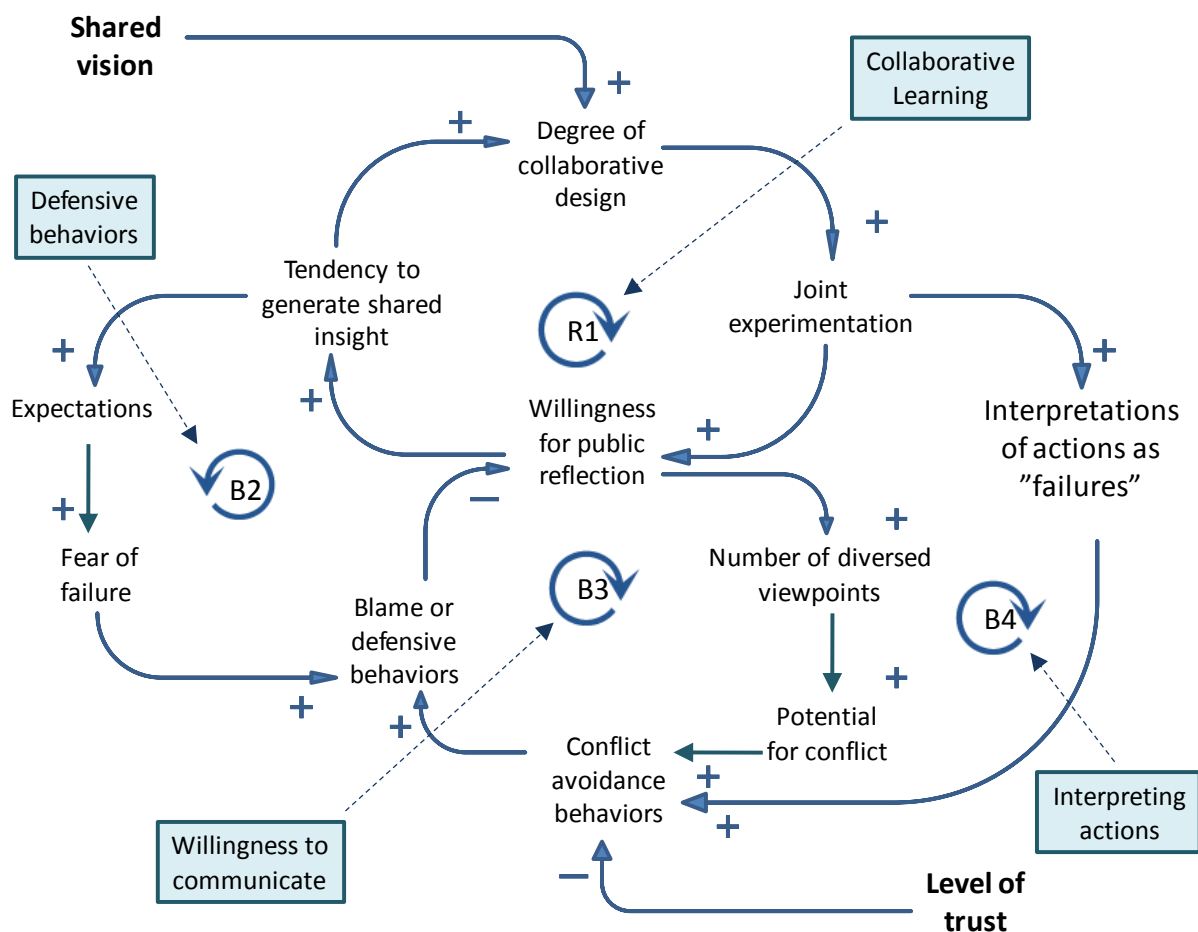
Model 4-4 has an additional balancing loop, B4, which limits team learning if actions are interpreted as failures. When joint experimentation increases, both the chance of failing and succeeding increase. There are side effects of experimentation resulting in processes that can reduce learning, by giving interpretations and expectations that are not in accordance with the

actual results. Hence, the more *interpretation of action as failure*, the more team members will protect themselves by conflict avoidance behavior, which brings us back to the B3 loop.

The model shows three mechanisms that work against team learning. A learning organization focuses on making the reinforcing loop, R1, the dominant one. A culture that appreciates and rewards new ideas and innovative thinking regardless of failure or not, is a method that reduces fear of failure and defensive behaviors that decrease the willingness for public reflections. Working to reach a high level of trust in the group helps to increase the willingness to communicate and the acceptance of diverse viewpoints. Conscious methods like this contributes to decrease the power of the balancing loops that limits team learning, thus allowing the reinforcing loop to dominate.

4.1 ISO 14001-implementation in the model

Differences and inconsistencies between learning organizations and factors that ISO 14001 facilitates are pointed out throughout the paper. These aspects are integrated in the following learning model to illustrate the effect a certification might have on the learning abilities of an organization. As the *pressure for an ISO certification* increases and organizations are certified, the formal structure in hierarchical organizations will be maintained and the *degree of hierarchy* will increase in organizations with a flatter organizational structure as this is one of the factors ISO requests.

A hierarchical organizational design has several effects on the organization. The model covers two important outcomes of such an organizational structure. To start with, the *degree of centralized decision making* will increase, leaving decision making responsibility primarily to the top management - which again is a deliberate wish from ISO.

The second outcome of a hierarchical structure is *increasing coordination costs* - meaning that the distances and communication paths will be longer. The term coordination costs covers both actual costs - in terms of time and money, but also the cost in the sense that hierarchy might create bigger differences between roles resulting in an invisible barrier for getting in touch with both higher hierarchical levels as well as lateral contacts. This is because the roles to a larger degree get separated and divided into different levels where the lower level has some degree of awe or subservience for the upper levels. One of the advantages of having a

