



**NTNU – Trondheim**  
Norwegian University of  
Science and Technology

# Implementation of Company-Specific Production Systems (XPS) in Multinational Companies

A comparative case study concerning  
implementation of XPS in two subsidiaries of  
Elkem

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Oppgavens (foreløpige) tittel <b>Knowledge Transfer within Multinational Companies</b>
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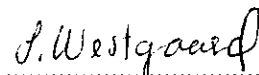
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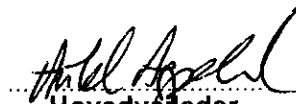
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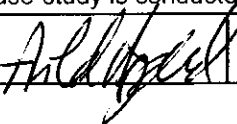
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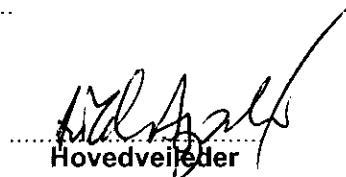
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## **Preface**

This master's thesis is written as the concluding part of a master's degree in Industrial Economics and Technology Management at the Norwegian University of Science and Technology (NTNU). The conducted case study has taken place over the spring semester of 2012, and is partly based on a preliminary literature review on Transfer of Procedural Knowledge within MNCs conducted by the authors. The authors of the study have a specialization in Strategy and International Business Development, and have attended courses within the fields of Supply Chain Management and Production Logistics.

The authors would like to thank several people for what has been an exciting and interesting semester. First, we would like to thank Elkem for providing us with a highly relevant real-life business case. Especially, we would like to thank the leader of the EBS center, Øyvind Sørli, who has spent so much of his valuable time feeding us with insight and information. Also he arranged for us to visit the plants in Iceland and Salten, providing us with the connections and resources to make this happen. We would also like to thank the management group and EBS coaches at Elkem Iceland and Elkem Salten for facilitating our visits and taking so good care of us during our stay. Our thankfulness also goes to the employees at the two plants, and to the EBS center, for giving us invaluable information in the conducted interviews. At last, we would like to thank our two study supervisors, Torbjørn Netland and Arild Aspelund, for their guidance and constructive criticism during the course of the research.



## Executive summary

In order for multinational manufacturing companies to strengthen their position in a competitive global market, continuous improvement of the companies' operations has received an increasing focus since the 1990s. In order to develop a *lasting* culture for continuous improvement, an increasing number of companies have developed 'improvement programs' tailored towards the company's specific operations. This type of improvement programs have been denoted as company-specific production systems (XPS), and are inspired by principles from Lean Manufacturing and the Toyota Production System (TPS). In Norway, the multinational materials producer Elkem has been one of the pioneers within XPS with its *Elkem Business System* (EBS). Elkem's EBS center has since the early 2000s implemented EBS in most subsidiaries within the company.

There has been a heated debate in research over the transferability of TPS, as some argue that TPS is a universal set of management tools that can be transferred everywhere, while others deny the universal transferability of TPS, emphasizing the unique socio-economic context in which TPS exists. This study adopts the *contingency perspective*, believing TPS to be universally transferable but subject to organizational and external factors which influence the implementation at the recipient site.

The contribution of this study is to increase the understanding of the conditions that influence implementation of XPS in the subsidiaries of a multinational company (MNC). In order to accomplish this, a *comparative case study* of two manufacturing units in Elkem is conducted, investigating one plant in Norway (Elkem Salten) and one plant in Iceland (Elkem Iceland). The two plants were chosen on the basis of their many similarities (production facilities, size, number of employees), which on a general basis should qualify the plants for an equal starting point when implementing XPS. However, while Elkem Salten appears to have experienced great success when implementing XPS, Elkem Iceland has experienced many challenges and relapses. Consequently, this case study seeks to examine *why* the implementation of EBS has varied to such a large extent between the two plants. In order to investigate this issue, the study first identifies i) factors influencing the local EBS implementation at each plant, ii) factors influencing the inter-unit EBS related sharing between the plants.

As the research approach of this study is *explanatory*, and the investigated events are contemporary and possible to observe directly, a case study design was chosen to carry out the research. Drawing on the strengths of such a research design, the study employs multiple sources of evidence such as: focused and in-depth interviews, direct observation and several types of documentation. Further, in order to guide the selection of empirical data, the study uses theory from five streams of literature: absorptive capacity theory, change management, institutional theory, corporate socialization theory and agency theory. The choice of literature is based on a literature review conducted as a preliminary study during the autumn of 2011, within the field of 'transfer of procedural knowledge within MNCs'.

The background for the comparative case study was a perception that Elkem Salten had achieved a higher level of success with its XPS implementation compared to Elkem Iceland. However, the findings of this study create a more nuanced impression of the current situation: Although Elkem Salten can be said to have had a more efficient XPS implementation, resulting in a more systemized approach to XPS, Elkem Iceland has in recent years shown significant improvement. Still, the plant lacks a sufficient systemization of the XPS implementation, resulting in a lower efficiency of the implementation process. Further, past events in the plant's history have influenced the implementation of XPS, giving the plant a difficult start. Yet, the findings show that both plants have some common areas of improvement potential, such as increasing the motivation and involvement related to XPS among employees at the operating level.

The study identifies 19 factors through the reviewed literature that are believed to have an influence on the implementation and inter-unit sharing of XPS within MNCs. These factors can be classified according to three levels of analysis: subsidiary level, corporate level and national level. The expected influence of the factors is formulated in 13 theoretical propositions, which are tested based on the empirical data. Four of the propositions find strong support and are thus expected to be generalizable to other MNCs. Further, a holistic perspective is used to evaluate all the factors, showing that they intertwine and influence each other across the three levels of analysis, and across the five theoretical perspectives. Although the discussion suggests a complex interaction of the identified factors, some particular factors are identified as major determinants for the different outcomes of the two plants.

Of the identified factors related to *implementation* of XPS, the discussion shows that the *organizational inertia* at Iceland has had a major influence on the outset of the plant's XPS implementation, and left a challenging basis for further implementation. Further, the plant at Salten has had a major advantage over the plant at Iceland due to a higher level of *prior related knowledge* and *support* from the plant manager, and the plant management's higher level of knowledge acquisition. This advantage has resulted in a more systemized approach to the implementation process, and a higher level of *cross-functional communication*.

Of the identified factors related to inter-unit *sharing* of XPS, the discussion reveals that the *lack of standardization* in XPS implementation has been an important underlying factor, causing the existence of other barriers to sharing. Most importantly, the lack of standardization has complicated the use of *corporate socialization mechanisms*. Further, the sharing between units in the case company has mainly been facilitated by an XPS knowledge center, acting as an intermediary. The empirical findings reveal that this arrangement has been a bottleneck in the XPS sharing process.

These factors have commingled, and led to a limited sharing of XPS related knowledge in the case company. Therefore, many valuable experiences related to XPS implementation have not been shared between units, contributing to the high variation in the level of XPS implementation.

For managers of multinational companies, the findings imply that managing XPS in a multinational company is a complex undertaking. The findings show that providing subsidiaries with theoretical knowledge of XPS tools and methodology is not enough in itself. In order to achieve higher levels of implementation, local managers must possess a practical understanding of how to translate XPS related knowledge to the every-day situation of the plant. Further, focus should be on systemizing the intra-unit, cross-functional communication as well as the inter-unit knowledge sharing. In addition, managers of the parent company must communicate the importance of XPS related knowledge sharing, and promote a common corporate identity to strengthen inter-unit ties within the MNC.

This study provides two main contributions to the theory. First, the study's findings indicate a strong link between the field of procedural knowledge transfer and the implementation and sharing of XPS in MNCs. Based on this link, a *set of propositions* for investigating XPS implementation and sharing in MNCs is provided for future research. Second, the study proposes a *theoretical model* which explains how the investigated theories interact to explain XPS implementation and sharing in multinational companies.

## Sammendrag

For multinasjonale selskaper som opererer i et marked med stadig økende global konkurranse, har kontinuerlig forbedring av prosessene blitt svært viktig for å opprettholde konkurransekraften. For å opprette en *varig* kultur for kontinuerlig forbedring, har et økende antall selskaper utviklet «forbedringssystemer» som er skreddersydde til selskapets virksomhet. Slike forbedringssystemer blir gjerne referert til som «bedriftsspesifikke produksjonssystem» (XPS), og bygger på prinsipper fra Lean og Toyotas produksjonssystem. I Norge er den multinasjonale metallprodusenten, Elkem, en pioner innenfor XPS med sitt *Elkem Business System* (EBS). Elkems eget EBS senter har siden tidlig på 2000 tallet implementert EBS i alle sine underenheter.

Det har vært en opphetet debatt innenfor forskningsmiljøet angående overførbarheten til TPS. Noen forskere argumenterer for at TPS er et universelt sett av ledelsesverktøy som kan bli overført overalt, mens andre avviser den universelle overførbarheten til TPS og fremhever den unike sosialøkonomiske konteksten til TPS. Dette studiet bygger på det såkalte *contingency perspective*, som støtter den universelle overførbarheten til TPS, men også fremhever at organisatoriske og eksterne faktorer påvirker implementeringen hos hver enkelt bedrift.

Hensikten med dette studiet er å øke forståelsen av hvilke faktorer som påvirker implementeringen av XPS i underenheter av multinasjonale selskaper. For å oppnå dette, utføres et *sammenlignende case studie* av to verk i det multinasjonale selskapet Elkem, der et verk i Norge (Elkem Salten) og et verk på Island (Elkem Island) utforskes. De to verkene ble valgt på bakgrunn av deres mange likheter (produksjonsfasiliteter, størrelse, antall ansatte), som på generelt grunnlag burde gitt dem et likt grunnlag for å implementere XPS. Likevel har Elkem Salten hatt stor suksess med å implementere XPS, mens Elkem Salten har hatt store utfordringer og tilbakefall.

Dette case studiet ønsker å undersøke *hvorfor* implementeringen av XPS har variert i så stor grad mellom de to verkene. For å undersøke dette vil studiet først identifisere i) faktorer som påvirker den lokale XPS implementeringen på hvert verk, ii) faktorer som påvirker delingen av XPS erfaringer mellom verkene.

Grunnen til at et *case studie* ble valgt som forskningsmetode er at implementering av XPS er noe som pågår i bedriften i dag, og som dermed kan observeres direkte. Dette studiet benytter seg av en av styrkene til case studiet som metode, nemlig å bruke flere beviskilder. Kilder som er blitt brukt er fokuserte intervjuer, direkte observasjon og ulike typer dokumentasjon. Videre, for å veilede utvelgelsen av empirisk data, bygger studiet på teori fra fem ulike teoretiske retninger: *absorptive capacity theory*, *change management*, *institutional theory*, *corporate socialization theory* og *agency theory*. Valget av teorier er basert på et forberedende litteraturstudie utført høsten 2011 som omhandlet *overføring av praksiser innad i multinasjonale selskaper* (*Transfer of procedural knowledge within MNCs*).

Bakgrunnen for det sammenlignende case studiet var det faktum at Elkem Salten hadde oppnådd en større grad av suksess med å implementere XPS sammenlignet med Elkem

Island. Dette studiet viser likevel et mer nyansert bilde av den nåværende situasjonen: Selv om Elkem Salten har hatt en mer effektiv XPS implementering, noe som har resultert i en mer systematisert tilnærming til XPS, har Elkem Island vist store forbedringer de siste årene. Til tross for forbedringene mangler verket likevel en tilstrekkelig systematisering av XPS implementeringen, noe som resulterer i en mindre effektiv implementeringsprosess. Videre har hendelser i verkets historie påvirket implementeringen, da de har gitt verket en vanskelig start. Dette har igjen har ført til at verket har blitt liggende etter. Resultatene av dette studiet viser likevel at begge verkene har felles forbedringspotensialer, som å øke motivasjonen knyttet til XPS og å involvere de ansatte på operatørnivå.

Dette studiet identifiserer 19 faktorer som har påvirket implementeringen og delingen av XPS erfaringer innenfor case selskapet. Disse faktorene kan bli klassifisert etter tre ulike analysenivå: datterselskapsnivå, selskapsnivå, og nasjonalt nivå. Den forventede påvirkningen til faktorene er formulert gjennom 13 teoretiske påstander, som blir testet basert på empiriske data. Fire av påstandene fikk sterk støtte, og er derfor forventet å være generaliserbare til andre multinasjonale selskaper. Videre er det benyttet et holistisk perspektiv for å undersøke faktorene, noe som viser at faktorene går inn i hverandre og påvirker hverandre på tvers av de tre analysenivåene, og på tvers av de fem teoriene. Selv om diskusjonen viser til et komplekst bilde av hvordan faktorene påvirker hverandre, har noen faktorer blitt identifisert og trukket frem som de viktigste determinantene for den ulike graden av suksess med XPS implementering på de to verkene.

Av de identifiserte faktorene som påvirker selve *implementeringen*, viser diskusjonen at *organisatorisk treghet (organizational inertia)* spilte en viktig rolle ved den første innføringen av EBS på Island, og at dette skapte et vanskelig grunnlag for den videre implementeringen. Videre har Elkem Salten hatt en stor fordel over Elkem Island på grunn av verkssjefens høye nivå av *tidligere relevant kunnskap (prior related knowledge)*, *sterk støtte* og iver etter å *erhverve ny kunnskap*. Dette har ført til en mer systematisk tilnærming til implementeringen, og en større grad av *kommunikasjon på tvers av funksjoner (cross-functional communication)*.

Av de identifiserte faktorene som påvirker *deling* av XPS erfaring mellom enheter, påpeker diskusjonen at *mangelen på standardisering* av XPS implementering har vært en viktig underliggende faktor, som igjen har ført til at andre hindringer har oppstått. Det mest kritiske er at mangelen på standardisering har vanskeliggjort bruken av *mekanismer for å bygge nettverk i selskapet (corporate socialization mechanisms)*. Videre har delingen av erfaringer mellom datterselskapene skjedd gjennom et XPS senter, som har fungert som et mellomledd i prosessen. De empiriske resultatene indikerer at denne ordningen har vært en flaskehals i delingsprosessen. Alle de overnevnte faktorene har sammen ført til en begrenset deling av XPS erfaringer i case selskapet. Derfor har mange verdifulle erfaringer knyttet til XPS implementeringen ikke blitt delt mellom datterselskaper, noe som har vært med på å opprettholde den store variasjonen i implementeringssuksess.

Som et bidrag til teorien utvikles en teoretisk modell som viser hvordan de ulike teoriene påvirker hverandre, hvilket fenomen de beskriver (XPS implementering eller XPS deling) og på hvilket nivå de forklarer fenomenet.

Resultatene av dette studiet impliserer at å lede XPS implementeringen i et multinasjonalt selskap er en kompleks oppgave. Funnene viser at å skaffe datterselskapene teoretisk kunnskap om XPS verktøy og metodologi ikke er tilstrekkelig. For å oppnå et høyere nivå av implementering må lokale ledere ha en praktisk forståelse av hvordan de kan overføre XPS kunnskap til praktiske gjøremål i den daglige operasjonen. Videre bør det fokuseres på å systematisere kommunikasjonen mellom ulike funksjoner innad i datterselskapene, og også erfaringsutvekslingen mellom datterselskapene. For toppledelsen i selskapet er det avgjørende å kommunisere viktigheten av erfaringsutveksling knyttet til XPS, og å fremme en felles bedriftsidentitet som styrker båndene mellom datterselskapene.

Dette studiet gir hovedsakelig to bidrag til teorien. For det første indikerer funnene at det er en sterk link mellom forskningsfeltet som omhandler *overføring av prosessuell kunnskap* mellom enheter og implementering of deling av XPS erfaringer i multinasjonale selskaper. Baser på denne linken, utvikler studiet et sett av påstander som omhandler implementering og deling av XPS i multinasjonale selskaper. Disse påstandene kan bli benyttet i fremtidig forskning. For det andre utvikler studiet en *teoretisk modell* som forklarer hvordan de undersøkte teoriene *sammen* forklarer XPS implementering og deling i multinasjonale selskaper.

## Table of Contents

<b>PREFACE</b> .....	<b>I</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>II</b>
<b>SAMMENDRAG</b> .....	<b>V</b>
<b>TABLE OF CONTENTS</b> .....	<b>VIII</b>
<b>FIGURES</b> .....	<b>X</b>
<b>TABLES</b> .....	<b>X</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 RESEARCH APPROACH .....	2
1.2 STRUCTURE OF THE STUDY .....	3
<b>2. THEORY</b> .....	<b>5</b>
2.1 ABSORPTIVE CAPACITY .....	7
2.2 CHANGE MANAGEMENT .....	9
2.3 INSTITUTIONAL THEORY .....	11
2.4 CORPORATE SOCIALIZATION .....	13
2.5 AGENCY THEORY .....	14
<b>3. METHODOLOGY</b> .....	<b>16</b>
3.1 DESIGNING THE CASE STUDY .....	16
3.2 PREPARATION .....	17
3.3 COLLECTION OF DATA .....	18
3.4 ANALYZING THE DATA .....	20
3.5 STRENGTHS AND WEAKNESSES OF THE METHODOLOGY .....	20
<b>4. CASE PRESENTATION</b> .....	<b>24</b>
4.1 INTRODUCTION TO ELKEM .....	24
4.2 ELKEM BUSINESS SYSTEM .....	25
4.3 ELKEM ICELAND .....	28
4.4 ELKEM SALTEN .....	29
<b>5. EMPIRICAL FINDINGS</b> .....	<b>30</b>
5.1 IMPLEMENTATION OF EBS AT ELKEM ICELAND .....	30
5.2 THE BASIS FOR SHARING OF EBS-RELATED KNOWLEDGE AT ICELAND .....	38
5.3 IMPLEMENTATION OF EBS AT ELKEM SALTEN .....	44
5.4 THE BASIS FOR SHARING OF EBS-RELATED KNOWLEDGE AT SALTEN .....	55
5.5 THE ROLE OF THE EBS CENTER IN FACILITATION OF INTER-UNIT KNOWLEDGE SHARING .....	59
<b>6. DISCUSSION</b> .....	<b>62</b>
6.1 FACTORS INFLUENCING THE IMPLEMENTATION OF XPS .....	62
6.2 FACTORS INFLUENCING THE SHARING OF XPS RELATED KNOWLEDGE .....	72
6.3 THE GENERALIZABILITY OF THE STUDY'S PROPOSITIONS .....	76
6.4 DISCUSSION OF MAIN FINDINGS: WHY HAS THE LEVEL OF XPS IMPLEMENTATION VARIED BETWEEN THE PLANTS? .....	78
6.5 PROPOSING A MODEL .....	83
6.6 MANAGERIAL IMPLICATIONS .....	84

6.7. THEORETICAL IMPLICATIONS .....	85
6.8 CONTRIBUTION TO THE THEORY ON XPS IMPLEMENTATION IN MNCs .....	89
6.9 LIMITATIONS OF THE STUDY AND DIRECTIONS FOR FUTURE RESEARCH .....	89
<b>7. CONCLUSION .....</b>	<b>91</b>
<b>LIST OF REFERENCES.....</b>	<b>93</b>
<b>TABLE OF APPENDIX .....</b>	<b>97</b>
<b>APPENDIX A: MANAGERIAL IMPLICATIONS FOR THE CASE COMPANY .....</b>	<b>98</b>
<b>APPENDIX B: CASE STUDY PROTOCOL.....</b>	<b>104</b>
SHORT INTRODUCTION OF THE STUDY .....	104
FIELD PROCEDURES .....	106
OUTLINE OF THE CASE STUDY REPORT .....	108
INTERVIEW GUIDE .....	109
<b>APPENDIX C: FINDINGS FROM DOCUMENTATION.....</b>	<b>113</b>
<b>APPENDIX D: RESULTS ON EBS AUDITS OF THE INVESTIGATED PLANTS 2012.....</b>	<b>117</b>
<b>APPENDIX E: PERFORMANCE INDICATORS AFTER EBS WAS INTRODUCED IN ELKEM.....</b>	<b>118</b>
<b>APPENDIX F: OVERVIEW OF THE CITED EBS TOOLS AND METHODOLOGY.....</b>	<b>119</b>



**Figures**

FIGURE 1: THREE LEVELS OF ANALYSIS COVERED BY THE SELECTED THEORY ..... 6

FIGURE 2: COLLECTION OF DATA ..... 19

FIGURE 3: THE CHAIN OF EVIDENCE FROM INITIAL RESEARCH QUESTIONS TO CASE STUDY CONCLUSIONS ..... 21

FIGURE 4: ELKEM'S FOUR MAIN BUSINESS DIVISIONS ..... 24

FIGURE 5: THE FOUR GUIDING PRINCIPLES OF EBS ..... 25

FIGURE 6: THE LOCATION OF ELKEM ICELAND ..... 28

FIGURE 7: THE LOCATION OF ELKEM SALTEN ..... 29

FIGURE 8: FACTORS INFLUENCING EITHER THE IMPLEMENTATION OR SHARING OF XPS-RELATED KNOWLEDGE... 78

FIGURE 9: A HOLISTIC MODEL EXPLAINING THE SUBSIDIARIES' VARIATION IN XPS IMPLEMENTATION ..... 83

FIGURE 10: INTERACTION BETWEEN THE APPLIED THEORETICAL PERSPECTIVES. .... 88

**Tables**

TABLE 1: STRUCTURE OF THE STUDY ..... 4

TABLE 2: THE STRCUTURE OF THE PRESENTED THEORY ..... 7

TABLE 3: QUALITY OF THE METHOD..... 22

TABLE 4: IMPORTANT ROLES RELATED TO THE IMPLEMENTATION OF EBS ..... 26

TABLE 5: THE THREE TYPES OF EBS FORUMS DIRECTED AT EDUCATION AND TRAINING ..... 27

TABLE 6: CENTRAL FACTORS CAUSING THE VARIATION IN XPS IMPLEMENTATION BETWEEN THE INVESTIGATED  
SUBSIDIARIES ..... 81

## 1. Introduction

When the Toyota Motor Company invented the Toyota Production System (TPS), they redesigned the mass production system. Based on the need to compete in a resource-constrained environment in post-war Japan, Toyota developed a hybrid production system that merged Ford's mass production techniques with a small-batch production system. This became what is known as the Toyota Production System (Ohno 1988, Fujimoto 1999). Since then, TPS has continuously evolved (Holweg 2007), and became known in the West initially as just-in-time (JIT) production, and subsequently as lean production or lean thinking (Womack et al.1990).

Inspired by the continual success of Toyota and its TPS, companies in the automobile industry have, since the mid-1990s, led the trend of developing improvement programs in the form of *company-specific production systems* (XPS) (Netland, 2012). In recent years, non-automotive manufacturing industries have joined the growing trend, giving evidence to a phenomenon that continues to spread globally across all types of manufacturing industries. XPS spans an array of different but related production concepts such as Total Quality Management, just-in-time production, Six Sigma, and lean production (Netland, 2012).

However, there has been a heated debate in research over the transferability of TPS (Lee & Jo, 2007). Some researchers (e.g. Adler & Cole, 1993; Womack & Jones, 1994) claim that TPS is a universal set of management norms that can be transferred anywhere, while others (Williams & Haslam, 1992; Williams et al., 1994) deny the universal transferability of TPS, emphasizing the unique socio-economic context in which Toyota exists. However, a third perspective, the *contingency perspective*, considers a more balanced approach: both the universality of TPS and the necessary pre-conditions and constraints related to its transferability. This academic group stresses that the successful implementation of TPS is dependent upon several organizational factors at recipient sites, like long-term management strategies, labor-management cooperation, employee and union involvement, open communication, and investments in training (Harber et al., 1990; White et al., 1999). They also point out that the processes and outcomes of TPS emulation are coordinated by external forces (i.e. market situations, internal division of labor, local institutional environment, social culture) (Liker et al., 1999; Mehta and Shah, 2004).

In terms of the implementation of XPS, the experiences of Norwegian companies have been mixed. During a recent workshop on company-specific production systems and their role in future manufacturing <sup>1</sup>(Netland, 2011), this impression was further strengthened. Leading multinational manufacturing companies shared their experiences related to implementing XPS. Some stated that they have experienced success when implementing XPS in the organization, while others have experienced challenges when they for instance try to transfer XPS to globally dispersed subsidiaries. Consequently, the contingency perspective is adopted in this study,

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<sup>1</sup> Held at the Norwegian University of Science and Technology in May 2011

believing XPS systems to be universally transferable, but subject to organizational factors and external forces which influence the implementation of XPS at recipient sites.

### **1.1 Research approach**

This study is conducted as a *comparative case study* of two subsidiaries within an MNC. The primary aim of the study is to investigate why the level of success related to the XPS implementation has varied between the investigated subsidiaries. This aim is consolidated in the study's first research question:

*RQ1: Why has the implementation of XPS varied between the investigated MNC subsidiaries?*

In order to approach this research question, a literature review was conducted during the autumn 2011. The purpose of this review was to identify influencing factors of XPS implementation addressed by previous research. However, despite an extensive body of literature concerning the applicability of TPS and lean production, XPS as a separate phenomenon has received less attention within academic research (Netland, 2012). Thus, in order to identify factors with a potential for influencing the implementation of XPS, the field of 'procedural knowledge transfer' was reviewed. Indeed, several links can be drawn between the 'implementation of XPS' and 'transfer of procedural knowledge'. First, knowledge related to XPS can be categorized as *procedural knowledge*, often referred to in the literature as production know-how (Ferdows, 2006) or, more broadly, as 'organizational practices' (Jensen & Szulanski, 2004). Second, many of the reviewed studies (Ambos & Ambos, 2009; Björkman et al., 2004; Gupta & Govindarajan, 2000; Kostova & Roth, 2002; Minbaeva et al., 2003) viewed the transfer of procedural knowledge to be a process, in which the *implementation* at the receiving unit is the last stage. Through this literature review, a set of factors within the fields of absorptive capacity theory, institutional theory, corporate socialization theory and agency theory were identified. Further, the theory of change management was added to tailor the theoretical background to the case being studied.

In order to understand why the implementation of XPS has varied between the investigated subsidiaries, the study first addresses which factors have influenced the XPS implementation at each subsidiary:

*RQ1.1: What factors have influenced the XPS implementation in the investigated MNC subsidiaries?*

Further, in the reviewed literature, the *sharing* of practices between units was found to increase subsidiaries' performance (Björkman et al., 2004). In this study, this finding is investigated in relation to XPS implementation, based on the assumption that the inter-unit sharing of experiences and ideas related to XPS will enhance the implementation process at the

subsidiaries. A *limited* inter-unit sharing, on the other hand, is assumed to cause a higher variation in how XPS is implemented and developed at different units. Consequently, the factors influencing XPS knowledge sharing between subsidiaries are addressed as a second sub question to help explore the variation in XPS implementation between the investigated subsidiaries.

*RQ1.2: What influences XPS knowledge sharing between the subsidiaries of the investigated MNC?*

The proposed research questions will be approached through a case study of the multinational materials producer Elkem, a pioneer within XPS in Norway. Elkem has since its founding in 1907 expanded from its Norwegian origins into a multinational company, with production facilities in Europe, North and South America, Africa and Asia, as well as an extensive network of sales offices and agents worldwide. At the end of the 1990s, Elkem Business System (EBS), Elkem's global management system, was introduced in the company. In order to facilitate implementation of this system, a team of experts in fields such as TPS and Lean was established as an EBS center in year 2000. Since the start-up, representatives from the EBS center have transferred EBS to several subsidiaries, but with diverse results (Øyvind Sørli, 2012).

The study will examine the case of two Elkem plants: Elkem Salten, located in the north of Norway, and Elkem's Icelandic plant, Elkem Iceland. The two plants are in many ways very similar. The facilities are constructed similarly, with three furnaces, crushing facilities and with similar installations to utilize the micro silica dust created from the smelting process. Other similarities are the number of employees working at each plant as well as annual revenues. Further, both plants have been assisted by the EBS center when implementing EBS. However, while Elkem Salten appears to have had a successful EBS implementation, Elkem Iceland has experienced many challenges and relapses. Consequently, this study seeks to examine why the implementation of EBS has varied to such a large extent between the two plants, thereby exploring the main research question of the study.

In addition to the two plants studied, Elkem's EBS center is included as a third unit of analysis. This was seen as vital for gaining a full picture of the implementation process, as the implementation of EBS at both plants was initiated and facilitated by members of the EBS center. Additionally, the EBS center is responsible for a large part of the EBS knowledge sharing that is executed within Elkem today.

## **1.2 Structure of the study**

This case study starts with a presentation of the theoretical background for the study in Chapter 2. Here, the five theoretical perspectives used in this study are presented, with propositions stated in relation to each perspective. Chapter 3 gives a description of the methodology, describing the reasoning behind the chosen *research design*, the process of *preparing* the interviews and *collecting the data*. Then, the strategy for *analyzing the data is explained*, before a discussion of strengths and weaknesses of the research design conclude the methodology chapter. Next, a

presentation of the case-company is given in Chapter 4, followed by a brief introduction to the units of analysis. Then, a presentation of empirical findings from each unit of analysis will be given in Chapter 5. Chapter 6 provides an in-depth discussion of the empirical findings using the proposed theoretical framework from Chapter 2. Here, the study's propositions are addressed, discussing the empirical evidence. As a result, influencing factors of the implementation and sharing of XPS are identified. Further, the main research question is addressed, exploring how the identified factors commingle to provide a full explanation of the variation in XPS implementation between the investigated subsidiaries. Next, managerial implications are proposed in the form of six suggestions for managers of XPS, before theoretical implications conclude Chapter 6 by proposing a theoretical model explaining the relationship between the theoretical perspectives, and providing directions for future research. Finally, the study's conclusion is given in Chapter 7.