flatter organizational business structure is that some of the differences and levels disappear even though the employees still possess different roles.
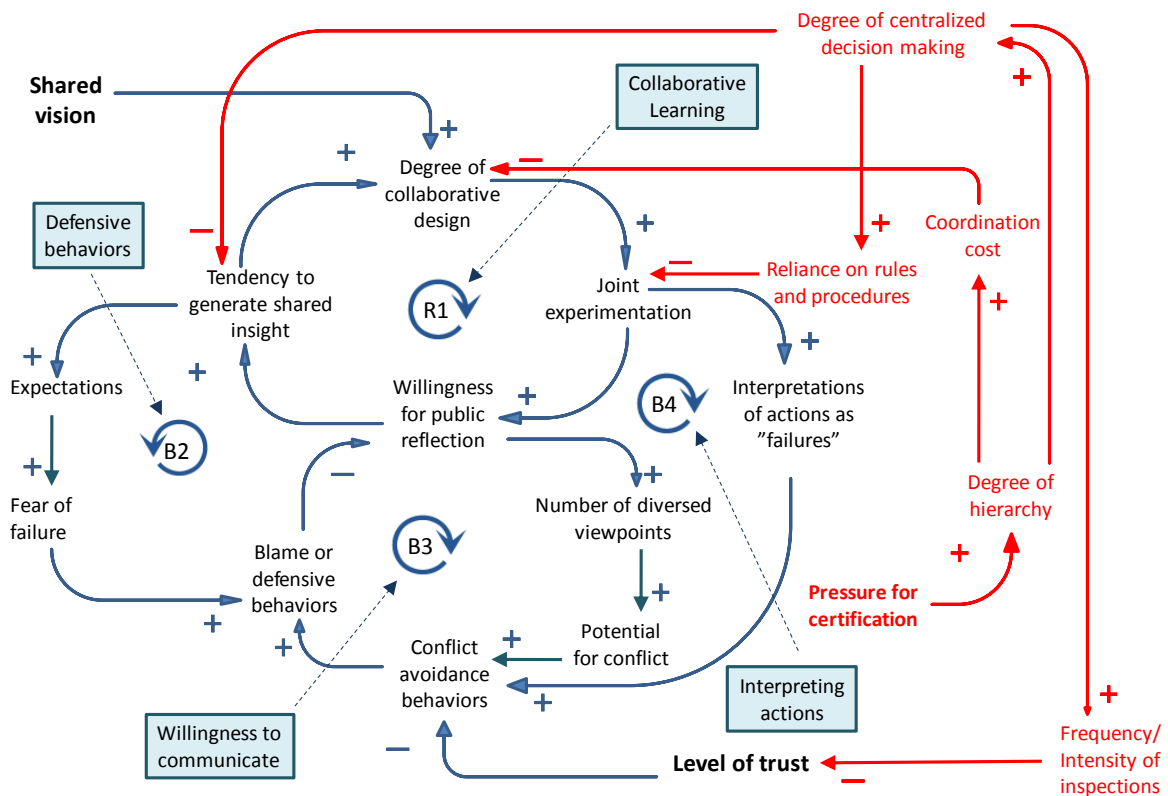
Figure 4.5: Limits to team learning when implementing ISO 14001

The increased coordination cost will again have a negative effect on the reinforcing learning circle through decreasing the degree of collaborative design. Both that the communication paths are longer and that the invisible barriers between roles or hierarchical levels are present contribute to reducing the cross level cooperation. When one has to go through several different levels to reach the right person, the process of getting through with knowledge, insight, ideas etc is slowed down and the likeliness for reducing the degree of collaborative design is very much present. To take this further, one can argue that the increased coordination cost has a negative effect on all of the elements in the learning circle. But keeping the model as simple as possible and only attaching it to one element still spreads the negative effect throughout the circle through the arrows.

Going back to the degree of hierarchy and its influence on the degree of centralized decision making - this again has several effects. The model covers three of them. First there is the negative effect on the *tendency to generate shared insight*. When the decision making process

mainly is left to the management while the rest of the employees in a larger degree are asked to follow routines and procedures, the chance of not following the thought, intentions and changes made by the management increases, because the affected departments are not as much a part of the decision making process any more. Hence, one cannot expect to keep the same shared insight.

Secondly, as the degree of centralized decision making increases, this also increases the need for rules and procedures. When decision making is left to the top management, it limits employees' possibility to solve unforeseen incidents based on their knowledge, insight and experience and increases the use of rules and procedures given by the management. When employees in a larger degree are ruled by rules and procedures and little is left up to them, this also has a negative effect on both the willingness and possibility for experimentation and joint experimentation. This again means that the reinforcing learning circle is weakened.

Finally, the third outcome of centralization of decision making brought up in this model is an increased need for inspections. When power and decision making is moved from each individual to the management, there will also be a need for management to keep a certain insight, given that their responsibility increases as the employees' responsibility decreases. ISO 14001 facilitates a system of inspection to ensure that the processes and procedures are being followed and that the management system is working as desired. The need for such an inspection is likely to increase as the level of trust decreases. The inspection is not solely for employees, but also for systems implemented in the organization. However, a high level of trust in the employees also means that the employees are handling the systems correctly. In the inspection part of the model intensity and frequency are merged into the same point. Intensity and frequency is not the same, the inspections might happen often on a shallow or low intensity level, or it might be very thorough and often or seldom, but the reason for merging the two is that the outcome is the same - negative effect on *the level of trust*.

As mentioned as a part of ISO's management system, control and inspection are eased by having a hierarchical organizational design. However, seeing this from the opposite point of view - the need for control and inspection is present since the level of trust is not. As the level of trust decreases and the need for control or inspection increases, the need for a hierarchical design also increases, to facilitate and ease inspection and control. This is of course inconsistent with what a learning organization facilitates. Further, with a hierarchical

organizational structure centralization of decision making follows, which again has a negative impact on the degree of collaborative design. This is because less responsibility given to each individual and less decision-making authority also limits the possibility for collaborative design, given that the employees have limited power and freedom of action beyond their given tasks. As a result, these aspects of an ISO-certification weaken the reinforcing learning circle additionally.

This paper has displayed inconsistencies between ISO 14001 and a learning organization both theoretically and more illustratively in pointing out specific points through a model. After going through the method the following chapter will look at how the learning culture is affected in PGS, an organization about to get certified these days. The issue will be addressed by first identifying the learning culture in the organization, to further being able to point out where the inconsistencies lie and possible challenges - based on the findings in the first part of the paper, that clearly shows some inconsistencies between the two approaches - namely a learning organization and an ISO 14001-certification.

5.0 Method

The paper is primarily a theoretical study with the use of a case study to illustrate and support the main argument. As Askheim and Grennes (2008) say, a case is favourable when wanting to legitimate the transferability of the findings. In this case the findings in the theoretical study. The first part of this paper is based on theory and much emphasis is put on earlier research. This forms the basis of the paper which facilitates the merge of a learning organization and an ISO 14001-certified organization in one model. The intention of the model is to contribute to answering the research question and to demonstrate potential challenges with a certification. This is to ease the understanding by illustrating points figuratively as a contribution to the written theory and discussion.

The case study is meant to illustrate the interaction effect in practice and legitimate the transferability of the findings in the theoretical study. A case study is a suitable method when there is a need for a lot of information from few units or cases (Askheim and Grennes, 2008), which in this case is PGS. PGS is chosen because it is as a company in a knowledge based industry and conveniently in the process of getting an ISO 14001 certification these days. This makes the study highly relevant for PGS as well, seeing that they get an indication to where and how an ISO certification might be challenging, given the learning culture in PGS.

However in a case study, the organization itself is not of primary interest (Askheim and Grennes, 2008), it could be any other organization in the same process of getting an ISO 14001 certification, with a certain knowledge focus. The point of PGS, the chosen case, is to serve as a means to increase and transfer the knowledge of how an implementation of ISO 14001 interacts with the learning culture in the organization. A case study is chosen also because it is favorable when you are dealing with *how* or *why* questions, and a larger degree and need of qualitative answers and data instead of numbers.

To identify the learning culture at PGS there will be carried out a survey followed up with one-to-one interviews with a few key persons. These meetings, information on PGS' web page and brochures along with acquired impression after two years of work at PGS, will contribute to identify the formal learning culture, while the survey and talks with the rest of the respondents in a higher degree identifies the informal learning culture, which does not show in brochures and web pages.

As an illustration and support of the theoretical part this method is appropriate. While an alternative is to in a higher degree make a quantitative research by carry out the survey in

several companies and on all the employees - to be able to see a picture or tendency and further support or answer the research question in a higher degree. However, as mentioned, this paper has a larger focus on the theoretical part and a uses the case more as an illustration. The findings in this paper can be useful for further research with a larger time frame and more resources.

As this paper basically is a qualitative research, the choice of using surveys that the respondents answer by themselves, is a deliberate choice, as an alternative to answering the surveys in larger focus groups solely. This is because qualitative research is characterized by nearness between the researcher and what is being researched on. This can be both positive and negative, but to counteract the negative effect the survey is chosen to be completed alone and handled as they are as an addition to data collection on meetings and observation.

5.1 Respondents

The twelve persons answering the survey are chosen in co-operation with the contact persons at PGS and they are selected to get an even distribution with respondents from different parts of the organization. 50 percent of the respondents are representing the headquarters at Lysaker, while the remaining 50 percent of the respondents are located in offices in other countries.

5.2 The interviews and survey

Initially in the process there have been meetings with the two contact persons, to clarify the purpose of the paper, what is needed from PGS and its employees and also what PGS gain from this survey. Further the 12 respondents were chosen, from different departments and levels of the organization, to give a more representative sample. These respondents get a survey sent by e-mail together with both a guidance of how to go through the survey and an introduction of the paper, its purpose, their purpose and explanation of the essential terminology. The survey was finished prior to final interviews, to minimize influence.

The survey is developed by Anthony J. DiBella, Edwin C. Nevis and Janet M. Gould and is a part of the workbook "Building Organizational Learning Capability" (1998). This survey is developed with the intention of identifying the learning culture of an organization - hence, it is tailor-made to fit the research in PGS. The advantage with this, in comparison of developing a new survey, is that this survey is made by researchers who have used a great

deal of time and resources on the matter. The survey has also been tested and used for several years and seem to be able to give a good picture of the learning culture in companies. This strengthens the credibility of the findings in the research.

The interviews were not arranged and did not follow a guide in which was the same for every interview, since the purpose of the interviews mainly was to clarify, assure and give the respondents the possibility to add opinions and comments that was developed after completing the survey and getting to think about the matter. Hence, the interviews were in a larger degree framed by the respondent. The reason this is favorable is because there is no need for answers to specific questions, beyond those set by the survey, since the analysis is based on qualitative data, not numbers and quantitative data for graphs and statistical analysis. Hence, the goal is to get each respondent's total impression in depth, and therefore allowing them to supplement the survey with additionally meanings and point of view.

5.3 Validity and reliability

It is important to be aware of weaknesses or mistakes in the research, to be able to get a valid and reliable result. To make it possible for other researchers to make a quality assurance of the work, it is throughout the paper been a focus on making the process transparent, by describing the process of the research, use and show sources at all times and also by using an approved and tested survey by reputable researchers, which is available for all.

The use of the survey by DiBella, Nevis and Gould increases both the validity and reliability of the paper. This survey is used and tested several times and this increases the certainty of the fact that the survey measures what is intended to measure, which is the learning culture. Hence, the validity increases in this case, as opposite to developing a new and not tested survey. However, when speaking of validation, it is the interpretation of the data that is validated, not the specific measuring method. Still - the workbook and survey by DiBella, Nevis and Gould thoroughly guide you through the process and ease the interpretation by giving clear answers. However, the methods of the paper is basically qualitative, given that the answers and results of interviews, observations and surveys are not meant to give a quantified result, in the shape of numbers and statistical analysis. When speaking of validity the question is if you actually measure what you want to measure. Measuring however implies quantifying something according to a set of rules (Askheim and Grennes, 2008) and further transfer a given behavior to a numerical value. Qualitative research does not *measure* a

behavior and it is therefore meaningless to speak of validity in a qualitative research (Askheim and Grennes, 2008). Instead, one might ask whether the chosen method examine what we want to examine. Validity in a qualitative relation is therefore about whether the findings or results reflects the purpose of the research and represents the reality we want to use (Askheim and Grennes, 2008), which is closely taken into consideration when choosing method. The use of several methods - interviews, more thorough conversations with two contact persons together with a year of weekly observation is also a conscious choice to give a broader insight in the case. This kind of method triangulation is a way of strengthening both the reliability and validity through several data collection methods.

Weaknesses in relation to choice of method will always exist, no methodological approach is flawless. One weakness with a qualitative approach is the limited force of the statements, meaning limited possibility to draw a more general conclusion, given the sample. The surveys will help in some degree, but only allowing generalizing inside of PGS, not companies in general.

Reliability problems
Random and irrelevant conditions can influence the result of the survey. It might be disturbance, influence by others, temperature, lighting, the researchers' clothing or personality, ambiguity in the survey or from the researcher. It is therefore important to make the paper and the techniques and methods in the paper verifiable, so that others can repeat the research if desirable. Using a survey available for others makes this possible. It is also helping with the use of several methods that together will give a stronger result. The total picture is therefore not only given by the input from the survey, but also through own experience with PGS and meetings with employees.

Validity problems
The validity is a result of how well one succeed with capturing the concept in questions and conversations. By being aware of this, there has been a focus throughout the case to inform and introduce the respondents to the terminology, meaning and definition of the concept, starting with an introductory e-mail to all respondents, explaining the purpose and objective of the research together with an explanation of the concept. This problem is easier to deal with

in qualitative research, given the closeness this brings along, and is therefore more important to stress in the survey which is somewhat more quantitative given the number and less communication with respondents.

In conclusion of this chapter one might call intention to the fact that notions validity and reliability come from the quantitative science, hence not equally suited as a quality indicator in qualitative research (Askheim and Grennes, 2008), but is still worth mentioning.

6.0 Case study

6.1 Introduction of Petroleum Geo Services (PGS)

PGS was founded in 1991, consisting of two seismic vessels. While today PGS has 16 vessels helping companies to find gas and oil reservoirs offshore, all over the world. As a part of the process, PGS has 23 data processing centers and 41 offices worldwide, employing 67 nationalities. PGS has offices in more than 25 countries with regional centers in London, Singapore

Figure 6.1: Ramform Sterling

and Huston. The headquarters is located in Lysaker, Norway.

Even though PGS operates in a competitive market, the organization has managed to establish itself as a market leader. The main cause for this is the innovative and unique technology PGS uses, no other companies have managed to find a similar solution so far (PGS, 2010).