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Structure of the study

1. Introduction
2. Theoretical background
3. Methodology
4. Case Presentation
5. Empirical findings
6. Discussion
7. Conclusion

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**Table 1: Structure of the study**

## 2. Theory

This chapter presents literature that is related to the *implementation* and *sharing* of XPS related knowledge in multinational companies. First, the reasoning behind the selection of literature is explained. Four of the five theoretical perspectives chosen, are covered in a literature review on ‘Transfer of procedural knowledge in MNCs’ carried out by the authors in advance of the case study. The fifth theoretical perspective, change management, was added to complement the theoretical background for the case study. Second, a multilevel classification is proposed, providing an overview of classes of factors from the selected theories which may influence the *implementation* and the *sharing* of XPS. Finally, a description is given of the structure of the remaining chapter, before each theory is presented.

### *Selection of literature*

When reviewing the literature on procedural knowledge transfer in MNCs, the *absorptive capacity* of the receiving unit was identified as one of the most cited determinants of knowledge transfer (e.g. Lee & Wu, 2010; Szulanski, 1996, Gupta & Govindarajan, 2000). Subsidiaries differ in their absorptive capacity, and this affects the level of internal knowledge transfer. Having identified a strong link between the transfer of procedural knowledge and implementation of XPS, absorptive capacity was an obvious choice of theory to review.

The implementation of XPS in subsidiaries can be a dramatic change in the organization, as it is often followed by changes in the organizational structure, replacement of managers, or adjustments to new routines (The Economist, 2012) Also, an important ingredient in most company specific production systems is continuous improvement. This can be interpreted as small incremental changes that are conducted on an ongoing basis (De Wit & Meyer, 2005). Consequently, the organization’s tolerance for change is an important influencing factor for the success of XPS implementation. Therefore, the literature on *change management* was reviewed before collecting the data.

The characteristics of a subsidiary’s host country have been found to have an influence on knowledge implementation (Kostova & Roth, 2002). Also, the relationship between the subsidiary and the headquarters is another important aspect of knowledge implementation identified through the literature review. Subsidiaries that identify with the parent company<sup>2</sup> will easier understand the importance and value of new practices, and therefore implement them more easily (Kostova & Roth, 2002). *Institutional theory* is thus chosen to describe the institutional context of the host country and the relational context that links a subsidiary to the parent company.

Furthermore, many studies in the conducted literature review emphasized the existence of close interpersonal networks in the organization as being an important factor for knowledge sharing (e.g. Ciabuschi et al., 2011; Minbaeva, 2007; Tsai, 2001). The importance of such networks for knowledge sharing is explained by *corporate socialization theory*. Additionally,

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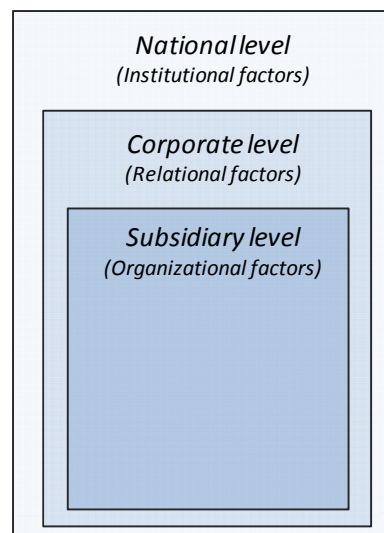
<sup>2</sup> During the entire study, Elkem is referred to as the ‘parent company’, even though the company was recently bought by China National Bluestar.

the motivation of the sender to share knowledge was emphasized in the reviewed literature (Cho & Li, 2007; Gupta & Govindarajan, 2000; Szulanski, 1996). *Agency theory* is often used to explain the subsidiaries' reluctance to share knowledge with other units in the MNC.

As a result of the given argumentation, this case study is based on five theories: *absorptive capacity theory*, *change management*, *institutional theory*, *corporate socialization theory* and *agency theory*.

### ***A multilevel approach***

When studying a complex phenomenon such as a cross-national transfer of practices between headquarters and a subsidiary, Kostova (1999) points to the necessity of using a *multilevel approach*. The theories selected to study the implementation and sharing of XPS related knowledge can be shown to cover three organizational levels of analysis: *subsidiary level*, *corporate level* and *national level*. At the subsidiary level, organizational factors within absorptive capacity theory and change management may help explain the outcome of local knowledge implementation. On the corporate level, relational factors within institutional theory, corporate socialization theory and agency theory can help explain interaction patterns within the corporation. More specifically, these relational factors can help explain how the interaction between subsidiaries, or between subsidiaries and headquarters, affect the implementation and sharing of knowledge. Finally, institutional theory can also be used to help explain how institutional factors of a subsidiary's host country affect the implementation process.



**Figure 1: Three levels of analysis covered by the selected theory**

This multilevel approach will be used in later sections, in order to address the identified factors influencing the implementation and sharing of XPS-related knowledge in the case company.

### ***Structure of theory***

The five selected theories are presented in accordance with the structure of the research questions: First, the three theories of absorptive capacity, change management and institutional theory addressing factors related to the *implementation* of XPS will be presented. Second, corporate socialization theory and agency theory, addressing the *sharing* of XPS related knowledge are described. A proposition is developed in relation to each theory, functioning as a guide for the collection of empirical data, and the subsequent discussion of findings.

<b>RQ1.1: Implementation of XPS</b>	1.1. Absorptive capacity 1.2. Change management 1.3. Institutional theory
<b>RQ 1.2: Sharing of XPS</b>	1.1. Corporate socialization theory 1.2. Agency theory

**Table 2: The structure of the presented theory**

## 2.1 Absorptive capacity

### 2.1.1 The concept

Cohen & Levinthal (1990) define absorptive capacity as the ability of knowledge receivers to *recognize the value of new information, assimilate it, and apply it to commercial ends*. In their study, absorptive capacity is conceptualized as a function of the firm's level of *prior related knowledge*: 'Prior knowledge base refers to existing individual units of knowledge available within the organization' (Kim, 2001, p.271). Thus, employees' ability, their educational background, and acquired job-related skills may represent the 'prior related knowledge' which the organization needs to assimilate and use (Cohen & Levinthal, 1990). However, in order to develop an effective absorptive capacity, *intensity of effort* is also critical. Intensity of effort represents the amount of energy expended by organizational members to acquire knowledge and to solve problems. Exposure of a firm to relevant external knowledge is insufficient unless an effort is made to internalize it. Thus, absorptive capacity has two elements: prior knowledge and intensity of effort (Cohen & Levinthal, 1990). Further, Cohen and Levinthal (1990) assume that a firm's absorptive capacity tends to develop cumulatively, and is path dependent in that prior knowledge facilitates the learning of new related knowledge.

Although many studies agree on the core construct of absorptive capacity as consisting of both prior related knowledge and intensity of effort (or more simply referred to as ability and motivation), the conceptualization varies greatly and the measures are multiple (Zahra & George, 2002). Zahra and George (2002) review representative studies on absorptive capacity, and propose a reconceptualization of the construct. They define absorptive capacity as a set of organizational routines and processes, by which firms *acquire, assimilate, transform* and *exploit* knowledge to produce a dynamic organizational capability. The acquisition and assimilation of external knowledge is referred to as *potential* absorptive capacity. The transformation and exploitation of knowledge reflects the firm's capacity to leverage the knowledge that has been absorbed and is referred to as *realized* absorptive capacity. The conceptualization of absorptive capacity as employees' ability and motivation is related to the concept of potential and realized absorptive capacity, since potential absorptive capacity is expected to have a high content of employees' ability, while realized absorptive capacity is expected to have a high content of employees' motivation (Minbaeva et al., 2003).



### 2.1.2 Factors affecting absorptive capacity

Although existing literature has paid much attention to the definition and construct of absorptive capacity, little attention has been paid to *how* absorptive capacity is created and developed in the firm (Alvær & Westgaard, 2011). However, this statement holds a few exceptions. Daghfous (2004) categorize factors affecting absorptive capacity as internal or external. External factors include the *external knowledge environment* and a firm's *position in the knowledge networks*. These factors go beyond the scope of this case study. However, several *internal* factors are also identified in the literature.

According to Daghfous (2004), *cross-functional communication* creates opportunity for the internal transfer of knowledge within a unit. Better internal communication enhances social integration mechanisms, which lower the barriers to information-sharing and increase the efficiency of assimilation and transformation capabilities. All of this implies that an organizational structure allowing the maximum amount of communication between various departments, improves a firm's absorptive capacity (Daghfous, 2004).

Minbaeva et al. (2003) investigate whether specific *human resource management (HRM) practices* oriented towards employees' ability and motivation increases the employees' absorptive capacity. The results of this research show that the simultaneous effect of HRM practices such as staffing, training, promotion, compensation and appraisal, increases absorptive capacity, and thereby positively affects the degree of knowledge transfer. *Performance appraisal* and *training* helps to develop employees' ability (Minbaeva et al., 2003; Minbaeva, 2005), while *internal promotion* and *performance-based compensation systems* are both providers of motivation (Minbaeva et al., 2003; Minbaeva, 2005). Furthermore, Minbaeva's (2005) study shows that the degree of knowledge transfer is stronger when HRM practices are applied as a system of mutually reinforcing practices.

Further, Cohen and Levinthal (1990) state that acquiring, assimilating and exploiting the firm's absorptive capacity is very much dependent on the *individuals* who stand at the interface of the firm and the external environment or at the interface between subunits of the firm. These individuals can assume the role as *gatekeepers*, reducing the communication gap and mismatch in 'cognitive orientation' between the producers and users of knowledge (Cohen & Levinthal, 1990; Daghfous, 2004).

Finally, the theory of *organizational inertia* links the theoretical perspective of absorptive capacity with that of change management. This theory states that organizations tend to stick to their existing strategies and have a natural tendency to resist change (Daghfous, 2004). According to Davenport and Prusak (1998), organizational inertia becomes an impediment to a firm's ability to adapt to changes in its environment, and thus negatively influences the firm's absorptive capacity.

### 2.1.3 Exploring the effect of factors within absorptive capacity theory on XPS implementation

Although past research differs in the definition and construct of absorptive capacity, there exists a general consensus that absorptive capacity of the receiving unit is one of the most

significant determinants of internal knowledge transfer in MNCs (Alv er & Westgaard, 2011). Subsidiaries differ in their absorptive capacity, and this affects the level of internal knowledge transfer (e.g. Szulanski, 1996, Gupta & Govindarajan, 2000). As discussed introductorily, strong links can be drawn between the *transfer of procedural knowledge* and *implementation of XPS*. Consequently, this study seeks to explore whether factors within absorptive capacity theory also can be found to have an influence on the XPS implementation within MNC subsidiaries.

*Proposition 1: Factors within absorptive capacity theory will have a significant influence on the XPS implementation in an MNC subsidiary.*

- 1a) *A high level of prior related knowledge will have a positive influence on the XPS implementation*
- 1b) *A high effort of knowledge acquisition will have a positive influence on the XPS implementation*
- 1c) *A high level of cross-functional communication, a high use of HR practices, and a presence of gatekeepers will have a positive influence on the XPS implementation*
- 1d) *Organizational inertia will have a negative influence on the XPS implementation*

## 2.2 Change Management

Change management has been defined as ‘*the process of continually renewing an organization’s direction, structure, and capabilities to serve the ever-changing needs of external and internal customers*’ (Moran & Brightman, 2001, p.111). According to Burnes (2004) change is an ever-present feature of organizational life, both at an operational and strategic level. Despite the eclectism of views on organizational change, some common classifications recur. Two main approaches to change which are treated in the literature is corporate transformation either as *revolutionary, dramatic change* or as *evolutionary, incremental change* (De Wit & Meyer, 2005). Change as *continuous improvement* is the change process most often associated with company specific production systems (XPS), and corresponds to the *evolutionary model* of change (De Wit & Meyer, 2005). Here, organizations and their people continually monitor, sense and respond to the external and internal environment in small steps as an ongoing process (Luecke, 2003).

A recurring theme in organizational change literature is the assumption –and warning to the practitioner- that most change programs or interventions are met with resistance (Ag ocs, 1997). However, the *type* of resistance given can differ in nature. According to Ag ocs (1997), resistance to change can be described in terms of four sequential stages: (1) *The denial of the need for change*, (2) *refusal to accept responsibility for dealing with the change issue*, (3) *refusal to implement change that has been agreed to*, and (4) *repression by taking action to dismantle change that has been initiated*. The denial of the need for change, identified as stage one, can either be in the form of attacks on the credibility of the change *message*, or on the *messenger(s)* and their credibility. Denial of the credibility of the messenger may be

expressed in personal attacks on change advocates either in public or private conversation, or through avoidance and marginalization (Agócs, 1997).

### **2.2.1 Factors influencing the resistance to change**

One pre-existing factor which may influence the resistance to change is an organization's *prior change history*. For example, cynical feelings may result from a loss of faith in change agents or a history of unsuccessful change attempts. Thus, the presence of cynical feelings has the potential to negatively influence change success (Walker et al., 2007).

The *support from top- and middle management* is a much cited factor for successful change implementation (Kaye & Anderson, 1999; Bateman, 2005; Kotter, 2007; Walker et al., 2007). It is important to demonstrate that management is serious about the change and that this attempt is not just another "program of the month" (Walker et al., 2007). Kotter (2007) recommends assembling a group with shared commitment and enough power to lead the change effort, working as a team outside the normal hierarchy.

#### ***Managerial mechanisms to implement and sustain change initiatives***

A large stream of literature within change management is concerned with managerial mechanisms for successful implementation and sustainment of change initiatives. One such mechanism is creating *clear targets and a common understanding of direction* (Upton, 1996). Even more important is the communication of the targets and direction, throughout the organization (Upton, 1996). This is supported by Kotter (2007): '*Employees will not make sacrifices, even if they are unhappy with the status quo, unless they believe that useful change is possible. Without credible communication, and a lot of it, the hearts and minds of the troops are never captured*' (Kotter, 2007:p.6). Also, according to Walker et al. (2007) employees affected should clearly see the *personal* benefits of implementing change. For example, they may be able to perform their job better, pay might increase, or long-term job security may increase (Walker et al., 2007).

Kotter (2007) points to the importance of *planning for, and creating, short-term wins*. Real transformation takes time, and a renewal effort risks losing momentum if there are no short-term goals to meet and celebrate. This is supported by Schaffer and Thomson (1992), who argue that successful change programs begin with results. They criticize activity-centered change programs, where employees are ritualistically sent off for training because it is "the right thing to do" although managers rarely make explicit how such activity is supposed to lead to specific results. Rather, Schaffer and Thomson (1992) argue that companies should introduce only those innovations in management methods and business processes that can help achieve specific goals. Further, the innovations introduced should be linked to short term goals. Empirical results will then quickly show the extent to which each approach yields results.

*Employee involvement*, a fundamental ingredient of company-specific production systems (Womack et al., 1990), is also found to have a positive and significant effect on resistance to change (Beer & Nohria, 2001; Brown & Cregan, 2008). Sharing responsibility for decision making represents a fundamental shift in the nature of the employment relationship.

Managers are no longer seen as the sole custodians of authority, and employees are able to bring their workplace experiences to the decision-making table (Brown & Cregan, 2008).

### **2.2.2 Exploring the effect of factors within change management on the level of XPS implementation**

As mentioned introductorily, the implementation of XPS can in itself constitute a large change to the organization. Further, with continuous improvement as a common element of XPS, small incremental changes become a part of employees' daily agenda. As discussed in this section, change often brings with it a level of resistance among employees, which again can obstruct the implementation of the change initiative. Consequently, factors within change management are believed to hold a significant potential in influencing the XPS implementation process, as formulated in the study's second proposition:

*Proposition 2: Factors within change management will have a significant influence on the XPS implementation in an MNC subsidiary*

- 2a) *A prior change history of disruption with negative consequences will have a negative influence on the XPS implementation*
- 2b) *A high level of top- and middle management support will have a positive influence on the XPS implementation*
- 2c) *The use of managerial mechanisms to sustain change initiatives will have a positive influence on the XPS implementation.*

## **2.3 Institutional theory**

A central tenet of the institutional perspective is that organizations sharing the same environment will employ similar practices and thus become more 'isomorphic' with each other. Given that many elements of the institutional environment, such as culture and legal systems, are often specific to a nation, organizational practices can be expected to vary across units. Applying institutional theory to the case of MNCs highlights the unique institutional complexity that these organizations face.

Empirical research (Kostova, 1999; Kostova & Roth, 2002) has used institutional theory to explain how MNC subsidiaries may react to a situation where the parent company is transferring, and actually imposing, organizational practices on its subsidiaries. According to these studies, the adoption response of a subsidiary is comprised of two components- the actual *implementation* of the practice and the *internalized* belief in the value of the practice. The implementation is expressed in the external and objective behaviors and the actions required by the practice. Internalization is that stage in which the employees at the recipient unit view the practice as valuable and become committed to the practice. The research of Kostova and Roth (2002) emphasizes that a foreign subsidiary is not an independent identity; hence, if a practice is mandated by the parent, the subsidiary is obliged to comply. At the same time, the subsidiary must adjust to the institutional pattern specific to the country where it's situated. As a result, the subsidiary is confronted with two distinct set of pressures, referred to as a situation of *institutional duality*.

The pressure from the subsidiary's environment can be conceptualized as the *institutional profile of the host country*, defined as a set of regulatory, cognitive, and normative institutions in a given country. The elements of the regulatory, cognitive, and normative dimensions, including laws and regulations, cognitive structures, and cultural norms, are issue-specific. This means that the institutional profile of a country can be *favorable* for certain types of issues (e.g. quality management), and unfavorable for others. The pressure from the parent company is influenced by the *relational context* that links the subsidiary to the parent. The relational context is defined through three characteristics- *dependence*, *trust*, and *identity*. *Dependence* of a subsidiary on headquarters is defined as the belief held by subsidiary managers that the subsidiary relies on the support of the parent organization for providing major resources. *Trust* is defined as a common belief within the subsidiary that the parent company has the subsidiary's best interest in mind, is honest, and does not try to take advantage of the subsidiary. *Identification* is defined as the degree to which the subsidiary employees feel that they are part of the parent company, and partly define their self-identities from this organizational membership. It is assumed that a subsidiary that identifies with the parent company is likely to share the values and beliefs of the parent, embodied in the practice that is being transferred. Thus, the employees will better understand the meaning and value of the practice. Also, identification with the parent is believed to reduce the 'not invented here' syndrome; the practice will be viewed to a lesser extent as strange and coming from an outsider. The belief that a high level of both trust and identity with the parent company will have a positive influence on practice implementation is consistent with previous work on the transfer of practices across units (Szulanski, 1996; Tsai & Ghoshal, 1998). Szulanski (1996) specifies that an arduous, or distant, relationship of the subsidiary with the headquarters might create difficulties in the transfer of practices.

To understand a subsidiary's response under conditions of institutional duality, the study of Kostova and Roth (2002) investigates the joint effects of institutional and relational factors on the pattern of adoption. One particular pattern of adoption is *ceremonial adoption*, a situation where the subsidiary employees have adopted a practice for legitimacy reasons, without believing in its real value for the organization (Meyer & Rowan, 1977). The study suggests that ceremonial adoption is likely to occur if the practice is viewed simply as a fad, arising from an institutional setting that is distinct from the local setting of the subsidiary, or if the institutional profile of the host country is not favorable for the specific practice. The likelihood of ceremonial adoption may increase even further if the relational context is characterized by a subsidiary's having high dependence on its parent, but low trust and identification with it.

### **2.3.1 Exploring the effect of factors within institutional theory on XPS implementation**

The institutional theory suggests that MNC subsidiaries are confronted with two distinct set of pressures, formed by the institutional context that links a subsidiary to its environment and the relational context that links the subsidiary with the parent company. Based on the given theoretical background of institutional theory, the study's third proposition is developed:

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*Proposition 3: Factors within institutional theory will have a significant influence on the XPS implementation in an MNC subsidiary.*

---

- 3a) *The combination of an unfavorable institutional profile and a relational context, characterized by a high level of dependency and a low level of trust and identity with the parent company, will have a negative influence on the XPS implementation*

## **2.4 Corporate Socialization**

The aim of corporate socialization is to *establish a shared set of values, objectives, and beliefs across MNC units, and to provide them with a sense of shared mission and a unitary corporate culture* (Björkman, 2004). The underlying rationale is that the more different units share long-term visions and goals, the more likely they are to exchange knowledge. Research has found knowledge flows in MNCs to be positively related to the use of corporate socialization mechanisms (Björkman et al., 2004; Gupta and Govindarajan, 2000) and the existence of close interpersonal networks in the organization (Tsai, 2001).

While the relational context that links the subsidiary to the parent company is important for the implementation of organizational practices (Section 2.3), the *relationship between subsidiaries* is important for inter-unit transfer of practices. Organizational units differ in their internal knowledge, practices and capabilities. Therefore, the sharing of practices between units may be advantageous for the organization (Björkman, 2004). However, the inter-unit transfer of knowledge is not straight forward. In his study, Szulanski (1996) finds that the success of knowledge transfer depends to some extent on the ease of communication and on the ‘intimacy’ of the overall relationship between the source unit and the recipient unit. In order for organizational units to obtain new knowledge through interacting with one another, *inter-unit links and networks* are essential. Networks of inter-unit links allow organizational units to access new knowledge from each other, and units may increase their cost efficiency through dissemination of ‘best practices’ within organizations. (Tsai, 2001)

A crucial design problem for MNC top management is how to choose organizational mechanisms that enhance knowledge flows (Foss & Pedersen, 2002). *Corporate socialization mechanisms* refer to those organizational mechanisms that facilitate the development of interpersonal ties in the MNC, which in turn can be expected to enhance the communication between units, including transfer of knowledge (Björkman et al., 2004). In their study, Björkman et al. (2004) investigate three different socialization mechanisms: *inter-unit trips and visits, international committees, and training involving participants from multiple units*. The results indicate that the more subsidiary managers interact with managers from other MNC units through visits, during joint training programs, and in cross-unit committees, the more the knowledge transferred to other parts of the organization.

In addition to lateral socialization mechanisms, the *use of IT* in knowledge transfer between units has been the topic for much research (Bolsani & Scarso, 1996; Brynjolfsson & Saunders, 2010; Ciabuschi et al., 2011). Bolsani and Scarso (1996) describe IT systems as tools with high potential in knowledge management, especially in terms of efficiency and

scope of knowledge access, although limited in terms of richness compared with more direct types of mechanisms. Given an initial investment in an IT structure, knowledge transfer can occur faster and cheaper compared to more expensive and time consuming alternatives, such as extensive traveling. In his study, Ciabuschi et al. (2011) finds that the use of intranet has a positive impact on the success of knowledge transfer between units in an MNC. However, he states that caution is to be recommended toward relying too much on IT based systems for knowledge transfer. As suggested by Brynjolfsson and Saunders (2010), the best results are likely to occur when IT usage is combined with lateral mechanisms.

#### **2.4.1 Exploring the effect of factors within corporate socialization on XPS related sharing**

Corporate socialization theory suggests that the use of corporate socialization mechanisms will create a network of interpersonal links in the MNC, which again will enhance the knowledge sharing between units. Also, the use of IT is assumed to increase the efficiency of knowledge sharing. Based on the above discussion, a fourth proposition is developed:

*Proposition 4: Factors within corporate socialization theory will have a significant influence on the XPS sharing between MNC subsidiaries.*

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- 4a) *The existence of inter-unit links will have a positive influence on the XPS sharing between MNC subsidiaries.*
- 4b) *The use of corporate socialization mechanisms will have a positive influence on the XPS sharing between MNC subsidiaries.*
- 4c) *The use of IT will have a positive influence on the XPS sharing between MNC subsidiaries.*

### **2.5 Agency Theory**

Agency theory is concerned with resolving two problems that can occur in agency relationships. The first problem is the agency problem that arises when the desires or goals of the principal and agent conflict, and it is difficult or expensive for the principal to verify what the agent is actually doing. The second is the problem of risk sharing that arises when the principal and agent have different attitudes towards risk (Eisenhardt, 1989). Agency theory has found increasing use in MNC research, as the relationship between headquarters and a subsidiary can be viewed as a principal-agent relationship. It is in the interest of the headquarters (the principal) that a subsidiary (the agent) contributes to the competence development of other MNC subsidiaries. However, as discussed under, subsidiaries may perceive it to be against their own interest to engage in knowledge transfers to other MNC units. (Björkman et al., 2004)

Research has indicated that *motivational factors at the sending unit* might be important barriers to knowledge transfer. For instance, a subsidiary may be reluctant to transfer knowledge to other units for fear of losing a position of superiority, or because it is insufficiently compensated for the costs and efforts involved in the transfer process (Björkman et al., 2004). By diffusing knowledge to other MNC units, proprietary technology might also leak out to other units (Szulanski, 1996). Also, effort to transfer knowledge may

interfere with the subsidiary's ability to attend to aspects of its own operations that subsidiary manager's view as more important for the unit's own performance (Szulanski et al., 2003). Given a situation of information asymmetry between the MNC top management and the subsidiary, it might be in the subsidiary's self-interest not to transfer knowledge to other units, even though it would increase the MNC's overall performance (Björkman et al., 2004).

Agency theorists generally agree that a combination of incentive based and behavioral control mechanisms should be employed, in order for MNCs to control and coordinate their subsidiaries. (Björkman, 2004). The research of Björkman et al. (2004) found that the higher the *perceived importance* attached to knowledge transfer by headquarters when evaluating the performance of the subsidiary, the more the knowledge transferred from the subsidiary to other units. One incentive based mechanism explored by several researchers (Björkman et al., 2004; Gupta & Govindarajan, 2000) is to let the president bonus be MNC network based rather than subsidiary focused, as this would increase the subsidiary managers' incentive to share.

### **2.5.1 Exploring the effect of factors within agency theory on XPS related sharing**

The above discussion revealed that the relationship between the headquarters and the subsidiaries can be viewed as a principal-agent relationship. Consequently, factors within agency theory hold a significant potential in influencing the XPS sharing between subsidiaries, as formulated in the study's fifth proposition:

*Proposition 5: Factors within agency theory will have a significant influence on the XPS sharing between MNC subsidiaries.*

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- 5a) *A low motivation of the sending unit to share knowledge will have a negative influence on the XPS sharing between MNC subsidiaries.*
- 5b) *A high perceived importance attached to knowledge sharing by headquarters will have a positive influence on the XPS sharing between MNC subsidiaries.*



### 3. Methodology

This chapter describes the methodology used to answer the research questions. The next section explains the reasoning behind the chosen *research design*, while Section 3.2 and 3.3 describe the process of *preparing* the interviews and *collecting the data*. Section 3.4 explains the strategy for *analyzing the data*, while the last section discusses the strengths and weaknesses of the methodology.

#### 3.1 Designing the case study

In the most elementary sense, the design is the logical sequence that connects the empirical data to a study's initial research questions, and finally, to its conclusions (Yin, 2009).

##### 3.1.1 Choice of research method

The background for the study was to investigate why the implementation of EBS had been more successful in some subsidiaries in Elkem than in others. Therefore, the general question of inquiry concerned *why* the implementation of XPS is more successful in some subsidiaries of MNCs than others. This type of "why" question is *explanatory* and therefore suited for a case study design (Yin, 2009). Also, the implementation of EBS in the investigated plants is a contemporary event. This means that central actors in the implementation process were available for interviews, and that the units of analysis could be observed directly. In addition, the factors influencing the level of success with EBS implementation could not be directly manipulated. The degree of focus on contemporary as supposed to historical events and the limited control over behavioral events, favor the case study as an appropriate research method (Yin, 2009).

##### 3.1.2 Theory development

The theory development of this case study was an iterative process. In order to explain the different level of XPS implementation in the investigated plants, it was decided to investigate *what factors influence the XPS implementation in MNC subsidiaries* (RQ1.1). However, when visiting the plants, it became clear that the exchange of EBS related knowledge between the subsidiaries in Elkem is very limited. This was believed to be an important contributing factor to the variation in the level of EBS implementation between Elkem subsidiaries, and thus also between the two investigated plants. Therefore, an additional sub research question was added exploring *what factors influence the sharing of XPS related knowledge between MNC subsidiaries* (RQ1.2).

In order to answer the two sub research questions (RQ1.1, RQ1.2), five theoretical perspectives were explored. The choice of these particular theories was partly based on a previously conducted literature review (Alv er & Westgaard, 2011) on "Transfer of Procedural Knowledge Within MNCs", which proved four of these theories to have a high explanatory power of the former investigated, and related, topic. An additional theory, change management, was added based on the belief that change management is important when implementing new practices or business systems in subsidiaries.

Based on the theories, five main propositions were developed. The propositions were essential when collecting the data; by having formulated a set of propositions, it became clear

what factors to look for. Also, the propositions were used to generalize the results. This mode of generalization is called *analytical generalization*, in which a previously developed theory is used as a template with which to compare the empirical results of the case study (Yin, 2009). If both cases were shown to support the same theoretical proposition, replication could be claimed.

### 3.1.3 The choice of cases

Based on the initial research question and suggestions from Øyvind Sørli, a key informant at the EBS center, this study has chosen two units of analysis or “cases”; the silicon producing plants “Elkem Iceland” and “Elkem Salten”. This is therefore a multiple-case study, or a *comparative study*.

The reason for choosing the two particular plants is due to their different levels of success with implementing EBS. While Elkem Salten has had success with implementing EBS, Elkem Iceland is still struggling with the implementation. Based on this knowledge, one would expect many of the critical success factors of implementation to be present at Elkem Salten, while the barriers to be more evident at Elkem Iceland. This is thus a “two-tail” design (Yin, 2009) in which cases from both extremes have been deliberately chosen.

This study investigates each case, or each plant, as a whole, and does not give further attention to any sub-unit within each case. The case study can therefore be said to be a *holistic study*.

### 3.1.4 Definition of specific measures

In order to ensure *construct validity*, it is important to identify the correct operational measures for the concept being studied. As a basis for investigating whether specific factors has had an influence on the implementation, the *level of EBS implementation* at each plant was addressed.

To measure the level of EBS implementation, the given score on the audits held by the EBS center was used. This is how the company itself measures the degree of EBS implementation, and the measures are developed by people having in-depth experience with EBS. Because the direct results on the audits are the plants’ property and considered confidential material, only the average score on the audits could be used to measure the level of implementation.

When it comes to *transfer of knowledge* between subsidiaries, several measures have been used in the literature. Some researchers measure knowledge transfer success in terms of the amount of knowledge being transferred, or the *flow of knowledge* (Foss & Pedersen, 2002; Kogut & Zander, 1993; Minbaeva, 2007). Other studies (Björkman et al., 2004; Gupta & Govindarajan, 2000; Kostova & Roth, 2002; Minbaeva et al., 2003) measure knowledge transfer success as to the extent knowledge is implemented and used at the receiving unit. In this study, both measures are used to investigate knowledge transfer between subsidiaries.

## 3.2 Preparation

A case study protocol was made in order to guide the investigators in carrying out the data collection (See Appendix B). A protocol is a major way of increasing the reliability of the

case study, as it contains the procedures and general rules to be followed in the data collecting process (Yin, 2009).

An important part of the case study protocol is the case study questions. In this study, a distinction was made between Level 1 questions and Level 2 questions. Level 1 questions were the questions directly asked to the interviewees. Level 2 questions, on the other hand, were the questions of inquiry. For example, one topic of investigation was the relational context that links a subsidiary to the parent company. A question of inquiry was: “To what extent does the plant identify with the parent company?” (Level 2 question). This question was converted into two Level 1 questions: (1) “Do you think of your plant as being part of a corporate family?” (2) “Is there a common “Elkem culture” across the different plants?”

### 3.3 Collection of data

This case study draws on three sources of evidence, namely *focused interviews*, *archival records*, and *direct observation*. No single source has a complete advantage over all the others; in fact, the various sources are highly complementary (Yin, 2009). By using several sources of evidence, this study was able to address a broader range of historical and behavioral issues. It was also possible to develop *converging lines of inquiry*, a process where the data is triangulated (Yin, 2009). This means that the different sources of evidence were used to confirm the same fact. The next sub sections describe how the different sources have been used to collect data.

#### 3.3.1 Interviews

##### *In-depth interviews*

An in-depth interview was conducted with the leader of the EBS center, Øyvind Sørli, who has acted as a *key informant* during the case study process. With in-depth interviews, one can ask key respondents about the facts of a matter as well as their opinion about events. The interview may also take place over an extended period of time (Yin, 2009). Through several meetings at “Teknobyen” in Trondheim, Øyvind Sørli has given his insights into different matters, and also guided the investigators in which people to interview.

##### *Focused interviews*

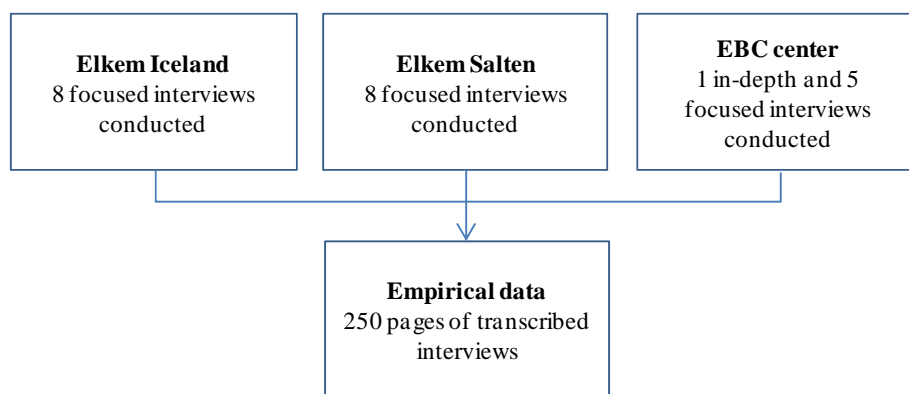
Focused interviews were conducted at both plants, and also with employees at the EBS center. The interviews remained open-ended and assumed a conversational manner, but followed a set of questions derived from the case study protocol. This is referred to as *focused interviews* (Yin, 2009). A total of eight focused interviews were conducted at each plant, with employees from different levels in the organization. Both at Elkem Iceland and Elkem Salten the following roles were interviewed: the plant manager, the production manager, the HR manager, the local EBS coach, two team leaders, and two operators. An interview guide was used to perform the interviews, a part of the case study protocol in Appendix A. The same interview guide was used at the two plants, but varying slightly between the different roles. By using the same interview structure in both plants, the results could be used for data triangulation. Also the fact that all levels in the organization were

interviewed, from the top management level to the operating level, contributed to data triangulation.

Four of the five employees at the EBS center were also targeted for focused interviews. A slightly different interview guide was used to conduct the interviews, but focusing on the same topics as the interview guide for the plants. The interviews with the EBS center are therefore another source of data triangulation.

The interviews varied in length, the longest lasting for approximately one and a half hour and the shortest for about 20 minutes. All the conducted interviews were recorded on tape, and later transcribed. This resulted in over *250 pages of transcribed interviews*. The interviews at Elkem Iceland were held in English, while the interviews with Elkem Salten and the EBS center were held in Norwegian. The reason for this was to avoid that the language became a barrier. The interviews held at Elkem Salten and the EBS center were transcribed in Norwegian, and only the parts being used as direct quotations were translated at a later point in time.

After the interviews were transcribed, they were e-mailed to the interviewees for approval. All 20 interviews were approved, with only small corrections from some of the interviewees.



**Figure 2: Collection of data**

### 3.3.2 Archival records

In order to address the plants' EBS activities and performance, archival records were collected from both the plants and the EBS center. From the plants, numbers concerning the EBS activity (i.e. training activities, conducted improvement projects, received coaching) were accessed through the local databases and handed over, together with .ppt files describing different projects. Also, the results from a recent employee survey at Elkem Iceland were given access to. The plants' results on the EBS audits were admitted from the EBS center.

### 3.3.3 Direct observation

Observational evidence is useful in providing additional information about the topic being studied, as it adds new dimensions for understanding either the context or the phenomenon being studied (Yin, 2009).

The case study protocol did not specify any certain types of behaviors to look for in the field. However, it was scheduled a guided tour at both plants, and also attendance at a morning meeting. During the tours, pictures were taken of observed matters of interest, and conversations were made with employees. The tour at Elkem Iceland was guided by the *divisional* EBS coach, while the tour at Elkem Salten was guided by the *local* EBS coach. While the tours were very similar in terms of what production facilities were shown, the two EBS coaches had a different focus. The divisional EBS coach visiting Elkem Iceland was eager to point out weaknesses and improvement potentials. The local EBS coach at Salten, on the other hand, was enthusiastic about showing the latest achievements related to EBS work.

### 3.4 Analyzing the data

In order to code and categorize the data, a qualitative data analysis software was used, called NVivo. The transcribed interviews were first imported into NVivo as Word files. Thereafter, a folder was made for each unit of investigation: “Elkem Iceland”, “Elkem Salten” and “The EBS Center”. Under each folder, a node was made for each topic of investigation. The topics of investigation were the same for each of the plants. When reading through the transcribed interviews, interesting parts could be marked and placed under the relevant nodes.

The analytical technique was to use a cross-case synthesis; even though the cases had been conducted as a pre-designed part of the same study, the two individual cases were first treated as separate studies. For each node, revealed factors were, if possible, related to one of the investigated propositions. For example, the empirical evidence pointed to *top management support* as being an important influencing factor, as hypothesized in one of the propositions. Therefore, all empirical data regarding top management support were collected in one sub node. After all the evident factors were placed under their respective propositions, a comparison could be made between the two cases.

The strategy for analyzing the data was to replicate the findings across the two cases. For a theoretical proposition to be supported, findings from *both* plants needed to confirm the proposed relationship. Thus, if a given factor (or factors) was shown to have had the expected influence on the EBS implementation at both plants, one would expect the finding to be generalizable and the respective proposition to hold.

### 3.5 Strengths and weaknesses of the methodology

Four tests have been commonly used to establish the quality of any empirical social research; (1) construct validity, (2) internal validity, (3) external validity, and (4) reliability. The first part of this section will discuss the quality of the method, based on these four measures. The second part will address weaknesses of the used method.

#### 3.5.1 Quality of the method

##### *External validity*

For a case study to have external validity, it must have defined a domain to which the study’s findings can be generalized. One way of accomplishing external validity, is to rely on

*analytical generalization*. The aim of analytical generalization is to generalize the results to some broader theory. (Yin, 2009)

The cases of this study are subsidiaries of the same multinational company, Elkem. The question is whether the findings from this study are applicable to other MNCs. The investigated factors at the two plants were not single and random experiences, but broader theoretical issues, such as the use of corporate socialization mechanisms. The investigated factors were based on the theoretical propositions, which again directly stemmed from an extensive review of the literature on knowledge transfer in MNCs.

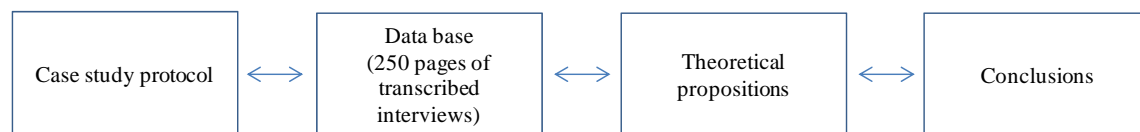
The generalization is not automatic, however. The proposed theories, or propositions, were therefore tested by replicating the findings in a second case. Once such a direct replication has been made, the results might be accepted as providing strong support for the theory (Yin, 2009). The fact that the investigated factors built on existing theory, and that replication was made between the two cases, means that the results can be generalized to other MNCs.

### **Reliability**

To ensure reliability, the investigators have to demonstrate that the procedures of the study can be repeated, with the same results. One prerequisite for allowing another investigator to repeat the same study is the need to document the procedures (Yin, 2009).

In this case study, two tactics to ensure reliability have been applied; the use of a case study protocol and the development of a case study database. The protocol contains the procedures for data collection, the name of the interviewees, and the case study questions. This would allow a different researcher to follow the same data collection procedure. Also a database was developed, where the data was codified and categorized based on the theoretical propositions. In principle, other investigators could review the evidence directly in this database.

In this manner, the case study maintains a chain on evidence; it is possible for an external observer to follow the derivation of evidence from the initial research questions in the case study protocol to ultimate case study conclusions.



**Figure 3: The chain of evidence from initial research questions to case study conclusions**

### **Construct validity**

One way to assure construct validity is to identify the correct operational measures for the concepts being studied. In order to say something about the level of XPS implementation, an appropriate measure needed to be identified. This study used the same measure of implementation level as the case company itself. As they are assumed to have in-depth knowledge about XPS systems, it is believed that this measure is valid. Also, the measures of knowledge transfer used in this case study are well known in the existing literature.

In this study, multiple sources of evidence were used to investigate the topics being studied. The most important advantage presented by using multiple sources of evidence is the development of *converging lines of inquiry*, a process of triangulation and corroboration. By using data triangulation, the facts of the case study have been supported by more than a single source of evidence. The potential problems of construct validity can be addressed because the multiple sources of evidence provide multiple measures of the same phenomenon.

### ***Internal validity***

Internal validity is a big concern of explanatory case studies when an investigator is trying to explain how and why event x led to event y. If the investigator incorrectly concludes that there is a causal relationship between x and y without knowing that some third factor –z- may actually have caused y, the research design has failed to address the threat to internal validity.

This case study assumed that given factors within absorptive capacity theory, change management and institutional theory would have a significant influence on XPS implementation in MNC subsidiaries. Also, given factors within corporate socialization theory and agency theory were assumed to have a significant influence on the XPS knowledge sharing between MNC subsidiaries. The risk of a *lack of internal validity* is considered low in this case study. First, the propositions are formulated with caution. While they suggest that some factors have a positive or negative influence on the XPS implementation, they do not indicate that some factor alone led to the success, or lack of success, with the implementation. Also, they do not state that some factors are more influential than others. Second, by basing the propositions on several theories, a broad scope of potential influencing factors are investigated.

Research quality test	Employed research tactic
External validity	<ul style="list-style-type: none"> <li>• The propositions were based on existing theory (analytical generalization)</li> <li>• Findings from one case were replicated in a second case (direct replication)</li> </ul>
Reliability	<ul style="list-style-type: none"> <li>• Used a case study protocol</li> <li>• Created a case study database in NVivo</li> <li>• Established a chain of evidence</li> </ul>
Construct validity	<ul style="list-style-type: none"> <li>• Used correct operational measures</li> <li>• Used multiple sources of evidence, and triangulated the data</li> </ul>
Internal validity	<ul style="list-style-type: none"> <li>• Basing the study on several theories</li> </ul>

**Table 3: Quality of the method**

### **3.5.2 Weaknesses of the method**

#### ***Subjectivity***

This study is exposed to the subjectivity of the researchers during the interpretation of the empirical findings. In order to reduce the degree of subjectivity, several measures are taken. After each interview, the transcribed interviews were sent to the interviewees for approval, assuring that their statements have been correctly interpreted. Further, a meeting was

arranged with the key informant at the EBS center after the collection of data, to discuss the interpretation of the findings. The intention was to ensure that the researchers' interpretations were in line with those of the members of the social context. This practice is called *member validation*, and is supposed to increase the credibility of qualitative studies (Bryman & Bell, 2007).

Also, the empirical findings were separated from the analysis of the data. This case study has a rich collection of empirical data; a big part of it being direct quotations from the interviewees. In this way, an external reader can make up her or his own opinion based on the findings.

#### ***Interviewees bias***

During the data collection process, the local EBS coaches at each plant were responsible for selecting employees to interview. While some of the interview targets were set, such as the plant manager, others were not determined in advance. This was true both for the team leaders and the operators. In this way, the local EBS coaches could in theory have selected the team leaders and operators that were most enthusiastic about EBS.

Also, at Elkem Salten, it was the local EBS coach who was responsible for guiding us at the plant, and therefore decided what areas of the plant to show us. It is possible that the local EBS coach is more biased than the divisional EBS coach who guided us at Elkem Iceland.

The fact that the EBS coaches to some degree were in control of the information available to the researchers could be considered a potential weakness of the study.

#### ***Language barriers***

Because the researchers are not familiar with the Icelandic language, the interviews at Elkem Iceland were all held in English. Although many of the interviewees spoke English quite fluently, others had some difficulties with expressing themselves adequately. Therefore, language barriers have influenced the research to some extent, and this can be seen as a weakness of the study.

The selected parts of the interviews from Elkem Salten that were presented in the empirical findings had to be translated from Norwegian. Therefore, some of the nuances in the language may have been lost in translation.



## 4. Case Presentation

### 4.1 Introduction to Elkem

Elkem was founded in 1904 by Sam Eyde, a Norwegian engineer and industrialist. In 2005, the company was taken over by the industrial conglomerate Orkla and delisted from the Norwegian stock exchange. After six years in Orkla's ownership, Elkem was acquired by the Chinese company China National Bluestar in April 2011. Elkem is headquartered in Oslo, Norway<sup>3</sup>, and have a total of 2500 employees spread across 12 production plants worldwide. Company revenues in 2011 were 9500 MNOK.

Elkem specializes in high temperature furnace technology and high-temperature process operations, and produces five main products: silicon, micro silica, ferrosilicon, carbon and solar grade silicon. The application of silicon is related to production of chemical silicones products, semiconductors used in computers and cell phones, and as an alloying material in aluminum. Solar grade silicon is the raw material for production of solar panels. Ferrosilicon, which is produced in numerous different grades, has two main applications: Ferrosilicon is used as an alloying material to steel industry and Specialty Ferrosilicon Alloys (MgFeSi and Inoculants) are used in the Iron Foundry Industry. Elkem's carbon products are delivered as electrode paste and refractory material to the Ferro alloy furnaces worldwide.

Based on these products, Elkem's main business divisions are: Elkem Silicon Materials, Elkem Solar, Elkem Carbon and Elkem Foundry Products.



Figure 4: Elkem's four main business divisions

<sup>3</sup> As Elkem is headquartered in Oslo, the institutional profile of 'the parent company' will be Norwegian

## 4.2 Elkem Business System

Elkem Business System (EBS) is derived from Alcoa's *Alcoa Business System* (ABS), which again is founded on the principles and philosophy of Toyota Production System (TPS). Thus, TPS is also the cornerstone for EBS.

Through its joint venture with Alcoa in the aluminum production, Elkem was introduced to Alcoa's ABS in the late 1990s. It was decided in 2000 that Elkem should develop its own business system *Elkem Business System* (EBS), but based mainly on the principles, methodology and tools from ABS. Both ABS and EBS were introduced in the companies partially as a reaction against short-term thinking, and some unfortunate experiences from several corporate cost cutting initiatives, based on extensive use of different external consulting groups.

The guiding principles of EBS are anchored in Elkem's Core Values of *respect, continuous improvement, precision, and involvement*, with a primary objective of improving customer satisfaction. The four fundamental guiding principles are: *Make to Use, Empowered People, Elimination of Waste* and *Processes in Control*. Make to Use is about connecting people in the organization as customers and suppliers in the value chain, making organizational output meet customer needs. *Empowering people* involves respect for individuals, developing people and recognizing that individuals drive the continuous improvement of the organization. Identification and *elimination of waste* is seen as an important principle for developing and improving process flow, while *processes in control* are about stability and capability to meet customer and business requirements.



**Figure 5: The four guiding principles of EBS**

### 4.2.1 The EBS center

The EBS center was established in year 2000 to support development of EBS as a global management system in Elkem. The center, located in Trondheim and Kristiansand, consists of five coaches and is organized as a unit within the Elkem headquarters' Human Resources department. The purpose of the center is to accelerate a continuous improvement process by developing the employees' motivation and ability to solve problems. The EBS center's main tasks are: *Divisional- and plant support* by coaching in problem solving and facilitate improvement projects, *education and training* in designated EBS forums, *annual EBS audits* for monitoring progress and initiating new improvement areas, and *system development and continuous improvement of EBS* as the company's management concept.

### 4.2.2 EBS implementation

The EBS implementation process starts with a visit to a designated plant from two or more of the coaches from the EBS center. The first visit lasts a week, where the plant is introduced to EBS according to a specific deployment sequence. The first priority of the coaches is to

*ensure sponsorship.* The main sponsor of each plant is the plant manager and the top management team, which is coached in EBS philosophy, methodology and tools, as well as the strategic importance of implementing EBS. In order to ensure continuation of EBS training and further implementation after the initial week, the plant's *HR help chain* is developed. The HR department's role in EBS is to ensure development of employees through process improvement, implementation of a team-based organization, and to support and stimulate an internal improvement culture. Next, team roles are defined, standards for work practices are developed, and EBS tools<sup>4</sup> are introduced to the organization. Table 3 summarizes the most important roles within a plant concerning the EBS implementation:

Role	Responsibilities:
Sponsor	The sponsor must express the strategic importance of implementing EBS in the organization, and should therefore acquire comprehensive knowledge about EBS philosophy and methodology in order to understand the necessary changes it takes to implement the system. He/she must be willing to put personal prestige behind the implementation of necessary changes, and is responsible for allocating the necessary resources for implementation and development of EBS at the plant.
HR help chain	In addition to more traditional HR-responsibilities such as recruiting, defining the internal and external HR policy and developing incentive systems and practical measures to support and encourage employees to education and development, HR is also responsible for development and operation of continuous training programs, implementation of a team-based organization, and facilitation and support of establishment and operation of continuous improvement teams.
Team leader	The team leader is also known as the "shop floor coach". The purpose of this coach is to involve and challenge all employees in improvement activities and facilitate "learning by doing". More specifically, he/she shall lead the development of standard practice in the process section, involve, coach and help operators in problem solving, as well as initiate and facilitate continuous improvement

**Table 4: Important roles related to the implementation of EBS**

After the initial introduction, the plants are left responsible for the further implementation of EBS with support and visits from the divisional EBS coaches. Regular audits to assess the plant's EBS performance are conducted through collaboration between the plant and the divisional EBS coaches. Further education and training is conducted through three types of EBS forums: EBS University, EBS Academy and EBS Team leader school. Table 4 presents a description of the three forums.

<sup>4</sup> See Appendix F for an overview of the EBS tools

	Content
EBS University	Was first started in 2001 to educate employees on EBS at all levels and functions within Elkem. The University is held by the coaches from the EBS center and gives an introduction to basic philosophy and principles, tools and methodology. Today, the University is held in 3 different languages (Norwegian, English and Chinese), and has from 2001-2011 had 819 participants. The EBS training material is translated to 12 different languages. One University-week lasts for 5 days and has a maximum of 35 students. Case presentations from Elkem plants are given, where the objective is to share experience and ideas between plants. Direct observation and practical training is also conducted at the hosting plant.
EBS Academy	EBS Academy is an initiative to increase EBS training locally at the plants, involving all employees. The academy runs over the course of 2-3 days, held either by the plant itself or with assistance from the EBS center, depending on the capacity of the plant. The academy consists of five modules of which some content is customized to fit with the level of EBS implementation at the particular plant.
EBS Team leader school	The target group is personnel who daily lead and coach improvement teams. The focus areas at this school are facilitation and coaching skills of teams, and how to apply EBS methodology and tools in a team based problem solving process. The team leader school has so far only been held in Elkem Solar and Elkem Salten.

**Table 5: The three types of EBS forums directed at education and training**

### 4.3 Elkem Iceland

Elkem Iceland (former Icelandic Alloys Ltd.) was established April 28, 1975 by the Icelandic government in a joint venture with the American company Union Carbide. The plant is located in Grundartangi, Iceland, about 45 kilometers northwest of the capital city of Reykjavik. In 1976 Union Carbide withdrew from the joint venture, and Elkem acquired the company's owner share. The government then started a cooperation with Elkem, who gained full ownership of the plant in 2003. The same year the production capacity was expanded through a third furnace, which was built by Elkem. The decision was made to use a new break-through technology on this furnace, which had not been tested in such a large scale before. The following years were marked by fluctuating company results, and several cost-cutting initiatives were carried out in order to maintain operations. Among these was a decision to outsource all maintenance operations at Elkem Iceland. In 2006 a large strategic decision was made that Elkem Iceland should go from being a commodity producer with ferrosilicon (FeSi75) as their main product, to becoming a specialty producer of magnesium-ferrosilicon products. A new alloying plant and crushing/ sizing plant were built to accommodate this type of production. In 2008, the financial crisis hit Iceland and the plant management was replaced. Due to challenges such as the economic climate and frequent changes to the plant's organization, being a specialty producer proved to be demanding. In 2011, a decision was made to go from producing magnesium-ferrosilicon back to specialty refined production of ferrosilicon (Fe75) to the steel industry, in addition to a few other specialized foundry products.



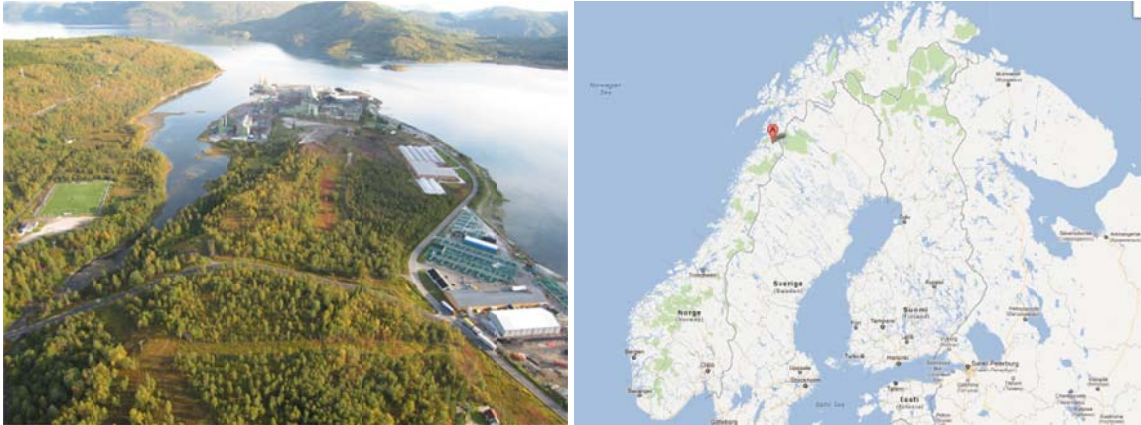
**Figure 6: The location of Elkem Iceland**

Today, the plant is organized under Elkem's foundry division. Elkem Iceland has 200 employees of which 30 holds staff functions and the remaining 170 are operators at the plant. Revenues in 2011 were estimated to 1200 MNOK.

The main products of the plant are ferrosilicon and microsilica, of which annual production is about 120.000 MT of 75% ferrosilicon and 24.000 MT of micro silica. Approximately 30.000 MT of the FeSi75 is used to produce 50.000 MT MgFeSi (FSM) products. The total use of FeSi in the world is approximately 3.5 millions MT per year, of which Elkem Iceland's production caters to around 3% of world use. The production is round-the-clock with a five-shift system operating the three furnaces of the plant.

#### 4.4 Elkem Salten

The plant of Elkem Salten was built by Elkem in 1966-1973 together with a local hydro power plant as part of a larger expansion in Norway. The plant is located by the fjord Sjørfolda, about 80 km east of Bodø. Since its establishment, the plant has had a stable development and has grown into one of the world's largest and most modern silicon plants and is an important cornerstone within the local community of Straumen.



**Figure 7: The location of Elkem Salten**

Elkem Salten is organized under the Elkem Silicon Materials division, and employed 175 people in 2011, of which 30 employees holds staff functions while the remaining 145 employees are operators at the plant. Annual revenues are approximated to 1000 MNOK.

The main product portfolio of the plant is a mix of ferrosilicon and silicon products (both FeSi75 and Si97 can be produced) and micro silica, of which annual production is approximately 110 000 tons of FeSi75 or 80 000 tons Si97, and 21 000 tons of micro silica. In 2012 the plant will undergo a conversion in the production, where one of the three furnaces will be converted from ferrosilicon production to silicon metal for the Chemical markets. The production at Elkem Salten, as for Elkem Iceland, is round-the-clock, of which the plant's three furnaces are operated through a five-shift system.

## 5. Empirical findings

### 5.1 Implementation of EBS at Elkem Iceland

#### 5.1.1 The history of EBS implementation

The implementation of EBS in Elkem started in year 2000. However, the understanding as to why EBS was to be implemented differed within Elkem's corporate management. According to Arve Ulriksen, who was working at Elkem Iceland at the time, this resulted in a difficult start at Elkem Iceland.

“The chief executive in Elkem at the time, I'm sorry to say that he didn't see his own important part in this. He used it without hesitation to start change processes in order to cut costs, but with the wrong motive, if I may say so. He-, when you look at people as an expense...that's when you have lost in my opinion. People are a valuable resource, and we have to have people to succeed with changes. (...) At Iceland, I remember, I think three or four managers resigned in protest. Nobody wanted them to go, they were the best, naturally, the best people we had at Iceland” [Arve Ulriksen, Plant Manager Salten]

Nevertheless, the implementation of EBS at Elkem Iceland was initiated. However, the motivation of local management rendered the implementation process as slow and the plant unconvinced as to the EBS philosophy.

“Well, if I look at the history of trying to implement EBS in Iceland, at the plant here, I see a lot of mistakes or, well, mistakes may be a too strong word, but something hindering the process. For example it was started without total commitment from the top management at the plant. And that really showed off, because you didn't really see anything happen.” [Einar Thorsteinsson, Plant Manager]

“(...) I would say that the philosophy behind EBS wasn't really there at that time, well we didn't implement it. We were more like looking at the EBS tools and using them.” [Sigrun Palsdottir, HR Manager]

During the following years, the plant experienced a series of large strategic changes. The first change came when Elkem gained full ownership of the plant in 2003, and a third furnace was built. This gave unanticipated and challenging consequences.

“Strategic choices were made for the plant, which when looking back one maybe would have thought about once or twice before doing again. The first choice was about the expansions that were done. It is such a large furnace, and the Icelanders themselves, along with Engineering, wanted a very complex new breakthrough technology on that big furnace. And it all went straight down the drain, to put it mildly. And that marked the organization in quite a strong way. They had some very large challenges.” [Øyvind Sørli, Leader of EBS center]

Shortly after installing the third furnace, the strategic decision to go from producing commodities to specialty products of magnesium ferrosilicon made another impact on the plant.