PGS mainly has two segments with customers; the first is the oil companies such as Statoil, Petronas, Shell, BP and Hydro. The second segment is the government and financial institutions.

6.1.1 The core values of PGS

Figure 6.2: PGS' Core Values

The core values of PGS are their guide lines of how to interact with colleagues, suppliers, customers and others they encounter with.

Leadership in HSE - PGS's goal is to have zero injury to people and no damage to the environment, which they work on a daily basis.

Initiative and innovation - PGS has a focus on putting forward new ideas, seek new solutions and break down boundaries. PGS also emphasize that a

proactive approach is encouraged, even at the risk of some failures on the way.

People focus and integrity - PGS subscribes to a high standard of business ethics. They practice involvement, accountability and honesty and further emphasize the importance of respecting and developing people - as all of PGS's employees are valued team members.

Delivery and reliability - The employees at PGS do their utmost to deliver what they promise not only to their clients and shareholders, but also to each other and to the society at large.

6.1.2 HSE&Q and Code of Conduct

The employees at PGS have to follow a set of rules - given the HSE&Q, Healt, Safety, Environment and Quality. Their vision is to be the safest place to work in the geophysical industry. To achieve this PGS believes in working together, taking responsibility for their own safety and that of others, on a 24/7 basis. Employees are following different guidelines for different working situation and workplace. The guidelines even cover such a basic level as always having a lid on the cup when containing hot beverages.

The Code of Conduct reflects PGS's commitment to their employees, shareholders and customers to conduct their business with the utmost integrity - providing a framework for what PGS considers responsible conduct. The Code of Conduct is an integration of their values, principles and business practices. While the *core values* are the foundation of how PGS does its business, the *principles of conduct* are how they maintain their values and they apply these principles to their *business practices* that support the way they conduct business.

Formally a learning culture is recognized in PGS through their focus on developing employees, as they are valued team members, and also through their focus on initiatives and innovation. This is shown in figure 6.2; the core values of PGS. The company has a continuous process on developing better and more efficient technology, and their newest Ramform ship is proof of this.

6.1.3 PGS and the marine environment

All companies today must take a certain responsibility for the environment. To protect the environment is the responsibility of individual persons, authorities, companies and the

community in general. As a part of this, but also pressure from customers PGS is getting an ISO 14001 certification. With the intention of improving PGS' ability to measure, monitor and evaluating the company's operation on a global basis. PGS wants to prevent damage to the environment by reducing the risk in connection with the activity to a minimum. All of PGS' vessels follow procedures for waste collection, to prevent pollution of the environment. Waste is isolated and paper, glass, metal, plastics and bottles are sorted out of the residual waste.

PGS also continuously searches for and evaluates alternatives to more effectively utilize the fuel for the vessels and further minimize the fuel consumption and emissions of greenhouse gases.

PGS participate in research and concept development activities, which among other things look at the use of renewable energy as supplement to conventional fuel and reduction of engine power needed on board. They finance research programs for students evaluating the possibilities for using gas-operated engines on seismic vessels in the future (PGS, 2010).

6.2 Results of the survey

The survey was answered by twelve respondents. The answers varied from a large diffusion to a clear accordance. The answers showing great disagreement among the respondents can have its explanation in the fact that PGS is a global company with grate differences and a changing culture both within different departments of the organization and across borders. This means that it would be expected to for instance see higher degree of factors that facilitate learning in one office, department or country than experienced by other offices or departments. Still, some factors might be strong enough to pervade the entire organization across departments or offices. The number of respondents is not great enough to be able to generalize and give clear answers. As a qualitative research the purpose is to dig deeper into fewer cases and to rather get a fundamental understanding that facilitates further research and maybe quantitative research.

6.2.1 The Learning Orientations

Learning orientation 1- Knowledge Source

The first learning orientation places PGS in the continuum between the two poles from a preference for developing knowledge internally as compared to preference for acquiring knowledge developed externally.

The results clearly show a preference for internal knowledge development. Only two respondents answer that the preference for developing knowledge is more through external acquire, while the remaining ten have an internal preference for developing knowledge.

This is substantiated by the fact that PGS has developed a unique technology within its business, and hence ahead within the seismic industry. This contributes to explain why employees seek internal knowledge. The two respondents with an external focus can be explained by their role - when responsible for the environmental management for instance, you are dependent on keeping up with the local and global trends and regulations, hence the external focus. Therefore it is not expected for all employees to answer that they have an internal knowledge source.

Learning orientation 1: Knowledge source						
Internal	**mostly**	**more**	**even**	**more**	**Mostly**	**External**
		6	4		2		

Figure 6.3: Knowledge source

Chief of Learning & Development in PGS supports this by telling that 80 % of the knowledge is developed internally on the job, while 10 % is developed internally in "class rooms" and trainings and only 10 % is acquired externally. This is also supported by EAME Project Manager who emphasizes that the recent years PGS has been proactive in developing new technology, driven largely by internal drivers.

Learning orientation 2 - Content-Process Focus

The employees have an almost even distribution in the middle of content and process focus, with only two more respondents on the process side. Meaning that the emphasis on accumulation of knowledge about *how* products and services are developed, delivered and

improved is only slightly bigger than the content focus where the emphasis is on accumulation of knowledge about *what* products and services are.

Learning orientation 2: Content-Process Focus						
Content	**mostly**	**more**	**even**	**more**	**mostly**	**Process**
			3	4	5	

Figure 6.4: Content-Process Focus

Responsible for Learning & Development in PGS explains this with support from the first learning orientation. The fact that they in the first round develop own technology and are unique in the business opens for a process focus in the second round, on how to deliver to the market. Still one of the Senior Project Managers in PGS says that they have many examples of clever technology, but without enough attention to the process of commercialization and plan for delivery as a service, and therefore the tendency towards the process side is lesser.

Learning orientation 3 - Knowledge Reserve

The results show a clear tendency towards possessing knowledge individually as opposed to publicly available knowledge. Seven respondents answer more personal, while three answer even and only one find the knowledge source more public. This means that in need of knowledge they turn to the person most expert in that domain, and not an organized source such as a formal databank. Even though the results do not show a knowledge sharing policy or culture with databases or libraries, a Senior Project Manager in Huston tells about the effort over the recent years in documenting what is learned, especially methods and processes. This means that there might be a change towards publicly available knowledge, without leaving the personal side, because as the EAME Project Manager says; Even though PGS is a global company it is small enough to always be possible to speak to a "local" expert.

Learning orientation 3: Knowledge Reserve						
Personal	**mostly**	**more**	**even**	**more**	**mostly**	**Public**
		7	3	1		

Figure 6.5: Knowledge Reserve

Learning Orientation 4 - Dissemination Mode

The next learning orientation looks at the dissemination mode with formal in one end, which reflects the use of formal prescribed methods for knowledge sharing. In the other end there is the informal method such as role modeling and casual interaction. The results show an almost perfectly distribution around "even", with one respondent answering mostly informal.