” (...) it was an entirely new process, that wasn’t tested in Elkem even. Also, it requires a lot of knowledge about the process and about the market in an organization that chooses a differentiation strategy. And then these things were all done at the same time. And then just before this, they had outsourced everything that had to do with maintenance almost, including the managers. They bought it from the outside. And the plant just started to fall apart, because the fixed costs became more important to get reduced than to get stability. They thought they could do both at the same time.” [Øyvind Sørli, Leader of EBS center]

As a consequence, the strain of being a specialty producer eventually started to show, as Wayne Faaland and many others in the organization observed:

“They wanted to be a flexible plant that could produce every product. And again it gave the plant good numbers, because it’s a high valued product that they’re selling. But we saw some quality issues, we saw some safety issues. And the efficiency was very low. So again, it showed that we overloaded this plant too much. They weren’t mature enough to take over.” [Wayne Faaland, EBS center]

After the plant became fully-owned by Elkem, EBS was given more focus. However, as a result of the plant’s difficult situation, the implementation process suffered as a consequence.

” (...) it is difficult to run EBS as an improvement process and organizational development if you are doing firefighting all the time, right? Because it wasn’t enough peace in the organization or enough resources for them to concentrate on it” [Øyvind Sørli, Leader of EBS center]

The following period was marked by frequent changes to the plant management. The plant managers employed were sourced from the Elkem system, and of Norwegian nationality. Language and culture barriers, organizational restructuring and disorganized implementation of EBS activities made the long-term view of the EBS philosophy difficult to carry through.

“So, you can imagine the operational challenge in strong volume growth, a differentiation strategy, new technology that doesn’t work, and added to that, changing the plant manager every other year. With Norwegians coming in that aren’t capable of communicating across the organization, right (...) so there wasn’t any basis for running a systematic improvement process, if you can call EBS that.” [[Øyvind Sørli, Leader of EBS center]

This is supported by the fellow EBS center colleague, Wayne Faaland, who observed how the EBS activity of removing middle management and implementing a team-based organization was carried out.

“Here in Iceland the people who worked with EBS before me came in and said that, “If you want to get EBS implemented, you have to take away the shift foremen”. And then a year later I was called in to help save the organization (...) the problem here in Iceland was when the shift leaders were taken away, everyone wanted to decide what they were to be doing. So, again, they rotated three times per shift, so the guy that was on the stoking floor, he was only there for two hours. Then he went down to tap, and then he went down



to refine. And again, if everyone is doing all these changes and they don't have any ownership, this is what almost ruined the plant, you know." [Wayne Faaland, EBS center]

Another experience made by the divisional EBS coaches at this time, was the reluctance of the plant management to accept assistance or to facilitate visits from the EBS center.

"Wayne experienced this many times. It is in many ways something like 'yes, ok, we will receive that gang from Norway that come here and talk about EBS and those things. And yes, we will gather some people'. But they didn't seem to find the time, and we made an arrangement to meet 15 people, and only 4 came. And that told us a lot about the thinking and prioritizing." [Øyvind Sørli, Leader of EBS center]

### ***A fresh start***

In 2008, the current plant manager at the plant, Einar Thordursson, was employed. The difference with this plant manager was his Icelandic nationality and thereby ability to speak the language and understand the culture (Øyvind Sørli, 2012). Changes towards the plant's EBS implementation were soon carried out.

"Einar was crystal clear and said to the corporation that 'Here, I am the one in charge. And it is me who asks for help, and I am the sponsor. But I am also going to get all the help that I ask for'. And that is what he got." [Øyvind Sørli, Leader of EBS center]

Thordursson observed early on how the plant reacted towards EBS and its content, after previous years of implementation by different plant managers, and decided to approach EBS differently.

"When I came I felt that we were pressing EBS on people, forcing it, and using the word EBS in every sentence, and I stopped that. I changed the tactics. Because people were saying, 'This is EBS, what the hell is that?' 'Elkem bullshit' is one of the phrases you get if you do it wrong. So, we stopped using the word EBS in every sentence, but sometimes when we're working with something, I sometimes stop up and say 'Hey guys, did you realize this is the core of EBS we're using now?'" [Einar Thorsteinsson, Plant Manager]

The ownership towards EBS taken by Thordursson, as well as the change in implementation tactics, resonated down the organization, and affected the way many employees at the plant perceived EBS.

"So I would say after 2008, from 2009 we really started to integrate it more. Not seeing it as just some tools you were using but integrating the philosophy and principles of EBS into the everyday work." [Sigrun Palsdottir, HR Manager]

***"It was a break through when the plant management in Iceland took this over by themselves and started to do things how they liked to do it. And stopped doing what someone else was telling them."*** [Thordur Magnusson, Production Manager]

After many years of changes and disruptions, the last few years have been spent building a new fundament for the organization. According to Sigrun Palsdottir, the focus has been on

getting the process under control and going back to the basic operations the plant started out with. This is also something Thorsteinsson reflects on:

“If we look back at the last three years, when I started it was supposed to be the most sophisticated, specialty producer in Elkem. After quite a struggle, we went back to the basics. We are going back to commodity production of ferro-silicon, which is quite a dramatic strategic change.” [Einar Thorsteinsson, Plant Manager]

The EBS activity is mentioned by Thorsteinsson as something that is gradually improving.

“We’ve been doing a steady progress building up the EBS understanding in the plant. So it’s always going better and better, up and up, and so, I haven’t seen any set-backs.” [Einar Thorsteinsson, Plant Manager]

In 2010, the plant also got its own, local EBS coach which is responsible for overseeing the local EBS implementation. In 2011 the first EBS school was held at Elkem Iceland by Unnur Sigrunsdottir, the local EBS coach. According to her, the plan is to hold an EBS school for the employees two times a year as a regular event. However, according to Wayne Faaland, the plant’s divisional EBS coach, the history of the plant still proves to be a challenge.

“But again, sometimes they, this is my worry, that they always want something new. And again, the progress for the plant here, (...) things have been going very quickly for them. And they haven’t been, they haven’t got time to really reflect on ‘what we’re doing well, and what we’re not doing so well’. And I think that is one of the reasons why FSM is being moved back to Bjølfvossen. They’re not performing well enough. And again, it’s our fault, and I say ‘our fault’ meaning that some decisions were made to do it here because it was supposed to be cheaper.” [Wayne Faaland, EBS center]

### **5.1.2 Roles and responsibilities related to EBS**

#### ***The Role of Top Management***

The current plant manager’s early introduction to EBS through the EBS University is something he believes has been important for his early commitment to the philosophy. Furthermore, before becoming plant manager, Thorsteinsson had already been introduced to many of the TPS and Lean-based elements used in EBS through his university education.

“(…) when I was introduced to EBS, when I started, I was really lucky. I started in Elkem in April 2008, and I was hired from outside Elkem as a plant manager, which is not the usual way Elkem has done things. And I was lucky, because only a few weeks after I started I got the opportunity to go to Elkem University. So that was really a good thing.” [Einar Thorsteinsson, Plant Manager]

“When I started looking at this EBS, whatever that was, I said ‘this makes sense, I know almost all the techniques, all the methodology as such, but not as a package.’” [Einar Thorsteinsson, Plant Manager]

However, Thorsteinsson is quick to point out that for him, EBS is far more than a number of tools put into system.

“Again, I feel that EBS is more a philosophy, than a..anything else. It’s a philosophy with a tool kit.” [Einar Thorsteinsson, Plant Manager]

What employees at the plant point out as the most important quality of Thorsteinsson, is the fact that he takes ownership towards EBS, and shows a commitment to the implementation of EBS at the plant.

“I think it’s...the saying was, that this was much harder in Iceland because of cultural differences, like you were mentioning, but that’s not really the point. The point is if the plant management takes ownership and adapts things and do what they feel is important, that’s the key to success, and not letting someone else come in and tell you what to do. But you should yourself take the initiative, and use the others to help reaching that goal.” [Thordur Magnusson, Production Manager]

### ***The role of the EBS coach***

The local EBS coach at Iceland was employed in 2010. Since then, she has focused on increasing EBS-related communication within the plant, as well as coaching of the employees.

“The biggest part is communicating with the operators and team leaders, everything regarding EBS, and helping them with the daily coaching part. It’s the biggest part.” [Unnur Sigurjónsdóttir, Local EBS coach]

When asked about the work of the local EBS coach, the general attitude towards the work that is carried out is positive.

“(...) Unnur, who we have as our EBS coach, she has done a very good job.” [Sigrun Palsdóttir, HR Manager]

“She is very visible and most often pops down with her presentations and things like that. She is the head of EBS here and I think she is respected for her job and her work.” [David Buason, operator]

The EBS coach has also been responsible for starting up the local EBS school in Icelandic, and the response of those who have so far attended is very positive.

“(...) they don’t just read through all the tools, you actually have projects and you use them in a group, a five-person group. And they have it for people in different divisions, it’s not usually people you work with, so you learn to work with them and solve projects using the EBS tools. So it’s really effective to see actually, you feel the tools work, you know, instead of just reading about it. Yes, you don’t really learn EBS unless you use it.” [Hannes Ingolfsson, Team leader]

Involvement of people is mentioned by Sigurjónsdóttir as the most important advantages of EBS, although she admits this is something the plant could get better at.

“I would say, by integrating people into projects, and involving them in all kinds of projects, and asking them to, you know, give us their opinion. I think that’s the biggest

thing that we can use, and probably don't use enough." [Unnur Sigurjónsdóttir, Local EBS coach]

In fact, having to engage the workers is not something the EBS coach has to worry about.

"They're really, many of our workers are really open to giving me their point of view with what they think I should be doing and how to be doing things and, most of the time they have really good points, so they're not afraid of telling me what they think, that's really good." [Unnur Sigurjónsdóttir, Local EBS coach]

Although the communication between the employees and the EBS coach is good, there does not seem to be many regular EBS meetings to secure an official line of communication from the operating level and upwards to the top management.

"No, no formal meetings, no. Only in small groups when we are talking about something, improvements or, but no formal meetings with management, no." [Unnur Sigurjónsdóttir, Local EBS coach]

### ***The role of HR***

At Elkem Iceland, the Human Resources department consists of only one person, the HR manager. This limits the capacity of the HR manager to assist the EBS coach in coaching and training of the employees. Therefore, the responsibility for the training employees receive in EBS on a daily basis is assigned to the individual departments at the plant.

The EBS coach recognizes the limited capacity of the HR manager, but expresses on a general basis the wish for more interaction between those responsible for HR and EBS, as well as other related departments.

"(...) how I see EBS is that it comes into HR, quality and EHS, so this proves we should of course contact each other more or you know, help each other out more than we do today, definitely." [Unnur Sigurjónsdóttir, Local EBS coach]

### ***The role of the team leader***

When interviewing the team leaders, it is clear that the vision of the plant manager to make EBS more about the philosophy concerning EBS rather than using specific tools has spread downwards into the organization.

"I really look into the people, the culture, and that means how I empower people. (...) How is my group? How do I get my people to constantly be active in thinking 'Hey, how can I get better, how can I continuously improve, how can I, there's a waste, how can I do that?' That's my main focus. Then, I feel in the long run I will gradually come to the tools. But, I feel often that EBS has been about the A3 or this, I don't know, the actual tools. But the EBS is a culture. It's the way we think, the way we work, that's the most important thing. You have to have that in place, then I think we can go and start using the tools, and that's what I've been trying to do." [Jon Atli Kjartansson, Team Leader]

Further, the team leaders express a clear wish to make any more EBS training they are to receive as practical as possible.

“(…) Not like formal training. No, that will not give me anything, another course in the literature. But maybe like, assistance on some actual projects or problems that I have. Not sitting about, reading about it and listening, that does not bring me anything.” [Jon Atli Kjartansson, Team Leader]

At Elkem Iceland, the information received is unclear as to how the improvement projects are organized, and who leads these projects. However, the impression given is that many small-scaled improvement projects are performed, of which the ones performing the improvements make A3s to structure their work. Those participating in the project don't necessarily report on the project status regularly in a designated forum. Rather, they are assisted by their shift team leader who, in the case of these projects, doubles as an improvement team leader. However, the use of formal tools such as A3s is not always viewed by the operators as worthwhile.

“The A3 has a bad reputation, it's like, ‘Oh, write an A3 about it’, that means ‘the kiss of death’, or that means that nothing will happen. So I'm trying to ‘Ok guys, we have a project’. (...) I try to do it without calling it A3 in the beginning, and then gradually getting into it. But, yes, I'm using the A3 but that's not my main focus. But still, it's good to think in a systematic way and everything, but to get my people to work, and to think about it, I have to motivate them. They can get a little skeptic about those formal tools.” [Jon Atli Kjartansson, Team Leader]

When talking about the involvement of the workers at the plant, the divisional EBS coach misses a more structured, hands-on approach to problem solving out on the shifts. One example where this could be improved is at the morning meetings where the shifts meet up to get an update about the production status from their team leader.

“I'd like to get a little more engagement at the morning meetings, instead of just the boss telling them what happen and then they go through the numbers they write down on the board. (...) To me, I define it sometimes as waste.(..) But my issue with morning meetings should be that there is more of a discussion. The numbers are up there, there's no sense in reading them. But I rather have more discussions on improvements that aren't there. I think this is where we could get a lot more information out to the teams and not just reporting their last production numbers.” [Wayne Faaland, EBS center]

### **5.1.3 Visualizing and communicating goals and results**

Visualizing and communicating goals and results related to EBS, is perceived by many of the employees at Elkem Iceland as one of the plant's biggest improvement potentials. The results of the employee survey recently conducted at the plant (see Appendix C for further details) clearly indicated the need for more information among operators.

“Well. Eh, communication is one of the big, big, big issues in a plant like this. Communicating strategy, results, what's going on, improvements work, how do you do that? We recently did a survey with all the employees regarding how they feel about work. And, well, surprise, surprise, what was at the top? “I want to know more”. The need for information.” [Einar Thorsteinsson, Plant Manager]

When it comes to communicating goals, this is done indirectly by showing results which are based on the Rolling Top Five. However, the plant manager believes that the overall awareness of the plant's goals are low, especially at the operating level.

“In the cantina you see a very big flat-screen. There we have on rolling weekly basis some operating results, which are in fact based on the Rolling Top Five. So it's both direct and indirect communication. But unfortunately we, I am quite sure, when I go out in the plant and see one of my operators and start discussing, I can very easily find that he hasn't a clue of what we are doing. But, so, this is really an on-going process.” [Einar Thorsteinsson, Plant Manager]

Many of the employees mentioned that both goals and results related to the production are sufficiently communicated. The results of EBS work, on the other hand, are not that visible.

“I think we are not efficient enough in doing that. So, we communicate production, and production goals and things like that, but we are not very good at communicating the results of different programs. So that is definitely an improvement potential.” [Thordur Magnusson, Production Manager]

When it comes to quantifying the results of EBS work in monetary values, it appears that this has not been a strong objective. The plants manager is actually a bit uncertain about the value of this practice.

“On top level, yes, everything is quantified in monetary values. But in the daily work, we do it sometimes, sometimes we don't. And that's one of the things I personally, in the EBS, I think is overrated. That everybody always thinks about costs and money. At management level, definitely, it's a very big driving force. But for the operators always to relate to monetary values, I'm not so certain about it. I think there are other things that can motivate even more.” [Einar Thorsteinsson, Plant Manager]

#### **5.1.4 Overall motivation at the plant**

It appears that the motivation for EBS at Elkem Iceland has previously been low. Some employees explain this by the lack of results in the early stages of the implementation.

“I think it is the older people that failed at the first time, and again, they usually use the same example that, ‘Why should it work now when it didn't work before?’ And again, I know some of these guys have been through different kinds of improvement work, both with external consultants and others. So, I think it's just a negative way of being.” [Wayne Faaland, EBS center]

The divisional EBS coach, Wayne Faaland, also blames the EBS center and the parent company for not being patient enough:

“We, sometimes we hunt for results, and have people not understand what they're doing. You'll get results, but you see after a while that the results are getting less, because a mega

glitch shows again that they don't know what they're doing, they're just doing something that somebody is telling them to do." [Wayne Faaland, EBS center]

In addition to the set-backs in results, some of the interviewees explain the low motivation by a general resistance to change.

"I think they actually, they're just do the work the way they've been told pretty much. And I remember the first time they were putting the safety rules much stricter, and I remember how people were frustrated. They hate change, but before they know it, they have just become a part of it. (...) And another change comes and they're frustrated about that, and they are just 'god damn it', you know, and before they know it they are a part of it, and they can't remember how frustrated they were before." [Hannes Ingolfsson, Team leader]

"Some people are against changes, just because it's a change I think. One thing I think the Icelandic organization do is that they focus on the people that want to do this, and they leave the people that don't want it, they just leave them alone." [Wayne Faaland, EBS center]

Both the local and the divisional EBS coach indicated that it is sometimes easier to motivate new employees for EBS. They also contribute to increase the overall motivation at the plant. As Sigurjónsdóttir explains:

"They're more open to new things and way of working. It's just like clay, you take a piece of clay and you need to form it. And off course it's different with the older ones, it takes longer time." [Unnur Sigurjónsdóttir, Local EBS coach]

Furthermore, it seems that the motivation for EBS is highest at the plant management level, and then becomes more varied further down in the organization.

"I think, my feeling is that on top level, we have been working top-down, and on top level, if I look at the plant manager, I am totally convinced about this philosophy as such. I really see the benefits. I think the next level, the management group, has really adopted. And to take the next level, the middle management, the team leaders etc., they are getting better and better. But there, I think, you start to see differences between departments. Shift leaders, they understand, I think, partly. At that level I think the 5S is the tool that most people know about. And they don't know about the 5 S, I think they know especially about one S, which is sweeping." [Einar Thorsteinsson, Plant Manager]

## **5.2 The basis for sharing of EBS-related knowledge at Iceland**

### **5.2.1 Relational distance**

#### ***Cultural differences between the plant and parent company***

Elkem Iceland is a wholly owned subsidiary of Elkem, and is dependent on the parent company for essential resources. This is pointed out by the plant manager at Elkem Iceland.

"So we are in a way very dependent because we are a production unit only, financed by the mother company." [Einar Thorsteinsson, Plant Manager]

Even though Elkem is a multinational company, many employees at Elkem Iceland feel that Elkem is more of a Norwegian company.

“We as Elkem, we say we are an international company. And in a way we can very easily describe us as an international company, we are owned by the Chinese, we have operations all over the world. But I feel very strongly that in our hearts we are not an international company.” [Einar Thorsteinsson, Plant Manager]

The plant manager at Elkem Iceland further points out that all the central functions are located in Norway, and that there is often a lack of understanding of other cultures.

“I feel that very often we get a response from headquarters that say “Well, you’re the same as us, aren’t you?” Or it’s assumed. But in Iceland we have different laws, the cultural issues I’m not so sure about, but different laws, different regulations, different ways of behaving because of that. And sometimes people forget that.” [Einar Thorsteinsson, Plant manager]

In addition to different laws and regulations, the history of the country has influenced the behavior of the Icelandic workers. Øyvind Sørli draws a parallel between Iceland, Norway and Sweden to explain the differences.

“When we work with these things (EBS) on Iceland they say, ‘Yes, we will do this and this’, but they don’t do it. There is no discipline towards decisions, and to a great extent a lack of precision culture. And that has to be related to the history, to the fact that it is a young industrialized community. They are fishermen and farmers and so on. If you look at Sweden, which is the other extreme, they have many hundred years of industrial experience. (...) In Norway we are somewhere in the middle. We keep discussing things after the decision has been made. But still, we put more precision behind the work.”

The divisional EBS coach, Wayne Faaland, indicates that the norms in Iceland are also different from those in Norway.

“(…) the industry is new for Iceland, this type of industry. Even though they have been doing this for 27 years, it’s new. And a lot of people that started working here are farmers and fishermen and they have a different way of working. But the changes that have been here, not just for the company here, but I see changes going on throughout the country too. When I came here six or seven years ago for example, there weren’t any garbage cans in the, not in the plant, but outside. And people were just throwing garbage outside and I even asked them, the organization here, ‘Why don’t you put of a garbage can, why would you want people littering your country?’ So things like this, they change a lot. But like I said, they’re very proud of the work they do. Even though sometimes it’s wrong, I think they’re very proud to try to solve their own problems. And again, it’s an ‘island culture’ I think.” [Wayne Faaland, EBS center]

The employees at Elkem Iceland point out that cultural differences between Icelanders and Norwegians are indeed evident.



“Of course you have to be careful not to say that we’re so special here in Iceland, we need special rules and special laws, but still there is a cultural difference. (...) There’s more of a rebel in Icelandic workers. They’re more rebels, like stubborn, want to do the things themselves. Like ‘hey, don’t tell me to do this’. Norwegians are more structured, more formal. But we have a lot of, more, creative people, but sometimes they’re a bit outside of the box. We are getting more formal and more structured, but I feel we have to be careful not to make everything really squared, everyone fits this frame, and so on.” [Jon Atli Kjartansson, Team Leader]

However, the understanding of cultural diversity seems to have increased after a new divisional manager was employed. Also, the implementation of EBS in Elkem is believed to make Elkem more of an international company.

“But, on the other hand, I can say that in our division, now we have a boss, French-Canadian, we have the Icelandic plant, we have a Chinese plant, and two Norwegian plants. And it has changed dramatically by not having a Norwegian divisional boss, in a positive way, for me. I’m not saying it’s bad to be a Norwegian, but it is a better understanding of the diversity. And I feel that we in the foundry division now are getting more and more, let’s say, international, instead of Norwegian.” [Einar Thorsteinsson, Plant Manager]

“And I think from our discussion, on top of my mind is that for me EBS is the key to making us an international company, not only a Norwegian company. This is the glue that should hold it all together.” [Einar Thorsteinsson, Plant Manager]

### ***Language barriers***

Several of the interviewees stated that the language barrier is the biggest cultural issue. One problem related to language occurs when the divisional EBS coaches are trying to work directly with teams in the organization.

“But one of the biggest, well if you are comparing the plant here to the Norwegian plants, one of the biggest factors is just the language. Because, if we want to run some courses or some training for our operators, the language is always a barrier. You know, compared to the Norwegian plants where they can get the people from the EBS-center to have some training or anything in their own language, even though a lot of people speak English here at the plant, it’s not quite the same. And, well, that is a big part, and maybe the biggest obstacle.” [Sigrun Palsdottir, HR Manager]

“The greatest hindrance is more the language. Because, Icelanders do normally not communicate in Norwegian. And it’s very often, although many can communicate in English, it very often leads people to be a bit passive in their work. So it’s been quite difficult to get Norwegian coaches to work directly with teams in Iceland, it’s been difficult to have active teams with Norwegian coaches. And that’s mostly related to language.” [Thordur Magnusson, Production Manager]

Also, the local EBS coach points out that the language barrier is one of the reasons why there has not been a team leader school in Iceland, yet.

“We have been planning to have that, but we haven’t been able to start that yet because we’re planning to have it in Icelandic. And, we can have it in English, but that won’t give us as much. So we want to have it in Icelandic to be able to use everything and get full understanding from the operators.” [Unnur Sigurjónsdóttir, Local EBS coach]

The perceived importance of holding courses in Icelandic is supported by her colleague:

It’s bad when you have to select people to participate not from their interest or capacity of EBS work, but from their knowledge of language. So it’s very good to have this for example in Icelandic, then everyone can participate.” [Thordur Magnusson, Production Manager]

The fact that English can be difficult to use in coaching and education activities seems not to be the only problem. According to the production manager, many important documents are only distributed in Norwegian. Also, even though the formal company language is English, several meetings are Norwegian biased.

“Elkem is a multinational company and I think definitely Elkem has shown that in procedures, stating that the common language is English. And the meeting language is, the formal Elkem language is English. Still there are lots of documents, which are distributed only in Norwegian, and a lot of meetings which are very Norwegian biased. It’s maybe that someone is speaking English, but it’s still, its’ often difficult for us to send operators. And they feel, if the discussion goes in Norwegian, they feel pretty isolated.” [Thordur Magnusson, Production Manager]

### ***Relationship towards the EBS center***

The Icelandic plant has been clear on the fact that they want to be in charge of implementing EBS, without too much involvement from the EBS center (Sørli, 2012). Even though they were dependent on help in the beginning, they now work more independently.

“I can see a difference in that, before we used to have Wayne coming here or someone else from the EBS center to help us on the tasks. But today we’re doing it mostly by ourselves and getting help from him just over the phone or if there is something special.” [Unnur Sigurjónsdóttir, Local EBS coach]

Even if they want to be in charge of the EBS implementation themselves, the plant manager points out the value of having someone from the EBS center to come and help them with bigger projects. He especially emphasizes the importance of having a divisional EBS coach who has an in-depth knowledge about the plant and its production.

“And we want some outsiders to come and help us with it, fresh eyes, guide us through it, and Wayne is doing an excellent job there. And for us he is very valuable, because he knows the methodology and also all the tools, and he knows us very well (...) Getting someone from the EBS center come and help, and the help will be going through all the methodologies once again, showing 150 slides, that’s not help. We know all about that, we’ve seen that all of us that are handling the situation. We need somebody with more in-depth understanding of how to adapt the tools to the current situation.” [Einar Thorsteinsson, Plant Manager]

It also seems like the plant has become familiar with the visits and inspections of the divisional EBS coach, Wayne Faaland. In fact, the operators appreciate these inspections, and do not appear to be threatened by them.

“He comes here and does an inspection and leaves a list to follow and to improve. I think that’s good. My aim is to, if I know he is coming, that I don’t have to jump off my chair, because I want to keep it in the standards just all the time. But I hear people talking about when they are coming and inspecting, and they’re not anymore talking about it in a frightened way.” [David Buason, Operator]

### ***Elkem Iceland, an island in the middle of the ocean?***

The feeling of being part of a corporate culture seems to be low at Elkem Iceland. Many of the employees say that they feel a bit isolated, or as the HR manager expresses it.

“I think sometimes we’re just an island in the middle of the ocean. (...)” [Unnur Sigurjónsdóttir, Local EBS coach]

The production manager also indicates that the corporate feeling is maybe stronger at the Norwegian plants.

“I feel that for example in the Norwegian plants, there is much more a common Elkem culture. I think it’s less so here.” [Thordur Magnusson, Production Manager]

The reason for not feeling as part of a ‘corporate family’ is said to be just as much due to the history of the plant as due to cultural differences.

“If we look 10 years back there was a lot of mismanagement of Elkem Iceland, both in Iceland and also from Norway. So I think differences are maybe as much in the history of the company as in cultural difference between Iceland and Norway. “[Thordur Magnusson, Production Manager]

“I would say before, it was kind of a stand-alone plant. We saw it more as cooperation with the Elkem plants. And Elkem was, it became the sole owner of the plant, I think it was in 2003. And there were other owners before. And, a lot of that culture, you can still find it here at the plant. But, just the thing like changing the name, and saying, like we are doing now everyday: that we are Elkem. With that it comes much easier to think we are part of that family. And I see a lot of difference there, in general, here at the plant. Even though, you could say that the name itself was just symbolic, but as a whole we have come a long way from where we were here in Iceland. (...)” [Sigrun Palsdottir, HR Manager]

Also other employees at Elkem Iceland agree that the plant has come a long way, and is now feeling more as a part of Elkem. However, many operators are still identifying only with Elkem Iceland. Some of the interviewees think this is because of the lack of knowledge of other Elkem units and the company as a whole. In fact, the results of an employee survey at the plant indicate that the operators would like to have more information about Elkem as a company.

“It was a survey, an employee survey, which showed that, what I read from that survey was that people are not very aware of Elkem as a whole. They are very aware of this company, but not very aware of Elkem as a whole, of what Elkem stands for, and what Elkem for example is producing.” [Thordur Magnusson, Production Manager]

“I think we just have to say that operators in Iceland look at themselves as employees of Elkem Iceland, and not Elkem anyways, that’s for sure. And more awareness of what other units are doing and what Elkem is for example producing would definitely be helpful.” [Thordur Magnusson, Production Manager]

### **5.2.2 Sharing of EBS knowledge with other plants**

Many of the employees at Elkem Iceland have visited other plants for various reasons. Even if sharing of EBS experiences was not the purpose of the visits, it has given them new ideas and insight into EBS implementation.

“I always learn a lot when I visit other plants. And yes, I always get new ideas and, and yes, see both good things and bad things. And when I see something we can learn, then I become very happy that this is something good we can implement. And then I see something which is worse than how we are doing, and then I get very satisfied that we are doing this quite well. So it’s a win-win situation.” [Thordur Magnusson, Production Manager]

According to the plant manager, different forums have also been used to indirectly discuss EBS.

“When we have the safety forums, which we have once or twice a year between the silicon division and foundry division, I feel that sometimes there we are discussing how we use the EBS tools, indirectly. And that’s very valuable. (...) And off course I look at the EBS, how they are performing, and compare it to what we are doing.” [Einar Thorsteinsson, Plant Manager]

However, many of the interviewees pointed out that it should have been more knowledge sharing on EBS between the different plants, and that it would be a shame if good ideas were not distributed.

“I think this is something that we should use more in Elkem (...) to share competence between the plants. [Unnur Sigurjónsdóttir, Local EBS coach]

“I want to be able to go out and see other plants, see how they are doing it, because it’s really a shame if there are good ideas out there, especially in the same corporation, it’s sad if it is not shared.” [Hannes Ingolfsson, Team leader]

However, the employees at Elkem Iceland mentioned several reasons why the knowledge sharing on EBS between the plants is so limited. One reason that was mentioned, is that it’s difficult to share experiences if you are not proud enough of what you are doing

“I think it’s not that they don’t like to. (...) One thing is, you know, feeling that something is good. But if you are not proud enough of what you are doing, you don’t want to share it with everybody. “[Sigrun Palsdottir, HR Manager]

Other reasons mentioned as to why the sharing of EBS is limited, are related to the lack of interpersonal networks. It was pointed out that it is difficult to share experiences with other plants if you don't know anyone there personally, and if the different roles are not connected between the plants.

“I don't know, maybe it's more or less how we can connect people in the same situation as me, and ask them ‘how do you, how are you doing things, how are you implementing EBS, how are you doing improvement work?’ And that has been like a competition all the time between the plants. (...) Maybe not a competition, but still, they are isolated, they don't talk to each other that much. Just if I personally know someone there, then that's easier, but otherwise it's like, isolated.” [Jon Atli Kjartansson, Team Leader]

“I think what we would gain most of is that if we connect the positions and if there were more EBS coaches in foundry, it would be good to meet them and share their experiences and what they're doing and what I'm doing, and to help each other out in that way”. [Unnur Sigurjónsdóttir, Local EBS coach]

However, it was pointed out that courses such as the EBS University is a good way of creating inter-unit networks in Elkem.

“I always find that the meetings like this they help for creating a network. And it's always a benefit when later on having some meetings or having some kind of relation with people in later ends, it makes everything easier if you know them from before and, so. There has been, I think it's very useful for networking, meetings like this and courses.” [Thordur Magnusson, Production Manager]

Even if most of the interviewees were very positive about sharing EBS knowledge with other plants, some skepticism was also to be found. This was related to the simple act of just copying ideas from other plants. Also, creating forums or meetings with the solely purpose of discussing EBS in general, was not very useful in the plant managers opinion.

“Because, again, EBS is not like so many, it's a philosophy, a culture. To sit down and discuss culture, it's very nice, I would probably enjoy it quite a lot. But would I benefit from it, apart from meeting the guys discussing something else? I don't think so. And because it's not that specific, discussing different tools, specific tools, maybe if we have some kind of a problem, some kind of improvement potential. But not to discuss EBS in general, I don't believe in that.” [Einar Thorsteinsson, Plant Manager]

## **5.3 Implementation of EBS at Elkem Salten**

### **5.3.1 The history of EBS implementation**

The implementation of EBS at Elkem Salten started in 2003, when the first employees were sent to attend EBS University. At the beginning, the implementation was slow, and the employees of Salten linked EBS to 5S, which was interpreted as cleaning.

“(...) it was said that it was going to be implemented at all plants. And it was given a try here as well, but those who were in charge of carrying it through didn't really understand what it was about. The first couple of years it was mostly used as 5S. What it led to here at Salten, EBS, was that somebody put up sheets which said who was responsible for that

area, and that person was supposed to clean and mop the floors.” [Terje Aanesen, HR executive]

In 2008, two new employments were made, which would both prove to affect the implementation of EBS at the plant; Oddgeir Samset, a divisional EBS coach from the EBS center was employed as a production manager, and Arve Ulriksen was employed as the new plant manager.

Oddgeir Samset was repositioned from the EBS center and employed as a production manager at Salten, in order for Samset to gain production experience. However, with extensive knowledge of process engineering as well as EBS, the employment proved to be valuable for the EBS implementation process in the production department.

“(…) and what was really smart of us was to send up one of the most experienced, like Oddgeir, as a production manager. He is a technical expert, but also one of the best in Elkem on EBS. And with that starting point you’re bound to have a flying start.” [Øyvind Sørli, Leader of EBS center]

“I think… We had Oddgeir here as a production manager in, I don’t know if it was three years, two and a half to three years. Up in the furnace house, I just think we got it really under our skin. Because he was you know, very much like that. So maybe we’ve had a head start, at least that’s what I feel we have had (…) He was a mentor on this, without doubt.” [Trond Steensen, team leader]

Although the organization at Salten remained stable, and the production process remained unchanged, the following period was marked by an international financial crisis and a fluctuating demand for materials.

“(…) Over the course of the two and a half years that I was a production manager there, we went from using the capacity of two furnaces, to three furnaces, to two furnaces, to one furnace, to two furnaces. So, five changes with temporary lay-offs and then re-hiring. Those types of things take a lot of time. And it eats up the time of the organization too.” [Oddgeir Samset, EBS center]

The same year, the new plant manager, Arve Ulriksen was employed. Ulriksen had experience as a manager from Elkem Bremanger, and was quick to start following up on the EBS implementation across the plant.

“(…)the plant was lucky enough to get hold of a plant manager that came from Bremanger, I’m talking about Arve Ulriksen. He had practiced EBS and seen the results in Bremanger when he was head of the Sil-department. And at Salten, he went straight inn with an iron fist to get EBS in place.” [Øyvind Sørli, Leader of EBS center]

Ulriksen became quickly involved in obtaining resources, both financially and from the EBS center, to develop the EBS implementation at the plant.

“(…) he was very much the one to ask for assistance from the EBS center all the time. He viewed it as free labor, I think, as he didn’t have to pay for us anyway. And that allowed us to

take a more systematic and structured approach to the implementation at Salten” [Øyvind Sørli, Leader of EBS center]

This systematic approach led to the development of the team leader school in 2010, as one of two plants in Elkem which has carried this through. A local EBS coach was appointed in 2008, to manage the EBS implementation and day-to-day work of the plant. Also, the plant was given money in 2011 to restructure its HR department and build its own improvement room at the plant (see Appendix C). Rune Skau, Salten’s local EBS coach, is quick to draw attention to the value of the commitment the plant manager has shown.

“(…) Arve has also seen the value of all the help we have gotten, and formalized it in a way. Because clearly, this has cost a lot of money what we have done, but it is an expense we have been willing to pay. And that is something I think we have gained from” [Rune Skau, EBS coach Salten]

Magne Løkaas is one of the divisional EBS coaches that has watched Salten’s EBS development closely through frequent visits to the plant the last couple of years. He observes that Ulriksen is not the only plant manager that has had a commitment to EBS implementation at this plant.

“What has been extraordinary at Salten, is that they have had, they’ve been very lucky with their plant managers, at least a couple of them, as they have been easy to work with. There has been very clear decision-making processes, in that “it should be like this and this”, in such a way that it has been easy for an EBS coach like me to come up there, as the course has been set and there is no discussion” [Magne Løkaas, EBS center]

Øyvind Sørli points to the stable production process as another influencing factor on the implementation of EBS.

“At Salten they haven’t really had any big challenges in implementing new technology or new processes, and new products and things like that. They have stayed where they are in this time period. Right now they are converting, but that is part of the their next phase and not comparable in any sense” [Øyvind Sørli, Leader of EBS center]

However, although the plant has had a continuous EBS implementation, Salten’s EBS coach admits that the plant still has work to do

“(…) and we have been developing from where we started, and that is, well, ten years ago now. And when you talk about ten years, ten years is a pretty long time, and you would think that in the course of ten years everything about it would be accepted and that it now was a regular way of working. But it isn’t, because it takes longer time. At least that’s what I have discovered, that it takes longer than you would think” [Rune Skau, EBS coach Salten]

### **5.3.2 Roles and responsibilities related to EBS**

#### ***The role of top management***

According to the local EBS coach, the top management at Salten has always been clear about the importance of EBS at the plant, even if the employees not always find the commitment.

” (...) and well, this is a new way of working and we are an organization that have been used to working differently. And when you introduce new things, there is always someone that will be like ‘no, I don’t want to do this’. (...) so we have been, on the sponsor side, extremely lucky. Those who have, like Arve, those who have sat behind the steering wheel have flagged this for a very long time.” [Rune Skau, EBS coach Salten]

The local EBS coach points to this as a necessity for the EBS work he has carried out at the plant

”What has been much of the reason for our success I think, or, it’s difficult to say if it’s been a success, but what has been good here is that those who have sat on top have realized that there isn’t any point in me going out here and working with EBS if there isn’t any support from top management. So, in my opinion, I think the success factor of this plant has been that the management, or top management, has realized that this is the way we’re going to do things” [Rune Skau, EBS coach Salten]

The plant manager himself mentions communication across the different organizational levels as key, and points to the location of the administration offices as an example of this.

” (...) I’m sitting right in the middle here. Actually, we built a large, new administration building on the outside of the fence. And that is maybe one of the most stupid things that have been done here. Creating distance like that, that’s, well, you would have to be back in the 50s to come up with such an idea. But this arrangement also demands that you take time off to listen to those people who actually come by the office for a chat.” [Arve Ulriksen, plant manager]

The divisional EBS coaches point to the plant management’s push to be involved in the EBS agenda as a great strength.

”We ran a team leader school when I was up there. (...) and afterwards we had to run, well, the whole plant management decided they wanted to have the school too. Then we had to do a second round with the plant management. So now the whole plant management has gone through the same team leader education as the others, and that is in itself a large strength. So Salten has a very good basis for continuing work there” [Oddgeir Samset. EBS center]

However, the interviews reveal that the top management still has improvement potential in their EBS work. The different departments are shown to have large variations in the level of EBS implementation.

“It is really important that the managers are coordinated and understand EBS well enough, and that they manage to run the different departments in the same way so that it is possible to identify the work at one department with the other. Today, I’m sorry to say that there are still some large differences across the plant.” [Terje Aanesen, HR Manager, Salten]

### ***The role of the EBS coach***

The everyday work of the local EBS coach at Salten includes facilitating improvement work, holding training sessions and performing regular EBS audits at the different departments. Regular meetings are held with the improvement teams as well as weekly meetings with the



top management. Spare time is often used out and about at the plant, talking to people (Skau, 2012).

When the EBS coach first started his work at the plant, he began with implementing 5S, and later widened the coaching to include improvement projects and facilitating the team leader school. Recently, the plant has performed several Kaizen projects, which has been done as a collaboration between the EBS coach and the selected departments (Skau, 2012).

However, the attitude towards the work the EBS coach carries out at the plant varies. The HR manager points out that most people recognize the overall value in the work the EBS coach does.

“I see that the active role he has, that he is out and about a lot, talking to people, that makes the knowledge he has more sought after. I’ve seen that many people consult him, asks him for advice. He’s become really good at involving people around here” [Terje Aanesen, HR Manager, Salten]

However, the regular audits that are performed at the various departments are met with a defensive attitude by many of the operators. During these audits, pictures are taken and each department is scored as to the status of their EBS work. Some of these defensive attitudes were displayed by some of the operators when asked about the work of the EBS coach.

Nevertheless, those operators who showed a negative attitude towards the work of EBS coach, explained that the coach himself was a nice guy and well-liked by most people, and that they viewed most of the defensive attitudes among operators as mostly harmless.

“He is a really nice guy, so we don’t put much into it” [Stig Sivertsen, operator]

“It is mostly done on a friendly basis. But it is as I said, not everyone is open to this kind of work. So I guess that from some it can be more genuine than from others, the criticism that he gets. But most people just joke around with it. And that’s the way I think it will always be when there are 200 people that work here. Some have been here from the beginning and have their routine, and won’t accept changes. And then he comes inn who has been here for ten years, and there are people here who have been here for forty years and say ‘that’s not how it works’.” [Hans Erik Vollan, operator]

However, the fact that the plant has started to see results of the work the EBS coach is leading, was pointed out as an effective antidote to any negative attitudes. Especially, the result of the recent Kaizen projects is something many workers at the plant have noticed.

“That’s when it’s so good that we have successful EBS projects like the room that they showed you earlier. It goes without saying, if you had been here four years ago and seen what the workshop looked like. We had to use a whole day to tidy up before a visit. But now it is done in half an hour, to get it back to the standard it’s supposed to be in. It’s a big difference, and is something that without doubt affects the attitudes of people” [Roar Åsbakk, team leader]

Further, when asked about what the plant could improve on in order to succeed with EBS, overcoming the negative attitudes towards the EBS coach was mentioned as an important step.

”It’s when every single person feels that we have to do something about this thing or that thing, which is bigger than just tidying the workbench. And that although the EBS coach comes around with his camera in hand, it isn’t seen as something negative” [Roar Åsbakk, team leader]

### ***The role of HR***

The Human Resources department at Salten consisted of two employees until 2011, when *the HR project* was initiated. This project was funded by the headquarters, and led to the creation of an improvement room at the plant to facilitate improvement work, as well as a restructuring of the HR department (see Appendix C). The department was expanded with a new position for today’s HR manager, and was organized as a team where all positions at the plant that concerned training and development of people were included. Today, the team includes people such as the HR manager, the EBS coach, the EHS manager and the Quality manager (Aanesen, 2012). Regular team-meetings are held in the EBS room every week. This way of linking EBS to HR is a thought-through decision, according to the coaches from the EBS center

”It’s the only plant that has a thought-through HR team organized as it should be (...) it was done like this mostly to clarify that EBS is maybe more related to HR than to production” [Magne Løkaas, EBS center]

In the HR manager’s perspective, the new HR team is something that has strengthened the organization at Salten.

“(...) it is a great strength, a great strength. In a way...you become more powerful in decision-making processes too. I mean, of all those that can make decisions here, it’s almost just the plant manager who isn’t part of the HR team. And now, quite often, decisions that have to be made are handed over to the HR team” [Terje Aanesen, HR Manager, Salten]

But although the HR department is expanded from two people to six, the visibility and communication has, according to one of the team leaders in production, yet to catch up.

”Of course I know well the job that Rune does, but the HR department covers quite a lot now actually, and it is somewhat invisible compared to what I feel it should be. Especially the development of (...) well, the development of the link between the different departments, the way they should fit together in a toothed wheel.” [Roar Åsbakk, team leader]

When asked about the inter-departmental communication, the same team leader expressed a wish that the HR team would establish a better forum for this type of communication.

”Right now it’s generally very dependent on who works at the different departments. Some have more links, through their area of responsibility, to others (...) before, we used to have these meetings where we gathered to work together, and take control of the direction we were heading. In a way steering the same boat. There’s too little of that now, in my opinion. Across the departments, I mean.” [Roar Åsbakk, Team Leader]

When asking about the educational background of the interviewees, it turned out that many of the local managers have ‘climbed the internal ladder’ at the plant, starting as operators. This was further confirmed by the HR manager, confirming a high focus on the internal development of employees.

“Yes, it can be said that if you look at the employees of Salten, they usually come from, well, most have started out as operators (..) most have taken supplementary education and some sort of school after they started working here. You know Lars Johnny, the Production manager, he started out at the furnaces, and has followed the same route as I have.” [Terje Aanesen, HR Manager, Salten]

### ***The role of the team leader***

According to the EBS philosophy, the ideal organizational structure is modeled on Toyota’s team-based structure, where there is a team leader for every 5-6 people throughout the organization. This team leader’s purpose is to continuously make the team members improve the process they are working in. When EBS was first implemented, one of the first tasks that were carried out was to remove the shift managers and implement a team-based structure (Løkaas, 2012).

”(...) so what we did, you can say that it was very good for increasing the dynamics in the organization, and we managed to get people responsible in an entirely different way than what we used to do. They were motivated by this, and we defined the role and responsibilities of every single one, so we really made people responsible.” [Magne Løkaas, EBS center]

At Salten today, the workers at the plant refer to two types of team leaders: those managing the shifts and those leading improvement projects. In other words, the old organizational structure with shift managers still seems to linger. The ideal of small, Toyota-inspired teams is something the HR manager doubts will ever be fully implemented

” (...) no, not in the way it is optimally supposed to be, with small teams of six or seven people. We have, the team leaders at the smeltery, they have what, 35 men they are responsible for. And of course, they don’t all work here at the same time. The shifts, they work afternoons and nights while the team leaders work during daytime. So, you will never get that kind of team leader.” [Terje Aanesen, HR manager]

When the team leaders of the plant are mentioned by members of the EBS center, the focus appears to be on the team leaders of the improvement teams. The shift-based teams are referred to as having little to do with the EBS philosophy.

”A team leader for me is someone that has a much smaller and tight knit group, like a coach on a team, if you can use that analogy. But they call them team leaders and I guess they can go ahead and call them that if they want to, but to me they aren’t team leaders.” [Magne Løkaas, EBS center]

The improvement work carried out on the shifts is believed to be done unaware as to the fact that it is EBS-related.

”Well, I think they mostly just focus on their usual routine. I don’t think EBS is, if you think in terms of improvement, continuous improvement, I don’t think it is systemized. I guess they do work that can count as improvements, but I don’t think that EBS is a topic out on the shifts.” [Magne Løkaas, EBS center]

The team leaders spoken to admit that most EBS work is done in relation to the improvement projects, and that the operators that aren’t part of this work have little knowledge about EBS, apart from the 5S. Further, practical barriers such as the shift-based work schedule make it difficult to carry out any regular EBS activities.

”Well, to get hold of the operators who work shifts on a rotation basis –they work days and nights. If you want to get hold of a person that has been on a nightshift, well, you have to fetch them out of what they’re doing, if it’s a meeting, maybe just a two-three hour meeting, then we have to replace these people that we fetch from production. So it’s like a game of solitaire, finding the right way to solve this. You can’t just go and fetch Per and Pål and make them come to a meeting, because they have their work that they are required to do. You can’t just pause the production and wait until everyone gets back from the meeting.” [Trond Steensen, Team leader]

Yet, there are significant individual differences between the different departments, which the local EBS coach thinks have a lot to do with the different department managers’ and team leaders’ own motivation

”Yes well, there has been, one can’t hide from the fact that some departments have gotten a lot further in their development than others. And that is without doubt connected to the managers. It’s not my job to go around talking to each and every one, that’s up to the head of department and other leaders’ job. And some, I guess it’s the same as for the operators, some are more motivated than others” [Rune Skau, EBS coach]

### **5.3.3 Visualizing and communicating goals and results**

At the recently established improvement room, all the improvement projects, or A3s, are hung up on the walls. Also, the results of the completed improvement projects are quantified in monetary value and displayed (see Appendix C).

This ‘improvement room’, however, is mostly used for management meetings. Also, when improvement projects are completed, the team leader for the project, maybe accompanied by another team member, comes here to present the results. This means that this room is not very much used by operators not participating in improvement teams.

“Those who come to this room to report, they already know what improvements have been created. And those who join the improvement projects know. But then you have hundred other employees who don’t participate in these groups. And if we can’t visualize the improvements to them, I think we have failed. So this we have to accomplish, one way or another” [Rune Skau, EBS coach]

In order to reach out to more employees, a digital screen is set up in order to show the quantified results of the improvement projects. This screen was previously placed in the cantina, but has now been moved to the entry, just outside the changing rooms, as many of the operators pass through here many times a day. In an interview with one of the operators however, he confessed that he had never stopped to look at this screen. According to him, it was better when the screen was placed in the cantina, as it was almost impossible not to look at it during the break.

Elkem Salten is also planning to use the new intranet site of Elkem to communicate EBS. They are currently developing an internal site for the plant, where EBS will have a great focus. According to the HR manager, one objective is to recognize the employees who participate in improvement projects:

*“I want to recognize the people who work with improvements to a greater extent than what has been done previously. And with an internal EBS site on the intranet, this can be achieved. I want people to know who participate in these groups, because today not everybody knows. And I want them to be acknowledged for the job they are doing.”* [Terje Aanesen, HR manager]

However, the HR manager admits that communicating EBS to employees through the use of IT may be problematic:

*“We see that when it comes to the IT culture here at the plant, it is very varying, especially on the competence side. Some don’t even open their e-mail. Maybe they don’t even know that they have an e-mail. So that is a big challenge.”* [Terje Aanesen, HR manager]

In addition to communicating EBS through screens and the intranet, many of the interviewees believed that the shift meetings could be a natural forum for this objective.

*“Shift work is off course difficult, since the only meeting the shift leader has with his shift is one meeting every fifth week. (...) And many other important matters have to be discussed there. EBS is given too little attention. But we have a plan on how to reach out, and we have started to think how we can get better at this point. We want to structure the shift meetings and give them a clear and visible content, where EBS, especially the improvements, has an active part in each meeting.”* [Rune Skau, EBS coach]

When it comes to communicating long term goals for the plant, Elkem Salted has lately focused on what they call the common thread.

“We have started to focus on the common thread, that everything is connected, from the creation of a new idea, through the prioritizing of team leaders in the different departments, to the Rolling Top Five of the plant, which again are rooted in the strategic directions of the division. In this way, it should be a clear and visible direction in the way we work.” [Terje Aanesen, HR manager]

### **5.3.4 Overall motivation at the plant**

It is obvious that Elkem Salten has had a positive development over the last years, and much of this may be attributed to the EBS implementation.

“We see that EBS has had an effect on peoples’ perception of their work place. And that is maybe the most important thing. If people call it EBS or not doesn’t matter to me; it is only a three latter acronym. But the perception of the work place is changing, and people come to me and say ‘Look at all we have achieved. So incredibly many things have happened’. And this has been in periods where Elkem has struggled. There has been two such periods this year as a consequence of the second wave of the financial crisis. We had to shut down furnaces and dismiss people, and there haven’t been any reactions. Because people know that we think long term, and that we think pass this period. And it creates stability in the organization. And this is because of our way of working, that we think long term. So personally I think I get a lot back from the operators in terms of trust. And EBS is the reason for this.” [Arve Ulriksen, Plant Manager]

The plant manager’s conviction of EBS can be reflected in his priorities, and he has sent a clear signal to the organization that this is something they will be focusing on.

“Arve is crystal clear on this, and it has to come from him and downwards. If it is forsaken on the top, it will fail down the system as well. But on this he is very clear, and I think that is very good.” [Lars-Jonny Lundeng, Production Manager]

In spite of the highly motivated plant manager, the plant is still struggling with the attitude of some employees.

“We have a long way to go when it comes to attitude. We have a lot of people that are not able to follow the standards. Too many don’t use their eyes to see improvement potential in their daily work.” [Arve Ulriksen, Plant Manager]

According to the HR manager, the understanding of EBS at the operating level is low. Also the operator, Stig Sivertsen, admits that many operators don’t really know what EBS is.

“We are still struggling with achieving an adequate understanding of EBS at the operating level. They take a too small part in the ongoing EBS processes, actually.” [Terje Aanesen, HR manager]

“Everything which is new takes time. It takes time before you get, at least those who have been here for 30, 40 years; it’s not done over the night to get them on board. At the same time they have to know what it is. You hear the word EBS, but you don’t have a clue what it is. And that is a problem.” [Stig Sivertsen, Operator]

In order to evaluate the operators understanding of EBS, it was asked about their interpretation of the concept. It seems like the 5S, and especially cleaning, is what many operators associate with EBS:

“EBS is, roughly speaking, this 5S thing, which we are handling on a daily basis. And it is trying to live by those rules, the 5S, to keep it tidy, clean, and systematic. It is not always easy, but we’re trying. And sometimes we make a mess, but then we have to take the time to clean it up afterwards, but most of all trying to make it a daily routine.” [Hans Erik Vollan, Operator]

The same operator was asked whether EBS had led to more involvement of people, but he was not so sure about that matter.

“No, I don’t know what to say. As I said, 95 % of my perception of EBS is the 5S. That is how far we have come.” [Hans Erik Vollan, Operator]

Another operator was asked what he thought of when he heard the word EBS, and he gave the following answer.

“Cleaning. Cleaning.” [Stig Sivertsen, Operator]

Another employee indicates that the low understanding of EBS is not the only problem. Time constraints and a fast changing focus might also cause problems. Further, he explains that if they were given enough time, to really make the new procedures into routines, it would make things easier.

“You get this new case, then you don’t get it, it’s not turned into a routine, before you get a new case which has to be done. Then you forget about the case you were working on. Like the cleaning (the Kaizen project in the work shop), it turned into a, it was the only thing we were supposed to focus on for several months. And then it stuck.” [Stig Sivertsen, Operator]

When the interviewees were asked about the overall motivation for EBS at the plant, the answers indicated that the motivation is very varied; from highly motivated employees to direct opponents. However it seems like the motivation has increased and that many employees have accepted that EBS is there to stay.

“No, it’s varying, that is nothing to hide. But most of them have eventually accepted that EBS is a working method we will continue with. Then you have someone who resists all they can, and what I’ve learned from these past three years is that I can’t spend my energy on them. Because they will eventually be eaten up by the others, or sitting on the side line. But when I started I spent too much energy on them. But I’ve found out that that is a waste of time.” [Rune Skau, EBS coach]

The operator, Hans Erik Vollan, concludes that what is important is to get what he calls “the grey mass”, or the undistinguished mass, on board.

“Yes, it is maybe 5 % on the top and 5 % on the bottom, and then you have the gray mass in between. Maybe a bit bigger part of those who are interested in participating, really interested, than those who are totally rejecting. But you can say that it’s a narrow layer at the top and bottom, and then it’s the big grey mass. And to embrace that big mass, that is what’s interesting. (...) Because what is important, is to get the big mass on board.” [Hans Erik Vollan, Operator]

Elkem Salten has tried different things to increase the overall motivation, among others to quantify the results of improvement projects in monetary values. The local EBS coach believes that seeing what big saving such projects can lead to, is highly motivating for the participants. Also the plant manager believes in the motivational effect of seeing results, but is afraid of a too high cost focus.

“The motivation can be better, and we don’t achieve this until we visualize things in a better way than we do today. But, I kind of feel that those who participate in the improvement projects are motivated. When they see the results; that a group can, with the job they do, save for instance 1.5 million or 3 million. Then you see that people become motivated and think their work is fun. Also, we have given them a carrot; those who participate in improvement work get extra paid. And, it is not rewarding, it is not the big amount, but at least it’s something.” [Rune Skau, EBS coach]

“(…) I haven’t focused too much on it. I am scared to death that we will have this one-sided focus on costs, because it is synonymous with jumping straight off a cliff when it comes to environment, health, and safety.” [Arve Ulriksen, Plant Manager]

## 5.4 The basis for sharing of EBS-related knowledge at Salten

### 5.4.1 Relationship with EBS center and headquarters

Elkem Salten has been one of the pioneers in Elkem when it comes to EBS implementation (Øyvind Sørli, 2012). The plant manager emphasizes the importance of pressure from top management in Elkem when it comes to EBS.

“We are dependent on a pressure from corporate top management, that they give a clear signal that this is something we should work with. And yes, they do, at least more clearly now than in previous years.” [Arve Ulriksen, Plant Manager]

Oddgeir Samset, one of the divisional EBS coaches from the EBS center, worked for a period of time as production manager at Elkem Salten (see Section 5.3.1). Also, Magne Løkaas has visited the plant frequently the last period. According to many of the employees, Elkem Salten has a close relationship with the EBS center, and especially with Oddgeir and Magne.

“We have been lucky with the people who work there (at the EBS center). One of them, Oddgeir, has worked here as a production manager, and he knows us very well. And he is used as a mentor for the new production manager and others. And I think we get the answers in no time if we have questions. The same holds for Magne, who has been here twice a month for a period of time. (...) It’s extremely important that those people know the plants, at least that’s my opinion.” [Rune Skau, EBS coach]



“I think we have had the opportunity to use the EBS center a lot compared to other plants. At this plant they have not only been a control function, but also a support function.” [Rune Skau, EBS coach]

On the question if the plant had received more help because of its location in Norway, not too far from the EBS center, the plant manager refused.

“No, it is not because of that. I don’t believe in that. Because there are a lot of plants that request this help, but the plants that show that they want it the most, get it.” [Arve Ulriksen, Plant Manager]

It seems like the education and training activities from the EBS center has been well received at Elkem Salten. As long as the training can be related to practical issues in the production, it is perceived as very valuable.

“When you get a PowerPoint presentation, it often becomes a little overkill. And the whole blackboard sometimes ends up completely covered. But if they (the EBS center) relate it to real problems that people can relate to in their daily work, it is a totally different matter. And one person that has achieved this is Oddgeir. I took over the role as production manager after him, and he is very well educated and structured. The same holds for Øyvind Sørli. He is extremely experienced and has a spicy way of presenting. And you feel like you have gotten an adrenalin kick when you leave the presentation, you think ‘this is good, I want to get started’. If the operators feel the same way, I am not so sure about.” [Lars-Jonny Lundeng, Production manager]

#### 5.4.2 Sharing of EBS knowledge with other plants

Several of the employees at Elkem Salten indicated that the sharing between plants has been limited in the past. They explain this by the history of the company and the relationship between units.

”The transfer of ideas between units has been insufficient in Elkem from times to times. And I think it is because of the fact that the company was an engineering company, which in itself was not very including.” [Arve Ulriksen, Plant manager]

”I have experienced that they put plants up against each other. And it is obvious that we should learn from each other, or I know that, that we learn from each other. But we do not want a situation where if we do something clever here, we have to keep it to ourselves. It was maybe more like this before. (...) But then we know that there are fluctuations in the market, and like I said, maybe the plants are put up against each other, and in times of recession maybe one plant has to shut down. And off course, everyone hopes that their plant will survive.” [Trond Steensen, Team leader]

However, today it seems like the plants have opened more up. Also, according to the plant manager, Elkem Salten has been one of the pioneers when it comes to opening up to others.