Learning orientation 4: Dissemination Mode						
Formal	**mostly**	**more**	**even**	**more**	**mostly**	**Informal**
		4	3	4	1	

Figure 6.6: Dissemination Mode

This is basically supported by the same arguments as learning orientation 3, that PGS in a large degree has an informal learning culture which is a result of an informal and internal development of the learning culture over time, and not a conscious organization from the top management to facilitate learning and exchange of knowledge.

Learning orientation 5 - Learning Scope

The learning scope is spread all over the continuum and the answers from the Lysaker office are just as spread as the answers from different offices. Still, the aswers show a tendency towards "incremental" - meaning that they have a preferance for knowledge related to the improvement of existing products, services or capabilities rather then the preference for knowledge related to the development of new products.

Learning orientation 5: Learning Scope						
Incremental	**mostly**	**more**	**even**	**more**	**mostly**	**Transformative**
	3	4	2	2		

Figure 6.7: Learning Scope

One of the Senior Project Managers explains this with the fact that it takes a long time to gather momentum to create change, if it happens at all. It is at least easier to improve existing products, services and capabilities rather than developing new ones - which means bigger changes. He also states that new ideas often are negatively received by telling that "this has been tried before, it did not work". The tendency of sticking to and improve what already exists rather then developing new products might also be due to the fact that PGS posesses a

unique technology which might be wise to stick to and improve for now, rather than developing a new technology.

Learning orientation 6 – Value-Chain Focus

 The value-chain focus in PGS is spread but leans towards a design and make focus rather than market and deliver. This can have the same explanation as with the knowledge source. Given PGS' unique technology it is explanatory that their focus is somewhat more towards design and make, to make such a technology development possible.

Learning orientation 6: Value-Chain Focus					
Design/make	**mostly**	**more**	**even**	**more**	**mostly**	**Market/Deliver**
		1	5	3	3		

Figure 6.8: Value-Chain Focus

Learning orientation 7 - Learning Focus

The answers to the learning focus in PGS are distributed all over the range between an individual learning focus and a group learning focus. This might be due to differences between departments and also personal preferences on how to learn. The answers are just as spread in the Lysaker office as they are across borders.

Learning orientation 7: Learning Focus					
Individual	**mostly**	**more**	**even**	**more**	**mostly**	**Group**
		2	3	2	2	2	

Figure 6.9: Learning Focus

It might also be that the respondents are too few to be able to see any pattern. It would therefore be possible to draw a conclusion if the survey was answered by a more representative share of organization, which would tell us whether there are large differences in the leaning focus in PGS, or if there actually are a tendency towards either group or individual development of knowledge.

6.2.2 The Facilitating Factors

In the second part of the survey respondents are asked to rate in what degree PGS facilitate learning, based on several statements. The answer is given on a scale from 1: "Little evidence to support this factor" to 7: "Extensive evidence to support this factor"

Facilitating factor XX						
1	2	3	4	5	6	7
Little evidence to support this factor		Some evidence to support this factor			Extensive evidence to support this factor	

Figure 6.10: Facilitating Factors result model

In the following paragraphs the row at the bottom of the table is filled in with number of respondents supporting each degree on each factor.

Facilitating Factor 1 - Scanning Imperative

The first facilitating factor asks in what degree the employees in PGS gather information about conditions and practices in the external environment. Six of the respondents find extensive evidence to support this factor. Five respondents find some evidence to support the first facilitating factor. This indicates a fairly strong facilitation of learning.

Facilitating factor 1: Scanning Imperative						
1	2	3	4	5	6	7
Little evidence to support this factor		Some evidence to support this factor			Extensive evidence to support this factor	
		2	1	2	5	1

Figure 6.11: Scanning Imperative

The EAME Project Manager supports the strong outcome of the first facilitating factor with their focus on listening to feedback from customers as well as keeping track of their competitors.

The three persons giving the lowest rate from 3 to 4 are all from the Lysaker office. Still the respondents are too few to conclude, but it might be that there are differences across borders - making Huston, London, Lieden and Perth better facilitators of learning. This is not an

improbable thought because countries such as the United States are further ahead with learning organizations than Norway is.

Facilitating Factor 2 - Performance Gap

This factor asks in what degree the perception of gap between current and desired performance is shared. Eight respondents find some evidence to support this factor, while three respondents find extensive evidence and only one find little evidence. Looking at table 6.12, this, as well as the first factor is a fairly strong indicator of facilitated learning.

Facilitating factor 2: Performance Gap						
1	2	3	4	5	6	7
Little evidence to support this factor		Some evidence to support this factor			Extensive evidence to support this factor	
	1	1	1	6	3	

Figure 6.12: Performance Gap

Facilitating Factor 3 - Concern for Measurement

The third factor has spread answers on the upper part of the scale. Five respondents find extensive evidence to support this factor and six respondents find some evidence to support this factor. The respondents answering 4 have different roles, two from Lysaker, one from Perth and one from Huston. The respondents answering 6 are just as spread geographically and with different positions. This means that it is a different understanding within PGS regarding whether considerable effort is spent defining or measuring key factors. And also whether discourse over metrics is regarded as a learning activity.

Facilitating factor 3: Concern for Measurement						
1	2	3	4	5	6	7
Little evidence to support this factor		Some evidence to support this factor			Extensive evidence to support this factor	
			4	2	4	1

Figure 6.13: Concern for Measurement

Here as well the outcome might have been different, showing a clearer pattern, with more respondents.

Facilitating Factor 4 - Organizational Curiosity

The curiosity of employees and their view on the organizational curiosity differs. Five respondents find extensive evidence to support this factor, while six respondents find some evidence - thereby feeling a certain curiosity about conditions and practices and an interest in creative ideas and new technologies. One respondent found little evidence. Except from two, all of the respondents from the Lysaker office found extensive evidence to support this factor, rating with 6 and 7. The rest are from offices in London, Perth, Houston and Lieden.

Facilitating factor 4: Organizational Curiosity						
1	**2**	**3**	**4**	**5**	**6**	**7**
Little evidence to support this factor		**Some evidence to support this factor**			**Extensive evidence to support this factor**	
	1	1	2	3	4	1

Figure 6.14: Organizational Curiosity

Facilitating Factor 5 - Climate of Openness

The fifth facilitating factor is climate of openness meaning open communication among organization members and sharing errors instead of hiding them. This factor has the most spread answers so far covering the range from 2 to 6 with no clear tendency. The results when only looking at the Lysaker office has just as spread answers.

Facilitating factor 5: Climate of Openness						
1	**2**	**3**	**4**	**5**	**6**	**7**
Little evidence to support this factor		**Some evidence to support this factor**			**Extensive evidence to support this factor**	
	1	2	3	3	2	

Figure 6.15: Climate of Openness

A majority of 7 respondents find some evidence to support this factor, but is spread within its range giving to little evidence to point in one direction and give a tendency towards either extensive or little evidence to support this facilitating factor.