“When it comes to sharing, it was more of a boundary before between the plants. But this boundary has been almost erased. So it is much more openness between the plants now than ever before.” [Lars-Jonny Lundeng, Production Manager]

“Somebody has to start. Somebody must dare to open up. So I have opened up the whole plant, and invited people to show up any time, come to visit. Then we will share what we have done. And this is in line with the basic principles of EBS, to share ideas and experiences, in order to strengthen the competence building.” [Arve Ulriksen, Plant manager]

The plant manager also states that the plant has gained goodwill from the headquarters because of its willingness to open up the plant to others, and to share what they have done related to EBS.

“We have gained a lot of goodwill because of what we have done with EBS. (...) People come here, and every time they come to visit they see new improvements. And it’s consciously done. And it is spreading. And my goal has also been that every time there are some training activities initiated by Elkem,(...) I’ve asked, or I’ve been eager to arrange it here. It’s not only marketing, but a nice way to share what you are doing.

It is not only the plant manager that has a positive attitude towards sharing. Also other employees at Elkem Salten stated that sharing EBS experiences would be very valuable.

“I think it would have been nice to meet people and discuss. I think that would have been a good idea. Off course, we have Oddgeir and Magne who are here from time to time to help us, and we can discuss matters with them. But without doubt, gathering people from different plants to discuss would not be a bad idea.” [Trond Steensen, Team leader]

” (...) we see that in many cases we struggle with the same problems. And maybe someone else has found a solution, and why on earth should we keep struggling if we can just copy it?” [Trond Steensen, Team Leader]

Some interviewees indicated that one way of sharing ideas is just to rotate employees between plants. In this way, the employees get new ideas to bring back home. Also, to receive visits from employees from other plants may help to solve the plant’s own problems, as it often helps to see problems with fresh eyes.

” (...) I’ve always claimed that visiting other plants to copy things, and to study in detail how they do things, is reasonable. It is always something you can find to bring back. The one who doesn’t find anything to bring back, has not been inside the gate. That is my claim.” [Lars-Jonny Lundeng, Production Manager]

“(...) it turns out that when you have been in the same job for 20, 30, maybe 40 years, you can’t see the forest for the trees. But it happens that someone comes from outside the plant, and during the first day he sees the solution to a problem that has existed for twenty years. We have experienced that very often” [Hans Erik Vollan, Mechanics]

When it comes to more long term cooperation between plants, this has been limited. As the HR manager emphasizes.

“We don’t have any active cooperation; this is something we are not good at in Elkem. We keep sitting on separate rocks.” [Terje Aanesen, HR Manager]

However, Elkem Salten started a cooperation with Elkem Solar, called the HR project. The aim of the project was, among others, to get a better documentation of training and education, and a more continuous improvement pace. Even though the project has been a success at each plant, the cooperation ended after only one visit from Salten at Solar. According to the HR manager, this can be explained by the fact that the two plants were in very different stages, as Elkem Solar was still in the ramp-up process. But he also stated that time is a big constraint when it comes to such cooperation.

“It becomes evident, when we look at the HR project we started with Solar, that to allocate time, and that they have time available to receive you, that they are available for you there and then when you arrive. That is not always easy.” [Terje Aanesen, HR Manager]

Even if the cooperation ended after a short period of time, the local EBS coach at Salten was able to copy some good ideas from Solar. He also expects that Elkem copies these ideas to all plants.

“(…) parts of the working method we use in our improvement work are ideas I have gotten from Solar, actually. The way they have used their rooms to visualize and review things. And then we have given it a distinctive character and built a system around it that fits us.” [Rune Skau, EBS coach]

“I have high hopes, or I would expect that those who sit with the power here in Elkem can copy this to the other plants. And I don’t know if they have done that, but they absolutely should.” [Rune Skau, EBS coach]

One thing that the local EBS coach at Salten is missing is a forum where people involved in improvement work could meet. He explains that, except from the EBS center, he has no one from outside the plant to discuss EBS related matters with.

“I wish that we could have a forum in Elkem where the people involved in improvement work could meet once or twice a year to exchange experiences. (...) I feel the need for an environment where the improvement people from the different plants meet. We don’t have enough knowledge about each other.” [Rune Skau, EBS coach]

In the interview with the HR manager, it was asked whether a yearly meeting with people involved in improvement work from different plants would be valuable. The HR manager stated that such a meeting would only be beneficial if it had a clear content and intention.

“If we were able to make it into something concrete, that the meeting had an agenda, an intention. And that some learning objectives or points of improvement were developed. And if we don’t achieve that, there is no point in continuing. But if we see some improvement as a result of such meetings, new ideas and thoughts and so on, it would absolutely justify it.” [Terje Aanesen, HR Manager]

### 5.5 The role of the EBS center in facilitation of inter-unit knowledge sharing

The sharing of EBS related knowledge between the plants is not very formalized. According to Magne Løkaas, there are several meeting forums within the special fields of production. However, there is no specific forum with the sole purpose of sharing EBS experiences.

“It is not put into system yet, but much of it happens through the contact between the plants, and the forums for the special fields, which occur all the time. What are formalized are the management meetings, division- and plant manager meetings, and meetings for process engineers and so on. And then we have some EBS focused gatherings, but this is not a forum with the main purpose of exchanging EBS experiences. (...) So you can say that this is something we could have done much better, and I think we can. But it is a bit difficult to formalize such a process. ‘Let’s meet, let’s share experiences, what experiences shall we share today?’ It becomes a bit forced.” [Magne Løkaas, EBS center]

Also the leader of the EBS center, Øyvind Sørli, points out that the sharing of EBS related knowledge between plants is not formalized yet.

“No, it’s not formalized properly. So it becomes very dependent on the one who is the responsible EBS coach for a specific area.” [Øyvind Sørli, Leader of EBS center]

It is not given that all the plants have an EBS coach, however. Both the silicon and foundry division have plants where the EBS responsibility is given to other employees.

“At Salten they have a local EBS coach, Rune Skau. We have an EBS coach at Thamshavn, we have it on Iceland, but if we look at Bremanger it is the HR manager who is given that role. And in other places there isn’t necessarily an EBS coach at all. If you look at Tana for example, one of the team leaders has that role. So it varies between the plants, but the cooperation between the EBS coaches could absolutely have been better.” [Oddgeir Samset, EBS center]

“(…) the problem with foundry is that we have only two full-time coaches; so three of the other plants don’t have coaches. There is either the HR manager or the quality manager, they have a shared role. And some of them even have three roles, and I don’t want to bother them with this. But I do bother the plant manager, saying that, ‘I would like an EBS coach at all the plants’.” [Wayne Faaland, EBS center]

One problem related to knowledge sharing appears to be that the plants are differently organized. According to employees at the EBS center, some plants have developed in their own direction.

“We have some plants which, we call them ‘Sinatra plants’. I don’t know if you have heard the song ‘My way’? We call them Sinatra plants if they go their own ways.” [Magne Løkaas, Divisional EBS coach]

Magne Løkaas at the EBS center indicates that this “Sinatra culture” is one of the reasons why the sharing of EBS knowledge between plants is limited.

“It is because we have allowed a Sinatra culture, which on some areas, have accelerated. And I am really against that. It should have been more standardized. And about six seven weeks ago, we had a global management meeting at Gardermoen where all the plant managers and some others were gathered. And there EBS was an issue. The case discussed was the experiences from Salten and Solar. (...) And a question came up, from the corporate manager actually, related to exactly what you are saying; ‘should we standardize HR for instance?’” [Magne Løkaas, Divisional EBS coach]

The leader of the EBS center, Øyvind Sørli, points out that many of the new ideas at the plants are transferred to other plants through the EBS center itself. When asked who was behind transferring new ideas to other plants, such as the ‘improvement room’, which was transferred from Salten to Chicoutimi, the answer was the following.

”We are the ones who do that, we who are coaches. It’s us who travel from place to place after all.” [Øyvind Sørli, Leader of EBS center]

It appears that the sharing activity between plants is reduced during times of recession. The leader of the EBS center states that the communication between the plants is very varying and dependent on the situation in the market.

“I think it is very varying. And it is also a bit time dependent. Because when you have situations such as the financial crisis where the plants were partly shut down and people were dismissed and so on, it is obvious that there is no room for meeting arenas then. So then we really saw a decrease in the activity level, you know, also within our field.  
”[Øyvind Sørli, Leader of EBS center]

The EBS center is trying to facilitate a more direct sharing of EBS knowledge between the plants. The divisional EBS coach, Wayne Faaland, has started to have monthly meetings for sharing EHS experiences within the foundry division. This has according to him been very successful, and he is planning to start this for EBS as well.

“This is what I try to get through with the EHS monthly meetings. That all the EHS managers bring their experiences and what they are working on within a monthly topics. And again, we started this up in January and it was surprising to hear the feedback from the safety managers saying that ‘That was a good idea’ and ‘We haven’t thought about that’. And then again, it’s not that difficult. It’s just that sometimes you get too hung up in what you’re doing and you can’t open your eyes for new ideas. So just bringing in five new ideas for fall protection or 5S and stuff like that, we learn a lot from that. And I know that people already asked the safety managers to send them more information and they said that they’ll implement some of these things.” [Wayne Faaland, Divisional EBS coach]

For a period, the divisional EBS coaches brought local EBS coaches with them when they performed EBS audits at other plants. The intention was that the local EBS coaches could bring new ideas with them back home, and also build relations to the people responsible for EBS at the visited plant.

“When we do assessments, our philosophy and policy is to bring an EBS coach from another plant that is with us. And then you have established a relation and they get first-

hand information, you know? And we did this a few times. But then comes times of recession and cost cuttings, and it is dropped. That is the problem. But it should have been in place.” [Øyvind Sørli, Leader of EBS center]

The employees at the EBS center have started to use the intranet as a channel for sharing EBS knowledge. So far, it is more of a knowledge base where relevant literature and information on EBS is uploaded. The plan is to make this into a forum where the EBS coaches can exchange knowledge and experiences.

”What we have done so far is to give a description of EBS on the intranet. We have uploaded literature, relevant literature, and we have uploaded information about training and other current topics. In the long run I hope that we can establish some kind of forum, which can lead to a better cooperation between the local coaches at the plants.” [Oddgeir Samset, EBS center]

”What is an improvement point here, and which I am supposed to find a way to develop, is a formalized virtual meeting forum, online, a meeting place online, for all the EBS coaches. So that they can use it and say; ‘If I have a problem of some sort, can I find the solution at some other plant?’ But this is only for the EBS coaches.” [Øyvind Sørli, Leader of EBS center]

However, the employees at the EBS center have their doubts about this online forum. Oddgeir Samset indicates that for the forum to be useful, it has to be designed for a both-way communication.

“It has to be more than just an intranet I think, for us to make it work. So we need an arena where people can exchange information and work together to become even better.” [Oddgeir Samset, EBS center]

Also, if a database with all the relevant information on EBS should be available for the EBS coaches, the leader of the EBS center is concerned about unintentional transfer of confidential material.

“I think this database should be more available to the EBS coaches. But there is also of course a downside. And that is the risk when something is available online, then it is just for others to download it, right? And then they can quit and start somewhere else.” [Øyvind Sørli, Leader of EBS center]

## 6. Discussion

The discussion of empirical findings is structured in accordance with the study's research questions. First, factors influencing the *implementation* of XPS in the case company will be discussed, followed by a discussion of factors influencing the inter-unit *sharing* of XPS. In each section, the propositions stated in Chapter 2 will be addressed, thereby determining which of the factors stated by theory that have influenced the implementation or sharing of XPS. Further, a discussion of which factors that have caused the variation in XPS implementation between the investigated subsidiaries is given, thus addressing the *main* research question of the study. Next, managerial implications of this case study are proposed, before theoretical implications are discussed.

### 6.1 Factors influencing the implementation of XPS

#### 6.1.1 Absorptive Capacity

##### *Prior related knowledge in the organization*

When Iceland and Salten received new plant managers in 2008, a new source of *prior related knowledge* was added to each organization. According to Zahra and George (2002) a higher degree of knowledge increases a unit's ability to realize the potential of new practices. Both plant managers were well-acquainted with theoretical knowledge of Lean-based tools and concepts through their university education. This is stated by both plant managers as helpful to recognize the value of EBS. Furthermore, Salten's new plant manager had a great advantage of having direct knowledge of how to make EBS work in practice through his former position at Elkem Bremanger. Several of the members of the EBS center point to this experience as playing an important part in the plant manager's proactive attitude towards the EBS implementation, and the following increase in Salten's EBS-related activity. According to these findings, the plant manager's prior related knowledge of similar practices at Elkem Bremanger seems to have made it easier to realize the potential of EBS practices within the organization at Salten –supporting with the prediction of Zahra and George (2002). Consequently, evidence from both plants gives support to Proposition 1a: *A high level of prior related knowledge will have a positive influence on the XPS implementation.*

##### *Effort of knowledge acquisition*

The organization's *effort to acquire knowledge* is identified as an important dimension of absorptive capacity (Cohen & Levinthal, 1990). At Salten, the proactive attitude of the current plant manager has resulted in frequent visits from the EBS center (see Appendix C). Also, the HR project carried out in 2010 is an example of the plant's effort of knowledge acquisition, as this was not only initiated by members of the EBS center, but also came about as a result of the plant's own effort. At Iceland, the current plant management values the work of the EBS center, but is much less proactive in seeking it. The plant manager clearly states that the plant itself is capable of handling its EBS work, and apart from the regular visits performed by the divisional EBS coach, the plant is reluctant to call upon the EBS center for help. This has led to a much lower frequency in visits from the EBS center the past few years, which is the plants' main source of EBS-related knowledge. Consequently, Salten

has achieved a higher score on the EBS audits the past few years, while Iceland has obtained a comparably lower score on these audits (see Appendix D). The findings thus strongly indicate that the effort of knowledge acquisition has an influence on XPS implementation. However, due to the lack of support from both plants, Proposition 1b: *A high effort of knowledge acquisition will have a positive influence on the XPS implementation* cannot be supported.

***The use of cross-functional communication, HR practices, and gatekeepers***

*Cross-functional communication* is important for the ability to assimilate and transform new knowledge and practices (Daghfous, 2004). Empirical findings point to the communication structure between the different levels at Salten as being more systemized than the corresponding communication at Iceland. As a result of the HR project conducted at Salten in 2010, the establishment of a HR team now ensures cross-functional communication between those managerial positions that are closely related to EBS. Further, the separate designated EBS team supports the work of the local EBS coach, as well as providing insights and feedback from the operating levels. Also, regular meetings held inside the plant's Improvement Room help communicate the improvement work carried out. However, evidence points to the inter-departmental communication between operational departments at Salten as having a large improvement potential. This lack of inter-departmental communication increases the differences in level of EBS implementation between the different operational departments at the plant.

At Iceland, the plant lacks regular and formalized forums where the EBS work can be communicated. As a consequence, the status of the EBS work committed across the plant is poorly communicated, making it harder to assimilate and exploit the knowledge within the plant. Overall, the lack of both cross-functional, managerial communication and the lack of inter-departmental communication on the operating level appear to have slowed down the EBS implementation process at Iceland, supporting the importance of communication cited in the theory.

The empirical findings suggest that there are significant differences in use of HR practices of the two investigated plants. In terms of *training*, the empirical data obtained through documentation shows that more employees from Iceland have participated at formal EBS training events than from Salten. However, according to the EBS center, by adding the level of undocumented training to the equation, Salten is the plant which has received the most training in total. In terms of *internal promotion*, the organization at Salten has had a strong focus on developing the ability of the plant's employees, filling positions from within the organization. This is in line with what Cohen & Levinthal (1990) refer to as *prior investment* in individual absorptive capacities, and thereby helps to develop the absorptive capacity of the organization. At Iceland however, the practice has mostly been to source potential candidates for managerial positions from outside the plant. At Salten, *compensation* is given to those who participate in the improvement teams. However, this compensation is not performance-based, but rather based on the number of hours put in, given as a raise in the hourly pay. Those interviewed who had participated in improvement projects, pointed to this



compensation as an extra source of motivation. Minbaeva et al. (2003) propose that internal promotion and compensation increases absorptive capacity, and thereby the amount of knowledge transferred into a unit, by increasing *motivation*. The empirical findings of this study point to the same conclusion. The use of training is proposed by Minbaeva et al. (2003) to increase the level of *ability* to absorb new knowledge in the organization. In this sense, the empirical data obtained may point to a stronger development of EBS related ability at Salten.

In 2008, the appointment of one of the divisional EBS coaches as production manager at Salten added to the character and distribution of expertise available in Salten's organization. During the years of his employment, the divisional EBS coach acted as what Cohen and Levinthal (1990) refer to as a *gatekeeper* towards the production units; monitoring the environment and translating information into a form understandable to the group in question. According to the study, a gatekeeping role can help a unit to better exploit the knowledge acquired. Indeed, Salten's employment of a gatekeeper is pointed out by several employees as having had a strong positive effect on exploiting acquired knowledge during the implementation process, supporting the predictions of Cohen and Levinthal (1990). At Iceland, the lack of such a gatekeeper role towards the lower levels of the organization is something the employees point out as a barrier to the implementation process. In fact, empirical evidence suggests that one of the main challenges the operators experience within EBS, is a difficulty in translating PowerPoint-presentations and simulation activities performed during EBS training, into practical everyday activities.

The discussion above reveals that the evidence concerning use of cross-functional communication, HR practices and gatekeepers is weak. At Salten, the level of *cross-functional communication* has led to an increased systemization of the EBS implementation at the plant. Further, evidence suggests that the *low* communication between operational departments has had a *negative* influence on the EBS implementation. At Iceland, the low cross-functional communication on both a managerial and operational level appears to have hindered the implementation process. At Salten, the high use of *HR practices* can point to increased ability and motivation related to EBS, while evidence suggests that using a gatekeeper has helped to internalize EBS at the plant. However, the study lacks empirical evidence concerning the effect that the use of HR practices and gatekeepers has on the EBS implementation at Iceland. Consequently, the empirical evidence is not sufficient to confirm Proposition 1c: *A high level of cross-functional communication, a high use of HR practices, and a presence of gatekeepers will have a positive influence on the XPS implementation.*

### ***Organizational Inertia***

Empirical evidence suggests that during the first stages of the implementation process, there were large differences in *organizational inertia* at the two plants. Organizational inertia, or resistance to change, is identified by Daghfous (2004) as a common obstacle to the use of transferred knowledge, consequently affecting a unit's absorptive capacity. While EBS was seemingly implemented at Iceland, those working at the plant at the time describe the implementation as what is best identified as a case of *ceremonial adoption* (see Section 2.3). The plant management resisted any participation in the implementation, viewing EBS as

something concerning the production workers. The workers themselves used the tools, but didn't understand why they were using them. Consequently, visits from the EBS center were met with a defensive attitude. This led to a low number of attendants of the training opportunities these visits presented. This *organizational inertia* or *resistance to change* is mentioned by the EBS center as a major barrier at the time of the initial implementation process at Iceland, giving support to the findings of Daghfous (2004). Also at Salten, evidence suggests there was some initial resistance towards change among the employees that hindered the initial implementation process. Thus, findings from both plants support Proposition 1d of this study: *Organizational inertia will have a negative influence on the XPS implementation.*

#### ***Absorptive capacity: cumulative and path-dependent***

A central assumption of Cohen and Levinthal (1990) is that the absorptive capacity of an organizational unit is both cumulative and path-dependent. The identified factors within absorptive capacity theory all seem to have, over the course of time, contributed to the accumulation of a higher level of absorptive capacity at Salten than at Iceland. Evidence suggests that prior knowledge and experience has helped to develop and assimilate new knowledge, thereby supporting the findings of Cohen and Levinthal (1990).

### **6.1.2 Change Management**

#### ***Prior change history***

One pre-existing factor which may influence the resistance to change is an organization's *prior change history* (Walker et al., 2007). Indeed, evidence suggests that this has been a major influencing factor on the resistance towards EBS at Iceland. The empirical evidence accounts of a turbulent implementation process, also after the initial years of top management resistance. Large changes to the plant's overall strategy created a difficult basis for implementing EBS. Today, an argument given by those operators skeptical towards EBS, is that there is no reason why implementing EBS should work now, when it proved unsuccessful in early years. The reasoning 'Why *should it work now when it didn't work before?*' is an argument the divisional EBS coach has received from some of the plant's employees. At Salten, the evidence suggests that changes experienced by the plant has been small compared to those of Iceland, which appears to have made its prior change history less influential. Accordingly, the study lacks empirical evidence from this plant regarding the influence of a disruptive change history. As a result, Proposition 2a: *A prior change history of disruption with negative consequences will have a negative influence on the XPS implementation* lacks sufficient evidence from both plants to be supported.

#### ***Support from top management***

Several authors highlight the *support from top management* as an influencing factor for successful change implementation (Kaye & Anderson, 1999; Bateman, 2005; Kotter, 2007; Walker et al., 2007). At Salten, the plant managers employed since the initial implementation process have mostly supported the implementation of EBS. Further, the current plant manager has been crystal clear about the importance of EBS from the very beginning of his employment, using an 'iron fist' when implementing EBS at the plant. Many of the plant's

employees list the strong, 'hands-on' involvement of the current plant manager as an important source of motivation. This is also highlighted by the EBS center as having been vital for Salten's success. Further, the HR team functions as a 'council' for EBS activity at the plant, helping the EBS coach lead the day-to-day implementation process. This is in line with Kotter's (2007) recommendations, assembling a group with shared commitment and enough power to lead the change effort, working as a team outside the normal hierarchy.

At Iceland, as the discussion of absorptive capacity revealed, one influencing factor of the initial implementation process was the organizational inertia or *resistance to change* which existed within the plant. An important reason for this inertia was *the lack of support* from the plant's top- and middle management, which again influenced the lower organizational levels, creating a negative attitude towards EBS. However, the employment of the current plant manager at Iceland changed the plant's attitude towards EBS. In fact, the current plant manager's initiative to take ownership of the plant's EBS implementation, making the plant itself more in charge of the process, is highlighted by the employees themselves as a major breakthrough. This is also stated by the EBS center as one of the most important reasons for the plant's positive development of the EBS implementation in recent years. However, when comparing the support at Iceland with that of Salten, the top management at Iceland still has an improvement potential in applying a stronger pressure on the process, driving the plant's implementation of EBS forward.

Empirical evidence suggests that support from top management has perhaps been one of the stronger influencing factors of both plants' implementation process. Further, the resulting impact of a strong support of the top management at Salten, the *lack of* initial top management support at Iceland, and the subsequent strong support from the current plant manager at Iceland confirms Proposition 2b: *A high level of top- and middle management support will have a positive influence on the XPS implementation.*

#### ***The use of managerial mechanisms to sustain change initiatives***

*Clear targets* and *a common understanding of direction* are both factors stated to be important for sustainment of change initiatives (Upton, 1996). Even more important is the *communication* of the targets and direction, throughout the organization (Upton, 1996). At both plants, the Rolling Top Five at each organizational level provides guidelines for the most important areas of improvement, intended to establish a common understanding of direction for the year to come. However, at Iceland the plant manager readily admits that the communication of the plant's goals related to EBS holds a large improvement potential. This is supported by employees at the lower levels, where evidence suggests that goals related to production are much better communicated than goals related to EBS. At Salten, the interviewees from the managerial levels speak of how the organization has managed to create what they call the plant's 'common thread'. This 'thread' is achieved through linking the improvement projects performed at each organizational level to the plant's Rolling Top Five. However, after having spoken to some of the plant's operators, it seems that only the employees who participate in the designated improvement teams, actually know what the current Rolling Top Five is. This suggests a gap in EBS-related knowledge among the

employees at the lower levels; between those participating in improvement work and those who avoid this type of activity. However, in terms of the *overall purpose* of implementing EBS, Salten's plant manager points out that an increasing number of employees now understand that using EBS to improve firm performance, also affects their job-security in the longer term. According to the plant manager, this has resulted in a calmer attitude among the employees in times of market instability. This is in line with Walker et al (2007), which claim that when workers see the personal benefits from implementing a change initiative, this has a positive influence on their attitude towards change. The findings within the two plants imply that both plants have well-established targets, but that the 'common understanding of direction' is perhaps not so common. Especially, the operators who avoid joining EBS activities in the first place, seem the most unaware as to the plants' areas of priority. According to Kotter (2007) employees need to know *why* change is important, and to understand that useful change is in fact possible. Consequently, this lack of understanding as to how activities at the operating level affect the overall level of the plant's performance, may contribute to explaining why the motivation towards EBS is lower across the operating level at both plants compared to the managerial levels.

Another factor reducing the resistance to change is *planning for, and creating, short-term wins* (Kotter, 2007). At Salten, one form of resistance to change existent within the plant is the resistance towards the change *messenger*, which, in the context of the plant's day-to-day EBS implementation, is the local EBS coach. However, empirical evidence suggests that the visible results of the recent Kaizen actions, facilitated by the local EBS coach, has had a positive influence on the negative attitudes towards his role. This is in line with Kotter's (2007) argument of *short-term wins* decreasing resistance to change. Further, as the results of improvement projects have been noticed across the plant, joining improvement teams has become more credible among the operators. The fact that these improvements are quantified in monetary value is also pointed out as a large source of motivation for participation, as this becomes something members of the team can point to having achieved. At Iceland, the empirical findings imply that the lack of motivation at the early stages of the implementation process was partly due to the *lack of results* connected to EBS. Further, evidence suggests that there is still not a strong focus on creating this type of short-term wins. Few of the employees interviewed could point a finger at the results of the improvement projects they had performed. Also, they didn't know whether the results of these projects had been communicated upwards to the management levels. Consequently, empirical evidence reveals that planning for, and creating short-term wins has had a positive influence on the resistance to change at Salten, supporting with Kotter (2007). At Iceland however, evidence did not suggest a large focus on creating short-term wins. Consequently, an improvement potential lies in better visualizing and communicating the existing short-term wins achieved within the plant.

In the change management literature, the level of *employee involvement* is found to have a positive and significant effect on resistance to change (Beer & Nohria, 2001; Brown & Cregan, 2008). The findings within the investigated plants imply that the way employee involvement is carried out differs between the two plants (see Appendix C). At Salten, the

involvement of employees is carried out through the improvement teams, where the participation is on a volunteer basis. The improvement projects are carried out on the basis of suggestions by employees, but have to relate to the areas of priority described through the Rolling Top Five of the plant. An observation made by the plant manager is that employees who participate in these projects also have a higher level of motivation for working with EBS. He explains this as having much to do with the fact that these employees can link their individual contribution to the results of the improvement project in question, supporting the cited theory as to the positive effect of employee involvement on the resistance to change. However, as the involvement is on a volunteer basis, evidence shows that those most resistant to EBS are also those who fail to volunteer. In this sense, the positive influence of employee involvement tends only to reach those who are already motivated. According to the operators themselves, the majority of the employees are neither very motivated nor strong opponents of EBS. The challenge of the plant therefore lies in reaching this ‘middle segment’ of the employees. At Iceland however, the improvement projects carried out are not systemized to the same degree as at Salten, making the degree of actual involvement in decision-making harder to judge. However, the local EBS coach points to involvement of employees as an area with improvement potential within the plant.

The discussion reveals that both plants have an improvement potential in *communicating targets and creating a common understanding of direction*. Evidence suggests that this has constituted a drawback for both plants’ EBS implementation. At Salten, the achievement of *short-term wins* such as Kaizen actions has decreased resistance towards the local EBS coach, making his work with implementing EBS at the plant easier. Further, evidence suggests that *employee involvement* has had a positive effect on the resistance towards EBS at this plant. However, due to the limited use of managerial mechanisms to sustain change initiatives at Iceland, sufficient empirical evidence could not be collected concerning the effect of short-term wins and employee involvement at the plant. Consequently, Proposition 2c: *The use of managerial mechanisms to sustain change initiatives will have a positive influence on the XPS implementation*, lacks sufficient evidence from both plants to be supported.

### 6.1.3 Institutional theory

In order to address Proposition 3a, this section will first discuss the *institutional profile* of the investigated subsidiaries, before the observed level of *dependency*, *trust* and *identification* is treated. Finally, the *combination of institutional and relational pressures* is discussed, in order to assess the support for proposition 3a.

#### *The institutional profile of the host country*

*The institutional profile* of the host country is defined as a set of regulatory, normative and cognitive institutions (Kostova & Roth, 2002). From the empirical findings it became evident that Iceland has a different regulatory institution, such as different laws and regulations, than the country of the parent company, Norway. Also the cognitive structure and cultural norms differ from that of Norway. This can be related to the history of the country; even if Iceland has been producing silicon for more than thirty years, it is a young industrialized community. Many of the people recruited to the industry were former fishermen and farmers, used to

working independently (Øyvind Sørli, Wayne Faaland). According to Øyvind Sørli, this has contributed to a limited precision culture at the plant. Also employees at Elkem Iceland admit that the Icelanders are less structured than the Norwegians. Wayne Faaland states that Icelanders are very 'proud to solve their own problems', and addresses this as due to an 'island culture'.

The institutional context influences the ability of the recipient unit employees to understand the practice, the way they interpret the practice and its value, and their motivation to adopt it. Positive judgments and motivations are more likely when the institutional profile is favorable for the particular practice (Kostova & Roth, 2002). The institutional profile of the host country, Iceland, contains elements which are not favorable for the implementation of EBS practices. First, the lack of precision culture may be a barrier to the use of standards. Second, the proud attitude may have decreased their willingness to request the EBS center's help. Third, different laws and regulations complicate the compliance with mandates regarding EBS coming from the headquarters in Norway. It is therefore reasonable to assume that an unfavorable institutional context has had a negative influence on EBS implementation at Elkem Iceland.

However, it is not said that the institutional profile of Norway is ideal for these types of practices either, as EBS is based on the Toyota Production System (TPS), which has its offspring in Japan. However, since EBS is developed in Norway, it is reasonable to believe that the institutional environment has shaped the system, making it a better fit with the institutional profile of Norway.

#### ***Dependency on headquarters***

*Dependency* on the headquarters is defined as the belief held by subsidiary managers that the subsidiary is dependent on the headquarters for essential resources (Kostova & Roth, 2002). Both of the investigated plants are mere production units, financed by the parent company. Therefore, the dependency on headquarters is high. According to the literature (Kostova & Roth, 2002), subsidiaries that perceive themselves to be dependent on the parent will tend to comply with mandates coming from the parent. In the case of the investigated plants, there was a strong pressure from the headquarters to implement EBS. Therefore, the dependence on headquarters secured the first *implementation* of EBS at the plants. However, a high dependence on headquarters is assumed to have different effects on implementation and internalization, which will be discussed at the end of the section.

#### ***The level of trust towards the parent company***

*Trusting* the parent will shape the perception that the transferred practices are efficient and valuable for the subsidiary (Kostova & Roth, 2002). Since Elkem gained the full ownership of Elkem Iceland in 2003, the plant has had several expatriate managers from Norway. In the following years, *unfortunate strategic decisions* hurt the overall performance of the plant. These changes were initiated by the headquarters, and later accepted and carried through by the expatriate managers. Even if these decisions were made with the plant's best interest in mind, evidence suggests that it affected the perception of the headquarters' judgment. Therefore, Elkem Iceland has had a lower level of trust with the parent company as a result of

this. Elkem Salten, on the other hand, has had a stable development without any major strategic mistakes. The empirical findings give therefore no reason to believe that the history of the plant should have caused an impaired level of trust towards the parent company.

### ***The level of identification with the parent company***

*Identification* is defined as the degree to which the subsidiary employees feel that they are part of the parent company, and partly define their self-identities from this organizational membership. A subsidiary that identifies with the parent company is likely to share the values and beliefs of the parent, and therefore better understand the meaning and value of the transferred practice (Kostova & Roth, 2002). The empirical findings suggest that the employees of Elkem Iceland define their self-identities from the organizational membership in the plant, and not from the corporate membership. Therefore the identity with the headquarters can be said to be low.

One reason for the low identity with the parent company indicated by the employees, is the fact that Elkem has not always been the sole owner of the plant. The entry mode used by Elkem differs between the two investigated plants. While Elkem Salten is a Greenfield subsidiary, built and owned by Elkem since 1973, Elkem Iceland has had a joint ownership until Elkem gained the full ownership in 2003. Before Elkem gained full ownership of Elkem Iceland, former 'Icelandic Alloys', the plant was partly a state owned company. Even if Elkem has been the sole owner for almost a decade, some of the former company culture is still to be found. This was confirmed by several of the employees at the plant. They pointed out that just the simple act of changing the name from 'Icelandic Alloys' to 'Elkem Iceland' has helped to undermine the former company culture. However, the previous name of the plant still appears in some artifacts, such as on the visiting name tags (see Appendix C). It is reasonable to assume that the former joint ownership has led to a lower identity at Elkem Iceland with the parent company, compared to at Elkem Salten.

Further, the empirical findings suggest that the employees of Elkem Iceland do not have much knowledge of Elkem as a company. As pointed out by several of the interviewees, many employees don't know what the different Elkem plants are producing, for instance. This limited knowledge of the company as a whole was also confirmed in the conducted employee survey at the plant (see Appendix C). Maybe more importantly, not many employees seem to know what Elkem stands for and what are the company values. As suggested by the theory (Kostova & Roth, 2002), there is a linkage between identity with the parent company and the sharing of values and beliefs. The fact that the employees of Elkem Iceland have a limited insight into company values, have led to a lower identity with the parent company. This causal relationship was also directly stated by some of the interviewees.

Also, from the empirical findings it became evident that cultural and linguistic differences have influenced the level of identification of Elkem Iceland with the parent company. Many of the employees at the plant indicated that they see Elkem as a *Norwegian* company instead of an international company. The reasoning behind this is the perceived lack of understanding of other cultures by the headquarters. As specified by the plant manager, the headquarters do

not always take into consideration the fact that Iceland has different laws and regulations. Also, even if English is the official language in Elkem, official meetings are often said to be Norwegian biased. In addition, many documents are only distributed in Norwegian. This means that foreign plants, such as Iceland, have to wait until documents are translated before they can arrange courses. Also the difference in language act as a barrier when divisional EBS coaches work directly with operators at Iceland, because the operators become passive when they have to communicate in a language which is not their mother tongue. The difference in culture itself might make it more difficult for Elkem Iceland to identify with the headquarters. When, in addition, the headquarters is perceived to have a low understanding of other cultures, this was shown to have a direct negative influence on the relationship.

### ***The combination of institutional and relational pressures***

*The combination of institutional and relational pressures* will shape the level of implementation and internalization of the practice (Kostova, 1999; Kostova & Roth, 2002). In the case of Elkem Iceland, an unfavorable institutional profile is combined with a high level of dependence, and a low level of trust and identity with the parent company. The legitimacy pressure to adopt the practices arises from within the organization itself, and because the plant is dependent on the headquarters, it has to comply with mandates coming from it. Thus, EBS had to be implemented at the plant. At the same time, the cognitive and normative profiles of Iceland made it difficult for the plant's employees to understand the real value of the practice. This led to a high level of implementation and a low level of internalization in the early stages of implementing EBS, conceptualized in the theory as *ceremonial adoption* (Kostova & Roth, 2002). As shown by the empirical findings, the employees at Elkem Iceland used the EBS tools in the beginning just because they were told so. However, they did not understand *why* they had to use them (Wayne Faaland). According to the divisional EBS coach, Wayne Faaland, this led to short periods of progress followed by major set-backs.

Also, the low level of trust and identity with the parent company appears to have caused a 'not invented here syndrome' at the plant. When the first EBS practices were tried implemented at the plant, they were viewed as 'something coming from the outside'. As the current plant manager indicated, the practices were referred to as 'Elkem bullshit'. This can be interpreted as something different than a general resistance to change, as the operators emphasized the fact that the practices were something coming from the outside. The finding that both trust and identity with the parent company had an influence on practice implementation is consistent with previous work on the transfer of practices across units (Szulanski, 1996; Tsai & Ghoshal, 1998).

Institutional theory can thus explain the difficulties with implementing EBS at Elkem Iceland in the early stages of the implementation process. However, the findings could not be replicated in the other case unit. Consequently, Proposition 3a: *The combination of an unfavorable institutional profile, and a relational context characterized by a high level of dependency and a low level of trust and identity with the parent company, will have a negative influence on the XPS implementation, cannot be supported.*



However, some of the discussed influencing factors have changed over the time passed. The employees at the plant state that they now have a higher understanding of the value of EBS, indicating a higher level of internalization. Also, the relationship between the plant management and the headquarters is believed to be better after the new plant manager was employed.

## **6.2 Factors influencing the sharing of XPS related knowledge**

Research question 1.2 that this section addresses, is more exploratory, seeking to identify what factors have influenced the EBS knowledge sharing in Elkem. This section will first discuss the identified factors which can be explained by the investigated theories, namely *corporate socialization theory* and *agency theory*, and address the propositions related to each theory. Next, identified factors which have influenced the EBS knowledge sharing, but which cannot be related to the investigated theories, will be explored.

### **6.2.1 Identified factors explained by corporate socialization theory**

#### ***The existence of inter-unit links***

In order for organizational units to obtain new knowledge through interacting with one another, *inter-unit links and networks* are essential (Tsai, 2001). The empirical findings revealed that the EBS coaches at the two investigated plants have limited knowledge about each other. Thus, there is no *interpersonal link* between the people responsible for EBS implementation at the two plants. From the findings it became clear that this has hindered them in contacting each other for discussing EBS related matters. Both of the local EBS coaches indicated that it would have been easier to share knowledge with other EBS coaches, for instance through an online forum, if they knew the receiving part personally. Therefore, the empirical findings indicate that the *lack of inter-unit links* has had a negative effect on EBS related knowledge sharing. However, the positive effect of the existence of such interpersonal ties could not be proved based on the empirical findings. Consequently, Proposition 4a: *The existence of inter-unit links will have a positive influence on the XPS sharing between MNC subsidiaries*, lacks sufficient evidence to be supported.

#### ***The use of corporate socialization mechanisms***

Corporate socialization mechanisms refer to those organizational mechanisms that facilitate the development of interpersonal ties in the MNC, which again can be expected to enhance the transfer of knowledge between units. Examples of such mechanisms can be (1) *training involving participants from different units*, (2) *inter-unit trips*, and (3) *inter-unit forums or committees* (Björkman et al., 2004).

Many corporate socialization mechanisms are to be found in Elkem. The most obvious mechanisms related to *training* are maybe the EBS University, which has had more than 800 participants from different units over the last decade. One of the objectives with the EBS University is to share EBS experiences between the plants. However, the university is often the participants' first introduction to EBS, which means that the participants don't necessarily have that many experiences to share. Therefore, the EBS University does not have a *direct* positive influence on knowledge sharing between plants. However, many of the interviewees

stated that the EBS University is a good arena to build personal networks with employees from other Elkem subsidiaries. According to the corporate socialization theory, these networks can enhance the knowledge sharing over time (Björkman et al., 20014).

Many *inter-unit trips* are facilitated related to the team work across units. The participants of these teams stated that they always learn something new when they visit other plants. Also, the plants receiving employees from other units benefit from these visits, as visitors from other plants often see solutions to problems that they have struggled with for years. However, the gained knowledge from these inter-unit trips is production knowledge, and not EBS knowledge. Therefore, the facilitation of inter-unit trips for operators does not have a direct positive effect on EBS knowledge sharing. However, the EBS center tried for a period to bring local EBS coaches with them when performing audits at other plants. Unfortunately, this was a short lived trend, as the economic crisis put an end to it. Due to the short period of time this was tested, it is difficult to say how this would have influenced EBS knowledge sharing between the plants. But the fact that operators from the production gain useful production knowledge from visiting other plants, gives an indication that EBS coaches would have gained valuable EBS knowledge from the same procedure.

Other used mechanisms are the *inter-unit forums*, such as the safety forum held twice a year between the foundry division and the silicon division. The plant manager at Elkem Iceland points out that they sometimes discuss EBS indirectly at those meetings, and that he compares what the other plants are doing with his own plant's EBS work. Therefore, even if these forums are not directed at sharing EBS knowledge, they facilitate EBS knowledge sharing to some extent.

Based on the above discussion, it is obvious that the use of corporate socialization mechanisms in Elkem has led to the creation of interpersonal links in the company, and also more sharing of knowledge. However, because the inter-unit trips and forums are not directly directed at EBS, the shared knowledge is mostly production knowledge and not EBS knowledge. This indicates that the use of corporate socialization mechanisms has a positive influence on knowledge sharing between subsidiaries, but that the different mechanisms must be directed towards the specific knowledge that the MNC wants to transfer. Thus, the findings of this study give a strong indication that Proposition 4b: *The use of corporate socialization mechanisms will have a positive influence on the XPS sharing between MNC subsidiaries*, holds true, but the proposition cannot be supported due to the limited empirical evidence.

### ***The use of IT***

IT systems have been described in the literature (Bolsani & Scarso, 1996) as tools with high potential in knowledge management, especially in terms of efficiency and scope of knowledge access. The employees at the EBS center have started to use the Elkem *intranet* as a channel for sharing EBS knowledge. Evidence suggests that as of today, the EBS site is more of a database where relevant literature and information on EBS is distributed to a limited number of people. However, the EBS center is also planning to develop a virtual forum where EBS coaches can meet and exchange EBS experiences. The empirical findings,

however, revealed several doubts about using the intranet as an EBS sharing mechanism. The first concern is about leakage of proprietary knowledge from the EBS database. If many employees in Elkem were to have access to this database, they could easily download the documents and distribute them to competitors. Also, it was indicated that there is not a culture for using IT in Elkem. As pointed out, many employees don't even open their e-mails. Regarding the EBS virtual forum, it was pointed out that it needed a both-way design to be useful. In this way, the EBS coaches can communicate directly with EBS coaches at other plants. However, the interviewed EBS coaches stated that they don't know any other EBS coaches personally, and that this would make the communication difficult. This finding is in line with the theory, which emphasizes that IT usage should be combined with corporate socialization mechanisms (Brynjolfsson & Saunders, 2010).

The use of IT, or in this case the use of the Elkem intranet, seems to have a potential for increasing the EBS knowledge sharing between plants. However, in line with the finding of Ciabuschi (2011), the empirical findings indicate that IT based systems should be used with caution. Also, since the online virtual meeting forum for EBS coaches is not yet developed, the empirical data only reveals the employees' mixed perceptions about the value of such a forum. Therefore, Proposition 4c: *The use of IT will have a positive influence on the XPS sharing between MNC subsidiaries*, cannot be supported.

### **6.2.2 Identified factors explained by agency theory**

#### ***Motivational disposition at the sending unit***

Another influencing factor of knowledge sharing between plants is the *motivational disposition at the sending unit*. Research based on agency theory indicates that MNC units may be reluctant to share knowledge with other plants in fear of losing a position of superiority (Björkman et al., 2004). The empirical findings of this study reveal that there is a competition between plants in Elkem. In times of recession, plants are in a position where they risk to be temporarily shut down, or have to run at a low capacity. According to the leader of the EBS center, the decision of what plants to partly or fully shut down is to some degree based on a comparison between the different plants' performance. Therefore, it might not be in the plants' self-interest to share knowledge with other plants, because this may lead to an improved performance at the receiving unit.

Further, empirical evidence indicates that the plants in periods have been 'put up against each other'. In such periods the plants have been reluctant to share information with other subsidiaries, because they are considered competitors. Therefore, the competitive nature of the relationship between the plants can be said to have decreased the plants' motivation to share knowledge. In line with agency theory, the findings of the case study suggest that a low motivation of the sending unit indeed has a negative impact on knowledge sharing between MNC subsidiaries. Hence, Proposition 5a: *A low motivation of the sending unit to share knowledge will have a negative influence on the XPS sharing between MNC subsidiaries*, can be supported.

### ***Perceived importance of knowledge sharing by headquarters***

According to agency theory, a high *perceived importance attached to knowledge sharing* by the headquarters will increase the outflow of knowledge from a subsidiary (Björkman et al., 2004). Even though some plants are reluctant to share knowledge in fear of losing a position of superiority, there are also good reasons to share. As the plant manager at Elkem Salten indicated, the plant has gained some goodwill from the headquarters because of its openness related to the EBS work. This goodwill manifested itself when the headquarters distributed resources to the HR project, for instance. This form of recognition has led to a higher perceived importance of knowledge sharing at the plant, thereby increased the outflow of knowledge. As the plant manager indicated, the continued strategy to ‘open up the plant’ is partly based on the gained goodwill from the headquarters. However, Elkem Iceland has not shared their EBS experiences or ‘opened up the plant’ to the same extent as Salten. One possible explanation for this was given by Iceland’s HR manager, suggesting that if a plant is not proud of its own accomplishments, it might be unwilling to share its experiences with others.

According to the agency theory, several incentive based control mechanisms (i.e. network based president bonuses) can be used by the headquarters in order to increase the perceived importance of knowledge sharing, and thereby the knowledge outflow from subsidiaries (Björkman et al., 2004; Gupta & Govindarajan, 2000). Elkem has so far not initiated any such mechanisms.

The fact that the headquarters don’t give any clear signals that EBS knowledge sharing is important and highly appreciated, might be a contributing reason as to why the sharing between plants is so limited. However, the example of Elkem Salten shows that the plant’s high perceived importance of knowledge sharing gave it an incentive to share. Therefore, the empirical findings give a strong indication that Proposition 5b: *A high perceived importance attached to knowledge sharing by headquarters will have a positive influence on the XPS sharing between MNC subsidiaries*, holds true. However, since the finding is only based on the experience of Elkem Salten, the proposition cannot be supported.

### **6.2.3 Identified factors not explained by theory**

#### ***Different XPS organization at the plants***

The lack of personal ties between the EBS coaches discussed previously, can be attributed to the absence of forums where they can meet in person, and also the fact that *EBS is differently organized at the various plants*. The empirical findings revealed that no forum exist, where the people responsible for EBS at the different plants can meet. Several of the interviewees at the investigated plants requested such a forum. However, since the EBS is organized differently at the plants, it would be difficult to decide who to include in such a forum. At Elkem Iceland, much of the responsibility for developing EBS at the plant is given to the local EBS coach. Even though she can ask her colleagues for advice, there is no formal support group around her role. At Elkem Salten, however, the EBS coach is part of a HR team which works together on EBS related issues. Also, the EBS coach has developed a

separate EBS team to support and help him with the implementation. Other plants don't even have a local EBS coach, but have other roles responsible for the EBS implementation.

The empirical findings indicate that the lack of standardized EBS organization makes it difficult for EBS coaches to know who to approach at other plants. It also makes it difficult to create a meeting forum for all people responsible for the EBS implementation. Therefore the different organization of EBS at the plants has a negative influence on the EBS knowledge sharing between subsidiaries.

#### ***A knowledge center acting as an intermediary***

The empirical findings suggest that today it is mainly the EBS center that transfers ideas and EBS experiences between the plants. This is done by presenting real life EBS experiences from various plants at different courses, such as the EBS University. Also, the divisional EBS coaches can bring along ideas from other units when they visit or perform audits at the plants.

The EBS center consists of five people and is responsible for the total EBS activity within Elkem. This results in a tight schedule for the members of the center, who have to divide their time among the plants. Although the facilitation of knowledge-sharing that the EBS center performs today is valued by employees at both plants, empirical evidence suggests that there is a demand among the plants for more EBS knowledge sharing. Consequently, the EBS center may constitute a bottleneck in terms of the efficiency of EBS-related sharing, as the plants are dependent on the time and availability of the divisional EBS coaches in order to share knowledge. Another argument is that the plants may be too dependent on the EBS center for information. This will hinder them in actively seeking information from other plants.

### **6.3 The generalizability of the study's propositions**

Through the preceding discussion of the study's theoretical propositions, a set of factors believed to influence the implementation and sharing of XPS have been investigated. Of the in total 13 propositions, 4 are supported by the empirical findings.

- *Proposition 1a: A high level of prior related knowledge will have a positive influence on the XPS implementation.*
- *Proposition 1d: Organizational inertia will have a negative influence on the XPS implementation.*
- *Proposition 2b: A high level of top- and middle management support will have a positive influence on the XPS implementation.*
- *Proposition 5a: A low motivation of the sending unit to share knowledge will have a negative influence on the XPS sharing between MNC subsidiaries.*

As explained in Section 3.4, the theoretical propositions could only be confirmed under strictly defined circumstances; the findings from *both* plants needed to confirm the proposed relationship. This result in *two main groups* of propositions that are not supported by the empirical findings based on the predefined rules:

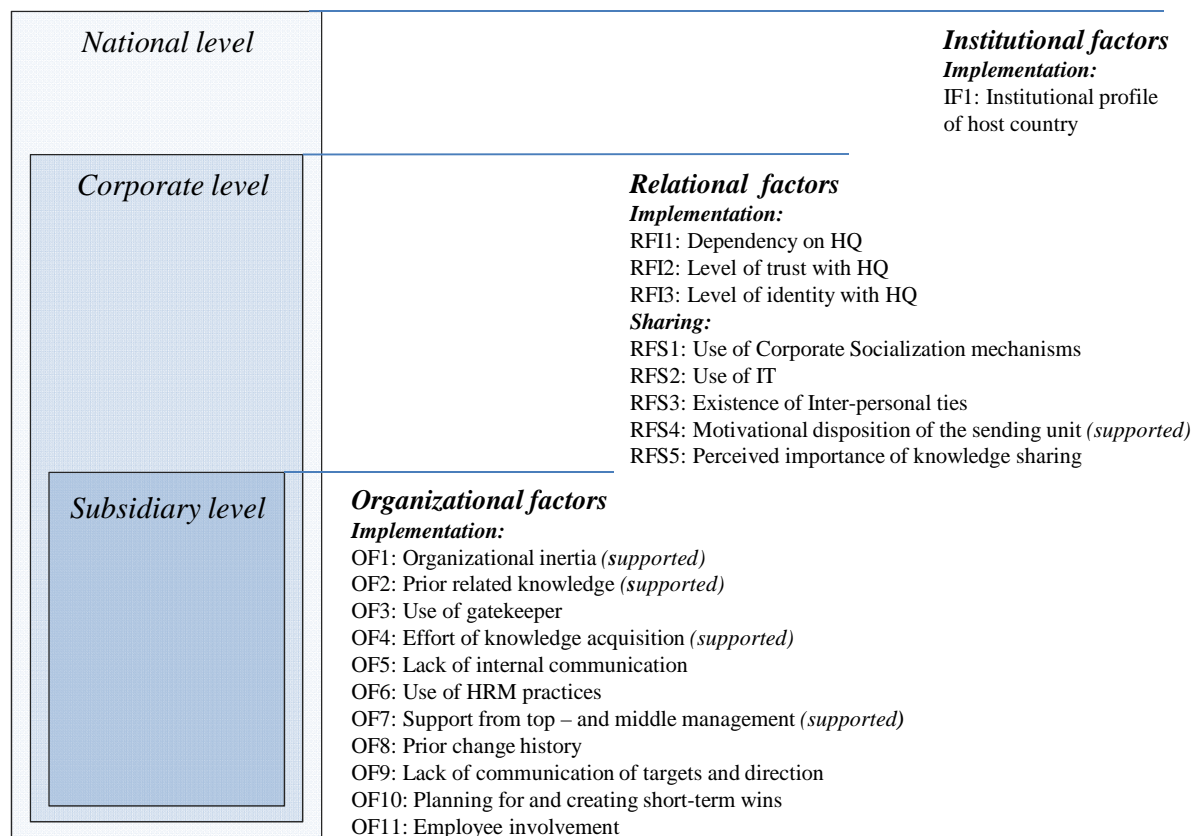
1. Propositions that find strong support at one of the plants, but lack sufficient evidence at the other.
2. Propositions that concern factors which appeared to be in limited use in the case company.

Even if the propositions in Group 1 (Proposition 1b, 1c, 2a, 2c, 3a, 5b) are not supported, the empirical findings give strong *indications* that they have the initially proposed influence on either XPS implementation or sharing. For instance, the use of cross-functional communication proved to have a positive influence on EBS implementation at Elkem Salten, while being in limited use at Elkem Iceland. Thus, based on the listed criteria, this factor lacks sufficient evidence to be supported. However, the finding is valuable, as it contributes to explaining the variation in EBS implementation at the investigated plants.

The propositions in Group 2 (Proposition 4a, 4b, 4c) lack sufficient evidence because of the limited use or existence of these factors in the case company. For instance, the use of corporate socialization mechanisms was proposed to have a positive influence on the sharing of XPS related knowledge between units. However, the empirical findings reveal that the use of corporate socialization mechanisms directed at EBS is very limited in Elkem. Thus, the proposition cannot be supported according to the given criteria. However, the finding is still important, because it reveals an essential improvement point in the case company. Therefore, many of the propositions in Group 2 are addressed in the managerial implications of this study.

The theoretical propositions were based on existing theory on procedural knowledge transfer in MNCs. Because the five propositions which found support in this study were grounded in existing theory, and were supported based on a replication between two cases, they can be assumed to be *generalizable* to other MNCs. Although not fully supported, the other propositions cannot be *rejected* based on the lack of support from *one* comparative case study.

As described introductorily in Chapter 2, the five theoretical perspectives used in the study, cover three different levels of analysis: subsidiary level, corporate level and national level. The investigated factors can thus be categorized according to these levels, as displayed in Figure 8 on the next page. The figure includes all the factors initially identified through reviewing the literature. However, the factors that have been confirmed through the supported propositions are marked in the figure with a note.



**Figure 8: Factors influencing either the implementation or sharing of XPS-related knowledge.**

#### **6.4 Discussion of main findings: Why has the level of XPS implementation varied between the plants?**

When discussing the study's propositions in Section 6.2, support of a proposition was given if the findings from *both* plants confirmed the proposed relationship. This criterion gives rise to a generalizability of the supported propositions to other MNCs. However, when exploring the *variation* between the investigated subsidiaries, the *strong* presence of one factor in one subsidiary compared to the *lack* of presence of the same factor in the second subsidiary may be directly attributable for the variation in XPS implementation. Thus, the explanation for the variation in XPS implementation may be given by factors which did *not* receive support on the basis of the given criterion. Consequently, when exploring the main research question of this study, the *generalizability* of the identified factors will not be given a strong emphasis. Rather, the main focus will be on addressing those factors identified in Figure 8 which best can explain the *variation* in XPS implementation between the plants of the case company.

The identified factors in Figure 8 have so far been treated separately and in accordance with the identified theories. However, simply adding up the separate factors is likely to create a simplified picture, when in reality the factors intertwine and influence each other. Thus, the

following discussion addresses the factors holistically, seeking to provide a full picture of the variation in the plants' EBS implementation. Also, a discussion of how the limited sharing between the plants has contributed to the different levels of XPS implementation will be given.

#### ***Multiple factors leading to Organizational inertia***

At Iceland, a strong influencing factor on the plant's EBS implementation has been the initial *organizational inertia*, or resistance to change within the plant. Interestingly, several of the other factors identified seem to be directly attributable for this organizational inertia. First, the *lack of top management support* is perhaps the strongest influencing factor, as the production workers were left to implement EBS tools without any conviction as to why the plant should prioritize this type of activity. Second, the combination of a *high level of dependence* on the parent company (and resulting pressure to implement EBS), with a *low level of trust and identity* resulted in a case of ceremonial adoption: tools and methodology was seemingly implemented, but with a lack of conviction as to the value of such a system. Finally, empirical evidence points to the unfavorable *institutional profile* of Iceland as another contributing factor. The country's adaptation from agriculture and fishing towards a more industrialized society has provided some transitional challenges. Bureaucracy and a rule of red tape are new elements that the Icelanders find hard to abide to. Consequently, the combination of the absence of support from top management, ceremonial adoption among the operators, in addition to an unfavorable institutional profile, seem to be directly attributable for the high level of organizational inertia hindering the initial EBS implementation. At Elkem Salten, there was also an initial resistance to change in the early stages of the EBS implementation. However, the organizational inertia at Salten did not have as strong a negative effect on the implementation as at Elkem Iceland.

#### ***Prior related knowledge and support from the plant managers***

The employment of the current plant managers at the investigated plants has proven to have had a significant positive influence on the plants' EBS implementation. At Iceland, the current plant manager is of Icelandic nationality and can thereby, as opposed to previous expatriate managers, better relate to the *institutional profile* shaping the plant. Second, the plant manager had *prior related knowledge* as to the value of TPS-based methodology, and was thereby easily convinced as to the value of EBS. Further, the plant manager took early ownership and gave *strong support* to the implementation process, which evidence shows has helped convince the plant's employees as to the value of EBS. However, the current plant manager at Salten has given equally strong support to implementing EBS, but has also shown a strong *personal involvement* in the process, and thereby constituting an important driving force related to the plant's EBS implementation. An important reason for this drive seems to be the manager's *prior related knowledge*. More specifically, the combination of prior related knowledge of TPS-based methodology *and* previous direct experience of implementing EBS has proven valuable for the plant's EBS implementation. Consequently, Salten has had a more focused approach to the implementation process, and has thereby achieved a more advanced level of EBS implementation



***The plants' effort of knowledge acquisition and the level of internal communication***

Another contrast found between the plants is the *effort of knowledge acquisition*. Again, the difference related to this factor seems to be explainable through several of the other identified factors in research question 1.1. First, at Elkem Iceland the *prior change history* of disrupting strategic changes and expatriate Norwegian plant managers seems to have impaired the *relationship of the plant towards the headquarters*. This is reflected in the plant management's focus on managing the EBS implementation as independently as possible. Second, the different language between the plant's employees and the EBS center creates difficulties when divisional EBS coaches perform practical training with the operators. This might also explain the limited effort of knowledge acquisition of Elkem Iceland. Consequently, the prior change history causing an impaired relationship with headquarters, as well as language barriers decreasing the value of the received training, has led to a *low intensity of effort in acquiring knowledge* in terms of the amount of help requested from the EBS center in later years.

In comparison, the strong *effort of knowledge acquisition* displayed by Salten's plant management is an important reason for the success of Salten in recent years. A consequence resulting from this effort and the close contact with the EBS center is the systemization of the *cross-functional communication* related to EBS. A cross-functional HR team, an EBS team supporting the local EBS coach, and regular meetings of the improvement teams all contribute to a higher awareness concerning the status of the plant's EBS work. Further, quantifying savings due to improvement work and the compensation given to employees who participate, has given the employees extra motivation for this type of work. Also, the achievement of *short-term wins*, such as the result of Kaizen projects, helps combat resistance among the workers and increase motivation towards EBS at Salten. In contrast, a lack of *cross-functional communication* related to EBS is an important existing barrier to the EBS implementation at Iceland. Information-sharing between departments is not systemized, and there are few regular cross-departmental meetings to assure the follow-up of the EBS work at the plant.