Facilitating factor 6 - Continuous Education

The factor continuous learning has even more spread support than the prior factor. Again the Lysaker office is just as spread ranging from 1 to 6. This should be more equal in the sense that it is based on standard procedures such as rewarding employees who take initiative in pursuing appropriate training and setting aside financial resources for education. The differences might be due to a small sample of respondents or the fact that they are from different departments with potentially different routines and standards regarding the continuous education.

Facilitating factor 6: Continuous Education						
1	**2**	**3**	**4**	**5**	**6**	**7**
Little evidence to support this factor		**Some evidence to support this factor**			**Extensive evidence to support this factor**	
2	**2**	**1**	**2**	**2**	**3**	

Figure 6.16: Continuous Education

Facilitating Factor 7 - Operational Variety

The factor of appreciation of diversity through valuing different methods, procedures and competencies is also supported variously and does not give a clear pattern or tendency towards facilitation for learning or not, because the results are so spread.

Facilitating factor 7: Operational Variety						
1	**2**	**3**	**4**	**5**	**6**	**7**
Little evidence to support this factor		**Some evidence to support this factor**			**Extensive evidence to support this factor**	
1	**1**	**3**	**1**	**4**	**1**	

Figure 6.17: Operational Variety

However, when only looking at the Lysaker office, there are several different nationalities working at the office, with different background and insight. In addition the employees travel a lot between the different offices, despite the distances, resulting in an even bigger diversity and exchange of insight, procedures and methods. From the outside PGS therefore looks like an organization that appreciates diversity. This might however feel different from the inside, taking the comment about change into consideration. It was said that it is easier to improve

what already exists rather than redeveloping. This might also mean that different methods and procedures are not as welcome as acting after the given set of procedures.

Facilitating Factor 8 - Multiple Advocates

This facilitating factor shows a clearer tendency, with all the answers gathered between 4 and 6. Three respondents answered 4, while 2 respondents answered 6, and as many as six respondents answered 5. Resulting in "some evidence to support this factor", leaning towards extensive evidence. This facilitating factor allows new ideas and methods to be developed or advanced by employees at all organizational levels, not only the top management. This is a very important factor in the "learning organization philosophy" where employees at different levels possess different knowledge and insight and is therefore considered as important knowledge sources to ensure a broader coverage of aspects.

Facilitating factor 8: Multiple Advocates						
1	2	3	4	5	6	7
Little evidence to support this factor		**Some evidence to support this factor**			**Extensive evidence to support this factor**	
			3	6	2	

Figure 6.18: Multiple Advocates

Facilitating Factor 9 - Involved Leadership

Even though the responses are fairly spread, there is at least enough support to have "some evidence to support this factor" being personally and actively involved leaders in learning initiatives and in ensuring that a learning environment is maintained.

Facilitating factor 9: Involved Leadership						
1	2	3	4	5	6	7
Little evidence to support this factor		**Some evidence to support this factor**			**Extensive evidence to support this factor**	
		3	1	5	1	1

Figure 6.19: Involved Leadership

This factor is important to facilitate problem solving and innovative thinking. It is not likely that a company with a unique technology always is developed by the top management or a

development team. New ideas might burst from all parts and levels of the organization. When facilitating multiple advocates the chances of new ideas bursting increase.

Facilitating Factor 10 - Systems Perspective

The last facilitating factor asks whether there are recognition of interdependence among organizational units and groups and also an awareness of time delay between actions and their outcomes. The support of this factor varies from little to extensive, with an overweight of respondents (9) with some evidence to support this factor.

Facilitating factor 10: System Perspective						
1	**2**	**3**	**4**	**5**	**6**	**7**
Little evidence to support this factor		**Some evidence to support this factor**			**Extensive evidence to support this factor**	
	1	**4**	**1**	**4**	**2**	

Figure 6.20: System Perspective

7.0 Discussion

The results from the survey provide more insight to this theoretical study. However, this is not the last word because the number of respondents is very low. Having more respondents would enable clearer detection of patterns and trends. With only 12 respondents the pattern might be coincidental. With a larger sample, the results would likely look different. Still, this is not a quantitative survey, and the purpose is to lay the foundation and show the need for further research in this area and to view the results as indicators.

The first part of the survey, the learning orientations, identifies the learning culture in PGS. With consideration of the small sample size the results only point in the direction of what the actual condition in the firm is. The overall impression from the learning orientations is that a great deal of the learning in PGS comes from an informal learning culture that is developed internally and informally, without being a conscious initiative from management. The learning orientation, knowledge reserve which is mainly personal, is one of several examples of this (see figure 7.1). There are limited cases of formal knowledge sharing policies such as the use of knowledge databases or libraries. Instead, knowledge is usually exchanged informally by going to the person most expert in each area where knowledge is needed. The same applies to the dissemination mode, more than half of the knowledge sharing is through informal methods. Formal prescribed methods still exist, but the informal side appears to be stronger.

Learning orientations							
		mostly	more	even	more	mostly	
1: Knowledge source	Internal	6	4		2		External
2: Content-Process Focus	Content		3	4	5		Process
3: Knowledge Reserve	Personal		7	3	1		Public
4: Dissemination Mode	Formal		4	3	4	1	Informal
5: Learning Scope	Incremental	3	4	2	2		Transformative
6: Value-Chain Focus	Design/Make	1	5	3	3		Market/Deliver
7: Learning Focus	Individual	2	3	2	2	2	Group

Figure 7.1: Learning Orientation Summary

The next part of the survey assesses the facilitating factors. The results here varied from unclear, covering the entire range of responses, to showing clear patterns in some cases. The results clearly show PGS as an organization that facilitates learning to some degree, but not through conscious facilitation of all possible aspects. Neither does learning appear to be consciously implemented through the facilitating factors in all departments of the organization. Both the Lysaker office and PGS in general reported quite different responses to

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this part of the survey. None of the facilitating factors have little evidence for support; all of them show at least some evidence while as many as half of the factors lean towards extensive evidence. However the results are far enough from being unanimous to consider them as full support of the facilitating factors.

Facilitating factors							
	1	2	3	4	5	6	7
	Little evidence to support this factor		Some evidence to support this factor			Extensive evidence to support this factor	
1: Scanning Imperative			2	1	2	5	1
2: Performance Gap		1	1	1	6	3	
3: Concern for Measurement				4	2	4	1
4: Organizational Curiosity		1	1	2	3	4	1
5: Climate of Openness		1	2	3	3	2	
6: Continuous Education	2	2	1	2	2	3	
7: Operational Variety	1	1	3	1	4	1	
8: Multiple Advocates				3	6	2	
9: Involved Leadership			3	1	5	1	1
10: System Perspective		1	4	1	4	2	
Sum per number	3	7	17	19	37	27	4
Sum per range		10		73		31	

Figure 7.2: Facilitating Factor Summary

The two bottom rows of model 7.2 above summarize the distribution of answers within the three ranges from little to extensive evidence and of each answer alternative; 1-7. As many as 73 out of the 114 points lie within "some evidence to support this factor" and "extensive evidence" has more than three times as many answers as "little evidence". This means that despite the fact that a conclusion of the survey is that PGS is not a strongly conscious learning organization, there are factors that facilitate learning and this can be of impact in the team learning model from chapter 4 (model 4-5).

The reinforcing collaborative learning loop makes several aspects to which PGS strongly contributes. Degree of collaborative design, joint experimentation and tendency to generate shared insight are all strengthened by the informal aspects of PGS, where people have a tendency to talk to each other to acquire knowledge and to get help rather then turning to a database. When other people are involved this automatically results in a tendency to generate shared insight because those needing help must fill in the other person on the project, challenge or task. A natural circular relationship in this problem solving process is by first generating shared insight between the two persons to further being able to have a collaborative process to find suggestions for solution. These are finally tested through joint experimentation. This process is an example of how the informal learning culture, identified

through the *learning orientations* in the survey, reinforces the learning circle shown in the model.

The reinforcing loop is further strengthened by looking at the *facilitating factors* that received strong support from the respondents. The perception of a gap between current and desired performance is shared to a large degree, which again can be a result of the informal culture identified in the learning orientation part of the survey. There will naturally be a more mutual understanding of the performance gap when people talk to each other to seek knowledge and help and consequently become updated on the status of other's work - hence a common perception of performance gap.

On the other side, several factors show disagreement and weak support for learning. One example is organizational curiosity. The survey responses were varied and without curious employees it is likely that joint experimentation is weakened. Facilitating factor 5, climate of openness also supports this claim. This factor has one of the most spread answers. This conflicts with the learning orientations that identified an informal culture where people talk to each other instead of turning to formal knowledge databases. This means that the previously identified informal culture is somewhat limited by a lack of openness, which counteracts an informal learning culture that would otherwise seem to have a positive effect on the learning loop.

To summarize, the results show that people seek each other in searching for knowledge and help to solve problems, but this openness does not seem to go beyond this. This means that the reinforcing learning loop is weakened due to this factor. An explanation might be found when looking at how the B4 loop in the model interacts with the rest of the model; the climate of openness or willingness for public reflection tends to be reduced as Spears (1993) shows in the model if actions are interpreted as failures. This is exactly what the climate of openness factor aims at by asking if errors are hidden or shared. Furthermore, as supported by one of the respondents, PGS might have a tendency to not accept new ideas because they have been tried and failed before. Such factors contribute to limiting the willingness for public reflection because the expected outcome of suggesting new ideas is that they will not lead to realization. We have placed PGS in the team learning model by showing which aspects that contribute to strengthening learning in the model and which aspects weaken the learning. This results in an overall impression of an informal, but not conscious learning culture.

PGS can be excluded as an exemplary learning organization when comparing it with the theory behind learning organizations as assessed in chapter 2. The trends from the survey are not consistent with typical aspects such as the ability to reject and throw out old ways of doing things. One of the respondents emphasized that PGS is not adept at putting old problems into new light, throwing away old ways of doing things, and creating new solutions. PGS operates on an incremental improvement of what already exists. Another important aspect is having an open flow of communication, as mentioned in the previous paragraph. An open flow of communication is one of the most important aspects of a learning organization, together with facilitating continuous learning. Both of these factors have the same survey results. As many as 33 % of the respondents are at the bottom of the range; finding little evidence to support the continuous education factor. In strong learning organizations the continuous education factor is so important that the results would have shown clear support if PGS would have had such a learning culture. These three aspects, open communication, continuous education and the ability to throw away old ways of doing things are some of the cornerstones in a learning organization, and are important enough to contribute to place PGS as no organization that consciously facilitates double-loop learning. This is despite some facilitating factors such as concern for measurement, performance gap and scanning imperative, all showing clear support for these factors. But they are not unanimous and cannot alone represent PGS as a learning organization. The results would have looked differently if the survey was done by departments; the differences between departments are large enough that it is likely to believe that some departments could have turned out as strong facilitators for learning, while others are not. However, the purpose of this survey was to get a picture of the organization in general.

Taking this discussion into consideration, the next paragraph considers how an ISO-certification will interact with the learning culture as identified in PGS.

As discussed above, there are both factors that facilitate learning and strengthen the learning loop, but also factors that slow down the learning such as lack of open communication. The results of the survey do not strongly contribute to increasing and strengthening the positive effects in the model. As a result, we conclude that PGS as not a typical learning organization, but as identified in the previous paragraph there are of course mechanisms that contributes to reinforce the learning process. When concluding that PGS is not a conscious double-loop learning organization it is also likely that PGS will experience less contradictory challenges with an ISO-certification. As this paper has argued, the greater an organization's focus on

organizational learning, the more likely it is to experience contradictions and challenging interaction effects.

Considering a typical learning organization on one hand, employees are expected to think, act and change if necessary. New ideas and ways of doing things are welcomed. On the other side, ISO expects less of this and rather prefers to facilitate a culture with formal feedback and organized routines. Facilitating such different cultures requires different organizational structure and a different mindset from both management and the employees. Not all employees like creativity and decision-making authority and would rather prefer predictability and security. The same goes the other way as well. This is why one might expect some challenges when implementing ISO into an organization as described here. The challenge is likely to be reduced as the organization in question approaches a more mechanistic or traditional style, as this is closer to the ISO ideal. The same goes for the other aspects brought forward in chapter 3, generative versus adaptive and the intervention level in the system. As ISO leans towards adaptive both in strategic and structural characteristics (model 7.3) it is likely to believe that the implementation of ISO is smoother if the organization as well leans towards adaptive. PGS is identified as somewhere in between both when being placed as mechanistic versus organic and adaptive versus generative and is therefore expected to experience relatively small challenges. Some departments such as the HR and accounting for example will barely notice a change.

As shown in the model, as well as in PGS' case, the process starts with pressure for certification. In PGS this was largely based on external pressure. Given the culture and structure identified in PGS, the degree of hierarchy will probably not need to increase to satisfy ISO because PGS does not have a remarkably flat structure. In the case of a flatter structure, the results of the survey might have returned higher scores on the facilitating factors. A high degree of organizational learning is often connected with flatter organizational designs. As the model shows, a higher degree of hierarchy leads to higher coordination costs, not only in monetary terms, but also through higher barriers to contact more senior persons. The consequence of higher coordination costs is a lesser degree of collaborative design.
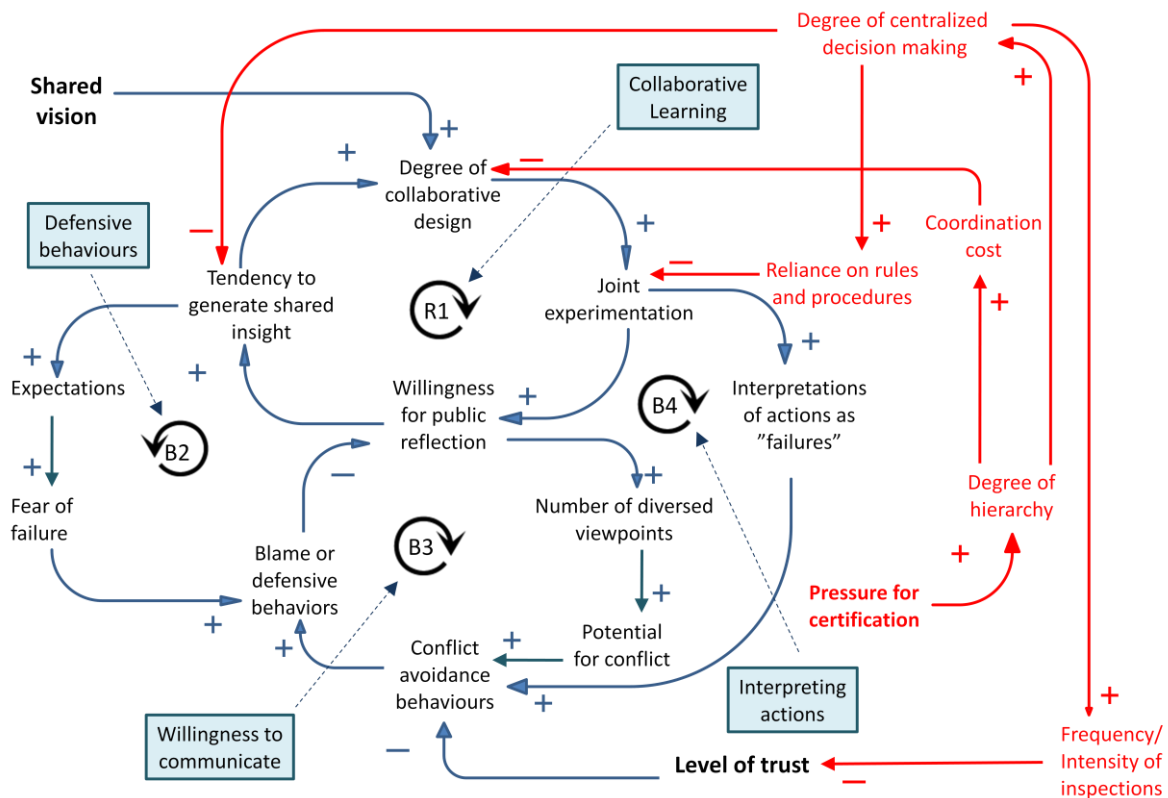
Figure 7.3: Limits to team learning when implementing ISO 14001

Degree of hierarchy also affects the degree of centralized decision making. Referring to the previous paragraph, the existing degree of hierarchy in PGS is high enough to implement ISO without additional increases in the degree of centralized decision making. This statement is based on the fact that leaders participating in the survey stated that new ideas are rejected, giving the impression that decision making lies higher up in the system, and is implemented on lower levels rather than creating the change at the same place as it is being implemented. Even though the degree of centralized decision making likely is not going to change, the ISO-implementation will mean more decision making for management, resulting in an increase in the number of decisions, as they now also have to decide upon the environmental policy. This will not change anything as the employees already are used to centralized decision making processes.

Policy is developed by top management while implementation affects the entire organization. It is therefore likely that the reliance on rules and procedures might increase as a consequence of the implementation of new policies. Since ISO depends on reliance on rules and procedures, as well as systems for feedback and control, it is important to be aware of the

effect this might have, as pointed out in prior paragraphs. Leaving less decision making authority to each individual also has a negative effect on willingness and possibility for experimentation and joint experimentation, as shown in the model. This negatively influences the learning loop.

Another aspect of the model which is likely to be affected is the frequency or intensity of ISO-inspections. Independent of potentially existing inspections, as the number or intensity increases, the effect is the same; as this factor increases the level of trust will decrease. The need for inspection is an indicator of lack of trust, and this indicator does not contribute to strengthening trust from the employees to the management either. A culture based on trust must go both ways. ISO is basically only implementing a management system, while it is up to management to create the environmental policy and determine the degree and scope of the changes. As management is aware of the negative effects a system of inspection might have, the threat immediately decreases, because this allows for management to take this into consideration when developing policy. Using the model, it is important to look at the factors that result in unwanted effects. In this case, degree of centralized decision making removes decision-making authority from each individual, creating a need for inspection and reliance on rules and procedures to ensure that instructions are being followed. It is therefore essential for management to be aware of the effects of all their choices.

Despite this, the overall impression when using the model on PGS is that the interaction effects do not seem to be of much concern. As long as each step and its consequences are thought through and the employees are part of the process and not surprised by sudden changes, the ISO implementation will be successful. The situation at PGS would be different if its organizational structure was flatter, more dynamic and decision making more decentralized, essentially the opposite of what ISO requires.

Managerial implications

One managerial aspect of the internal perspective is that an ISO-certification provides yet another limitation to learning, as the model shows. It would be wise to bear in mind that change is easier implemented when management and employees know in advance what changes will come, and what challenges will follow these changes. Still, there are external advantages, and customer satisfaction probably is the most important. The implementation of ISO will probably have little impact on PGS' environmental performance, even though ISO is an environmental standard. With reference to Meadows' (1997) article about places to

intervene in a system, standards are not the most powerful means to make the changes that the corporate environmental management needs, but it is a step in the right direction. As indicated by some of the respondents, certification is a result of external pressure, which no doubt will be satisfied.

8.0 Conclusion

Even though standards have been identified as low leverage initiatives in this paper, criteria and the changes that need to be implemented as a part of the environmental policy that ISO demands might be of higher leverage and one must therefore not underestimate the power that ISO can have by creating initiatives for environmental consideration. This is voluntarily, however, and ISO does not demand any changes of significance for the environment. Still, a positive external effect is satisfied customers that demand ISO-certified suppliers. The threat posed by ISO certification is identified when looking at the internal perspective as the limitations to learning that the model shows. As PGS might be an example of, the interaction effect does not have to be of much concern if the organization already leans toward a hierarchical structure, and not as much towards being a typical learning organization. However, this still means that the organization is managed in a way that does not facilitate learning as much as it could. A final conclusion of this paper is that there seem to be contradictories between the wanted aspects to facilitate learning and the aspects an ISO implementation brings along, which are not necessarily consistent. A helpful part of the certification process is to be proactive to deal with potential problems by identifying the culture and learning culture of the organization in question to be able to reveal contradictories and challenges the two different cultures might have.

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