***Multiple factors leading to limited inter-unit XPS related knowledge sharing***

From the previous discussion it becomes clear that the sharing of EBS related knowledge is very limited between the plants in Elkem. Several influencing factors are identified, both factors addressed in the theoretical propositions, and factors not covered by the investigated theory.

Of the identified influencing factors, some appear to cause the existence of other factors. Maybe the most important underlying factor is the *lack of standardization in how EBS is organized* at the different plants. This factor is not covered by the investigated theory, but appears to have undesirable consequences. First, it makes it difficult for EBS coaches to know who to contact at other plants if they want to discuss an EBS related matter. Second, the lack of standardization makes it difficult to know who to include from the different plants in a potential forum for EBS sharing. Thus, it complicates the use of corporate socialization mechanisms.

The limited *use of corporate socialization mechanisms* related to EBS, is in itself a major barrier to the EBS knowledge sharing between subsidiaries. As revealed by the empirical findings, most corporate socialization mechanisms used in Elkem today are not directed at EBS, and thus facilitate the sharing of other types of knowledge. The lack of a forum where people responsible for EBS can meet and exchange knowledge creates a situation where there are no personal ties between EBS coaches.

An interesting question is why the use of corporate socialization mechanism directed at EBS is so limited. The empirical findings revealed that today the *EBS center acts as an intermediary* in the sharing process between subsidiaries. This could be the underlying cause to the limited use of corporate socialization mechanisms; if the parent company views this as a sufficient measure for facilitating EBS knowledge sharing between plants, there is no need for them to initiate other mechanisms. Also, the plants become dependent on the EBS center for information, which prevent them from actively seeking information themselves at other plants. Therefore, the empirical findings suggest that the EBS center becomes a bottleneck in the EBS sharing process.

The limited use of corporate socialization mechanisms also give a signal that sharing of EBS related knowledge is not a high priority in the company. Thus, it leads to a lower *perceived importance attached to knowledge sharing* by headquarters. The perceived importance of knowledge sharing is important for the outflow of knowledge from subsidiaries, especially in times of recession, as the findings revealed that the plants are reluctant to share knowledge in such periods.

Consequently, five factors related to the implementation of XPS and four factor related to the inter-unit sharing of XPS can be identified as central for explaining the variation in XPS implementation between the investigated subsidiaries. These factors are listed in table 6.

RQ1.1: Implementation of XPS	<ul style="list-style-type: none"> <li>• Organizational inertia</li> <li>• Top management support</li> <li>• Prior related knowledge</li> <li>• Effort of knowledge acquisition</li> <li>• Cross-functional communication</li> </ul>
RQ 1.2: Sharing of XPS	<ul style="list-style-type: none"> <li>• Standardization of XPS implementation</li> <li>• Use of corporate socialization mechanisms</li> <li>• XPS knowledge center acting as an intermediary</li> <li>• Perceived importance of knowledge sharing</li> </ul>

**Table 6: Central factors causing the variation in XPS implementation between the investigated subsidiaries**

***Limited sharing contributes to the variation in XPS implementation***

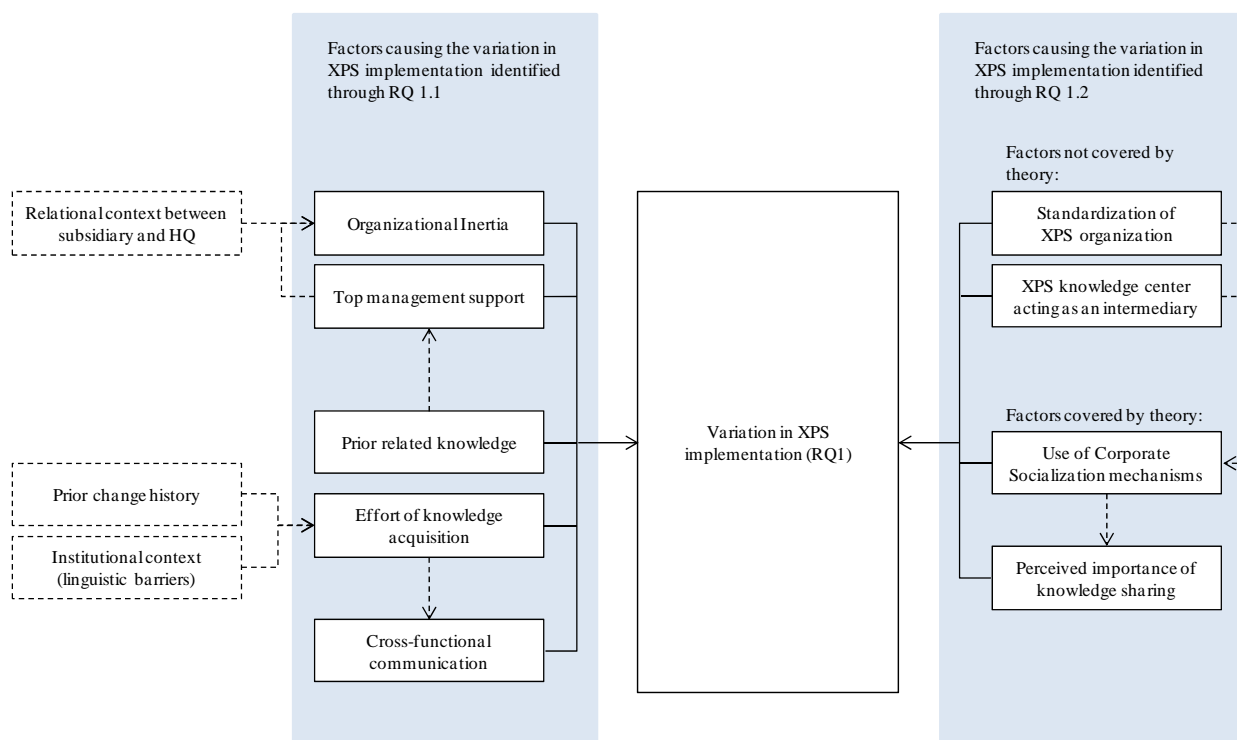
As stated introductorily in the study, inter-unit sharing is believed to explain some of the variation in the XPS implementation success. The empirical findings of this case study suggest that this assumption can indeed be verified. One illustrative example is the HR project carried out at Salten. The HR project at Salten has led to an increased cross-functional communication and overall systemization of the EBS work carried out at the plant. These are factors identified through research question 1.1 as a significant difference between the investigated plants, and an important area of improvement for Iceland. Considering that some of the ideas that have been implemented at Salten, are directly copied from Elkem Solar in Kristiansand, it is reasonable to assume that if the ideas from this project had been implemented at Iceland, many of the same positive effects would be gained.

As of today, the EBS center is responsible for transferring such ideas between plants. Consequently and as previously discussed, the plants themselves become less active in seeking information from other plants. Further, the EBS center, consisting of five coaches, has limited resources in facilitating this type of sharing at all thirteen plants. Also, implementing projects such as the HR project, demands resources from the headquarters. However, as of today, evidence suggests that the sharing of EBS related knowledge is not given a high priority. This results in only occasional sharing, further limited by a low budget allocation from the headquarters.

Consequently, evidence suggests that if there existed a higher degree of knowledge sharing related to XPS between the different units, ideas emerging at one subsidiary could soon be spread out in the network and copied at other units. This would enhance the overall XPS implementation in the company, and also lead to a lower variation in the level of XPS implementation at the different subsidiaries, thus supporting the link between inter-unit XPS related knowledge sharing and the variation in XPS implementation.

### 6.5 Proposing a model

The preceding section identified a number of factors which, commingled, provides the explanation for the variation in XPS implementation between the investigated subsidiaries. Based on this discussion, nine factors are identified as essential for explaining the variation in XPS implementation between the investigated subsidiaries. These factors (four factors related to implementation identified through RQ 1.1 and four factors related to inter-unit sharing identified through RQ 1.2) are shown in Figure 9. Further, the identified *underlying* factors, as well as the relationship between these factors, are given in stippled boxes to visualize the holistic explanation of the variation in XPS implementation.



**Figure 9: A holistic model explaining the subsidiaries' variation in XPS implementation.**

## 6.6 Managerial Implications

On a general level, this study identifies multiple factors which may affect the XPS implementation and the sharing of XPS related knowledge in a multi-plant manufacturing network. Many of these factors may be influenced by managers of the parent company, of which the six given suggestions are directed at. Each suggestion is discussed in further detail below.

- 1) Ensure that local managers have the ability to lead change processes
- 2) Establish a cross-functional team to support the XPS implementation within each plant
- 3) Standardize positions with XPS-related responsibility across the plants
- 4) Promote a common corporate identity through promoting shared values and a common language
- 5) Create physical and virtual forums for inter-unit knowledge sharing
- 6) Communicate perceived importance of knowledge-sharing towards subsidiaries

The ability to produce lasting changes in the organization is found to be highly dependent on the local manager's ability to lead change processes. First of all, a strong influencing factor identified in this study is the display of *top management support*. The level of XPS implementation was found to be highly dependent on the support from local management. In order to avoid organizational inertia, it is important for the local management to take ownership of the implementation process. Further, the local manager is proven to be the single most important driving force of the long-term implementation process. Second, the *prior related knowledge* of the local plant manager proved to be of influence. The case study shows that prior related knowledge of XPS makes it easier for the local manager to recognize the value of such a system. Further, if the plant manager has *prior experience* with XPS, this may constitute a great advantage when driving the implementation process forward. Consequently, headquarters should consider mechanisms for internal sharing of practical experience as a supplement to training and courses containing theoretical knowledge.

The findings also indicate that in order for the plants to internalize XPS, *the structure of communication within the plant* is an important influencing factor. In order to encourage cross-functional, internal communication, the establishment of interdisciplinary teams should be promoted. Especially, establishing a standardized, cross-functional team to support the XPS implementation should be prioritized, linking the HR function with XPS.

Furthermore, a barrier identified in this study towards *inter-unit* knowledge sharing, is the lack of knowledge as to who holds title to the XPS-related responsibility within the different plants. Consequently, not only standardizing a cross-functional XPS team, but standardizing *all important* XPS related positions will facilitate XPS related knowledge sharing between the equivalent positions across the different plants.

This study also addresses challenges caused by the institutional profile related to the location of the plants within different countries. If the headquarters fail to accommodate a plant's institutional profile, this may lead to a *distant relationship between the headquarters and the*

*plant in question*. Further, a distant relationship may lead to a stronger resistance towards change, which if left unattended, can arise to the ‘not invented here’ syndrome. As the implementation of XPS may be viewed by some plants as a system imposed by the headquarters, this form of resistance can become a strong barrier to the implementation of XPS. In order to prevent this type of situation, it is therefore important for corporate managers to focus on creating a common company identity through promoting shared values and promoting XPS as a common language.

Further, in order to promote inter-unit sharing of XPS-related knowledge, physical and virtual forums should be established where XPS representatives can engage in sharing of knowledge and practical experiences. This will help relieve prospective intermediaries (such as a knowledge center) of this task, increasing the efficiency of the sharing of ideas and experiences.

Also, the *perceived importance attached to knowledge sharing* by headquarters was found to influence the level of XPS related sharing. Consequently, in order for the XPS representatives to engage in knowledge sharing and use the suggested forums, it is important that corporate managers communicate the importance of knowledge-sharing towards the plants, and draw attention to this as an area of priority.

### **6.7. Theoretical implications**

This study uses three theoretical perspectives in order to investigate the *implementation* of XPS in MNC subsidiaries, and two additional perspectives to investigate the *sharing* of XPS related knowledge between MNC subsidiaries. This provides an opportunity to compare and discuss the contribution and applicability of each theory.

As indicated in Section 6.4, the explanation for the difference in level of XPS implementation at the investigated plants appears to be a complex interaction of different factors revealed through the theoretical perspectives. Many of the applied theories have an explanatory power by themselves, but a more complete understanding of the investigated phenomena can be reached by using the perspectives in combination.

This section will first discuss the contribution and limitations of each of the applied theories. Next, the pattern of interaction between the different theoretical perspectives will be investigated. Finally, a model explaining the application of, and interaction between, each applied theory will be proposed.

#### **6.7.1 Contribution and limitations of the applied theories**

##### ***Absorptive capacity theory***

Absorptive capacity theory has proven to be useful in identifying major challenges and success factors at the investigated plants. As discussed, *organizational inertia* was a huge barrier to implementation at Elkem Iceland in the early stages of implementation. Absorptive capacity theory designates organizational inertia as a barrier to implementation, but does not give an explanation as to *why* the resistance to change was so high in Iceland.

A main element of the absorptive capacity of a unit is *the intensity of effort* in knowledge acquisition. This has proven to be a major success factor at Elkem Salten, as the plant manager has been very eager to request the EBS center's help. This has resulted in a high frequency of visits from the EBS center, helping the plant with the EBS implementation. While the absorptive capacity theory states that intensity of effort in knowledge acquisition reflects the unit's absorptive capacity, it does not seek to find what drives the motivation for knowledge acquisition.

### ***Change management***

Change management can partly explain *why* organizational inertia was present at Iceland, as the top management showed significant resistance towards the implementation of EBS, and thereby *a lack of support* of the implementation process.

More importantly, change management is also a key perspective in explaining *how* organizational inertia was overcome. The negative trend at Elkem Iceland was not turned until a new, committed plant manager was employed. Based on the findings from both plants, the *support from top management* seems to be one of the most essential success factors for EBS implementation.

Also, change management give an explanation to why there is still a 'gray mass' of employees at both plants that are not motivated for EBS. The *lack of communication of goals and results* related to EBS was found to be an essential barrier to reaching an adequate understanding of, and motivation for, EBS at the plants.

### ***Institutional theory***

Institutional theory has proven to be very useful in explaining *why* subsidiaries react in certain ways in a situation where the parent company is transferring, or actually imposing, organizational practices on the subsidiary. The strong resistance to change at Elkem Salten can be explained by the existence of a 'not invented here' syndrome. Because the plant had a *low level of identity with the parent company*, the practices were viewed as something coming from the outside, increasing the resistance to adopt the practices.

The institutional theory can also explain the many set-backs in the implementation process at Elkem Iceland. The combination of an *unfavorable institutional profile* of the host country, a *high dependency* on the parent company, and a *low level of trust and identity* with the parent caused the plant to implement the practices without understanding the meaning behind them.

Of the investigated theories, institutional theory is the only one which looks at the *combined effect* of influencing factors. This gives a high explanatory power of how new practices are implemented at subsidiaries. However, the theory says nothing as to *how* the relationship towards the parent company can be improved, for instance.

### ***Corporate socialization theory***

Corporate socialization theory provides many suggestions as to *how* companies can facilitate the sharing of knowledge between subsidiaries. The empirical findings suggest that the use of corporate socialization mechanisms in Elkem has indeed led to the creation of interpersonal

links in the company, and also more sharing of knowledge. However, because the committees and inter-unit trips are not directly directed at EBS, the shared knowledge is mere production knowledge and not EBS knowledge.

From the findings of the study it became evident that the *lack of interpersonal ties* between the EBS coaches and the *absence of forums* directed at EBS sharing were major barriers to the sharing of EBS knowledge between the plants. This is in line with the corporate socialization theory, which states that these are important influencing factors for knowledge sharing. However, the theory does not explain why some subsidiaries are reluctant to share knowledge in the first place.

### ***Agency theory***

Agency theory is useful for explaining the underlying causes as to *why* the sharing of knowledge between the plants has been so limited. As suggested by the theory, subsidiaries may be reluctant to share knowledge in fear of *losing a position of superiority*. This has been shown to be the case in the history of Elkem, where the plants have been in danger of being partly shut down in times of recession. Therefore, it has not been in the plants' self-interest to share knowledge with other plants, even though this would benefit the company as a whole.

The relationship between the subsidiaries and the parent company can indeed be categorized as a principal-agent relationship. The theory gives clear directions as to how the behavior of the agent (subsidiary) can be controlled or monitored. However, the use of behavioral control mechanisms has been found to be very limited in Elkem. This is in spite of the finding that *perceived importance* of knowledge sharing has a significant influence on the knowledge outflow from Elkem Salten.

### **6.7.2 Pattern of interaction between the employed theoretical perspectives**

The empirical findings of this study prove that both absorptive capacity, change management, and institutional theory can explain important aspects of XPS implementation in MNC subsidiaries. Also, corporate socialization and agency theory were partly able to explain the limited sharing of EBS related knowledge. However, it appears that none of the perspectives are capable of explaining any of the two investigated phenomena alone; a more holistic understanding appears to be reached when using the perspectives in combination.

### ***Interaction between perspectives explaining the implementation of XPS***

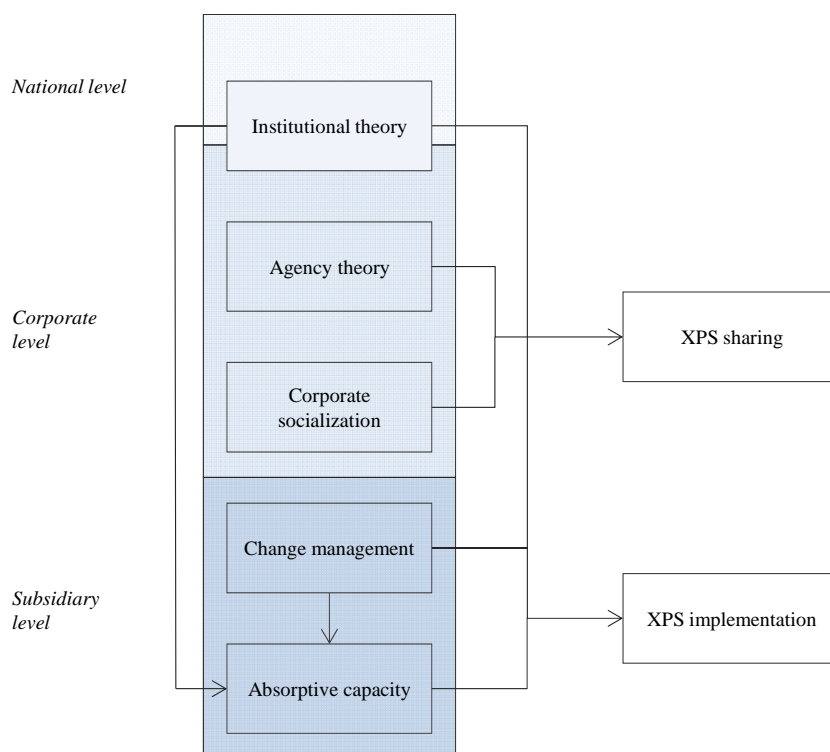
It is possible to see a pattern in how the different theoretical perspectives have interacted with each other in order to produce a holistic explanation. Both change management and institutional theory seem to contribute to a greater understanding of the absorptive capacity of a subsidiary. The main elements of absorptive capacity are *ability* and *motivation* for absorbing new knowledge. Change management is directed at managing change processes, where an important part is managing the *resistance to change* within the organization. The resistance to change can be directly connected to the motivation for absorbing new knowledge; if there is a resistance to change within the organization, the employees will have a low motivation for absorbing new knowledge. Thus, change management gives directions as to *how* the motivational aspect of the absorptive capacity can be increased. Institutional



theory explains the *underlying causes* to this resistance to change, or the low motivation for absorbing new knowledge. Both the absorptive capacity theory and change management investigate aspects of the implementation process on a *subsidiary level*. The institutional theory, however, explain the implementation of practices by drawing on factors from both the *corporate level* (relational context) and the *national level* (institutional context).

### ***Interaction between perspectives explaining the sharing of XPS***

From the empirical findings it became evident that both the corporate socialization theory and agency theory can give useful explanations as to *why* the sharing between plants in Elkem is so limited, and also *how* the sharing can be increased. However, while the corporate socialization theory explain the limited sharing by the lack of lateral mechanisms or lack of personal ties between units, the agency theory is based on the assumption that units are reluctant to share knowledge with other units. Thus, corporate socialization theory suggests that the development of interpersonal networks and the existence of forums will automatically lead to more knowledge sharing. Agency theory, on the other hand, indicates that for subsidiaries to share knowledge they have to be monitored or somewhat controlled by the headquarters. Both of the theories investigate factors influencing the knowledge sharing on a *corporate level*. Based on the above findings, a model is proposed. The model shows how the different theories interact, what phenomenon they explore (XPS implementation or XPS sharing), and on what level they explain the topic of investigation



**Figure 11: Interaction between the applied theoretical perspectives.**

### 6.8 Contribution to the theory on XPS implementation in MNCs

This study can provide *two main contributions* to the theoretical field of XPS implementation in multinational companies.

- 1) The study's propositions build on existing theory on 'procedural knowledge transfer in MNCs'. Four of the thirteen developed propositions were supported in the study, and are thus believed to be generalizable to MNCs other than the case company. This also gives a strong indication that there is indeed a link between the theoretical fields of procedural knowledge transfer and XPS implementation and sharing in MNCs. The set of propositions is based on an extensive review of the literature on this related field, and is therefore considered to be a useful framework for future research on XPS implementation and sharing in MNCs.
- 2) The propositions are based on five theoretical perspectives. The findings of this study reveal that none of these perspectives are able to explain implementation or sharing of XPS in multinational companies by themselves. However, this study proposes a theoretical model which explains how the different theoretical perspectives interact.

### 6.9 Limitations of the study and directions for future research

The main limitation of this study is the fact that it is based on a single comparative case study of two subsidiaries within the same MNC. Even though a replication between the two cases justified that four of the propositions could be generalized, a stronger generalizability could be claimed if more cases were included in the study. Future research should therefore use the same set of propositions in order to strengthen the findings, and in order to confirm the propositions not supported according to the criteria used in this study

Another limitation is that the study is based on the assumption that an increased *sharing* of XPS related knowledge between units will level out the variation in XPS implementation between MNC subsidiaries. The case study's findings indicate that there is a connection between *limited* XPS related knowledge sharing and a high variation in XPS implementation between subsidiaries. However, the causal link between increased sharing and a lower variation in XPS implementation was not empirically tested in this study, and the topic has not received much attention in previous research. Future research should therefore investigate the causal link between XPS related knowledge sharing and variation in level of XPS implementation between MNC subsidiaries.

The factors which were included in the theoretical propositions, proved not to be the only factors influencing the sharing of XPS related knowledge in the investigated case company. Thus, the set of propositions does not cover all potential influencing factors. The main empirical finding, which was not covered by the investigated theory, is the fact that the EBS center constitutes a bottleneck in the sharing of EBS related knowledge between the plants. Other MNCs with company-specific production systems tend to have the same organization as Elkem, with a knowledge center acting as an intermediary in the sharing between subsidiaries (Netland, 2011). An interesting topic for future research would therefore be to

investigate the role of such a knowledge center, related to XPS knowledge sharing between subsidiaries. The question of inquiry could be to what extent the knowledge center should interfere in the sharing of XPS related knowledge, and to what extent the knowledge sharing should go directly between the subsidiaries.

## 7. Conclusion

This thesis addresses the topic of XPS implementation in multinational companies. The thesis has been conducted in the form of a case study of the multinational materials producer Elkem, a pioneer within XPS in Norway. The aim of this study has been to identify the underlying factors causing a variation in XPS implementation between the two investigated subsidiaries. The research approach when investigating this issue has been to first explore what factors that have influenced the XPS *implementation* in the investigated subsidiaries. Second, influencing factors on the XPS *knowledge sharing* between the investigated subsidiaries have subsequently been explored. Three main findings can be drawn from this study:

- 1) A link can be drawn between factors identified in the literature as influencing the *transfer of procedural knowledge in MNCs*, and factors influencing the *implementation and sharing of XPS*. Factors within the five theoretical perspectives of absorptive capacity theory, change management, institutional theory, corporate socialization theory and agency theory find support in this case study. These factors are categorized according to three levels of analysis: subsidiary, corporate and national level. The total number of influencing factors at each level is summarized in Figure 8. Further, both organizational factors and external factors can be said to have an influence on the success of XPS implementation in the investigated MNC subsidiaries, thus supporting the *contingency perspective*.
- 2) From the basis of identified factors influencing the implementation and sharing of XPS, nine factors are identified as having had a strong influence on the variation in XPS implementation between the investigated subsidiaries. Five of these factors have been essential for explaining why the level of XPS implementation varies between the plants. The remaining four factors have been identified as the most influencing factors on the XPS knowledge sharing between the subsidiaries. All nine factors are summarized below. Further, the case study's findings give strong indications of a link between the level of inter-unit XPS related knowledge sharing, and the variation in XPS implementation between MNC subsidiaries.

Implementation of XPS	<ul style="list-style-type: none"> <li>• Organizational inertia</li> <li>• Top management support</li> <li>• Prior related knowledge</li> <li>• Effort of knowledge acquisition</li> <li>• Cross-functional communication</li> </ul>
Sharing of XPS	<ul style="list-style-type: none"> <li>• Standardization of XPS implementation</li> <li>• XPS knowledge center acting as an intermediary</li> <li>• Use of corporate socialization mechanisms</li> <li>• Perceived importance of knowledge sharing</li> </ul>

- 3) Moreover, we find that no set of factors within a single theory can explain the difference in XPS implementation alone. Rather, a holistic perspective must be applied, as the

factors within the different fields of theory intertwine and influence each other. Therefore, a holistic model (Figure 9) describing the variation in the XPS implementation of the investigated subsidiaries is proposed. Further, as a result of this finding, a theoretical model is proposed (Figure 10), explaining how the different *theoretical perspectives* interact, what phenomenon they explore (XPS implementation or XPS sharing), and on what level they explain the phenomenon.

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**Table of Appendix**

**APPENDIX A: MANAGERIAL IMPLICATIONS FOR THE CASE COMPANY .....97**  
**APPENDIX B: CASE STUDY PROTOCOL ..... 104**  
**APPENDIX C: FINDINGS FROM DOCUMENTATION ..... 113**  
**APPENDIX D: RESULTS ON EBS AUDITS OF THE INVESTIGATED PLANTS 2012..... 117**  
**APPENDIX E: PERFORMANCE INDICATORS AFTER EBS WAS INTRODUCED IN ELKEM..... 118**  
**APPENDIX F: OVERVIEW OF THE CITED EBS TOOLS AND METHODOLOGIES.....106**

## **Appendix A: Managerial implications for the case company**

The implications discussed in this section are directed towards three ‘levels’ within the case company: the local plant managers, the EBS center, and managers of the parent company. Some of the suggestions in this chapter have been commented on during interviews, or coincide with suggestions proposed by the interviewees themselves. Thus, selected citations from the empirical findings will be repeated to display the employees’ own opinions related to these suggestions.

### ***Implications for the local plant management of the investigated plants***

The case discussion pointed to areas of improvement for Elkem Iceland in order to advance the level of the plant’s EBS implementation compared to Elkem Salten. However, some of these areas hold an improvement potential for *both* plants. Consequently, we propose two areas for improvement for Elkem Iceland, of which the last area also concerns Elkem Salten. Within each area we propose a set of actions to help reach the target.

The two proposed improvement areas are:

- a) Formalize the structure of communication
- b) Increase motivation for EBS among the operators

#### *A: Formalize the structure of communication*

The discussion points to the lack of a formalized communication structure at Elkem Iceland as an important area of improvement. In order to formalize internal communication, a number of measures which has proven successful at Salten can be applied.

Firstly, a *cross-departmental HR team* should be established. This will assemble positions (e.g. the EHS manager and the HR manager) that relate to EBS, which at Salten has proven to strengthen the communication between managerial functions.

*“(...) it is a great strength, a great strength. In a way...you become more powerful in decision-making processes too. I mean, of all those that can make decisions here, it’s almost just the plant manager who isn’t part of the HR team. And now, quite often, decisions that have to be made are handed over to the HR team”* [Terje Aanesen, HR Manager, Salten]

This is also a measure that Iceland’s local EBS coach is positive towards.

*“(...) how I see EBS is that it comes into HR, quality and EHS, so this proves we should of course contact each other more or, you know, help each other out more than we do today, definitely.”* [Unnur Sigurjónsdóttir, Local EBS coach]

Second, the plant should establish an *EBS team* consisting of a small panel of team leaders and operators in addition to the local EBS coach. This team will function as a support group for the local EBS coach, providing feedback and suggestions from the operating levels concerning EBS-related activity. Further, *establishing an improvement room* will help visualize the on-going improvement projects, and create a common meeting place for the improvement teams. In this way, members of the plant management may also be continually

updated. According to the local EBS coach at Salten, the successful implementation of such a room at both Elkem Solar and at Salten should result in the transfer of this idea to other plants:

*“I have high hopes, or I would expect that those who sit with the power here in Elkem can copy this to the other plants. And I don’t know if they have done that, but they absolutely should.”* [Rune Skau, EBS coach]

Finally, a *formal EBS-related meeting schedule* should be set up, where the HR team, the EBS team, as well as the improvement teams have regular, designated meetings at the improvement room.

*B: Increase motivation for EBS among operators (Capturing the ‘grey mass’)*

An important area of improvement concerning both plants is increasing the motivation and employee involvement at the operating levels. As pointed to in the case discussion, the focus should be on capturing the ‘middle segment’ or ‘gray mass’ which is the proportion of workers that are neither very motivated nor very resistant towards internalizing EBS.

In order to increase both involvement and motivation, the *communication of targets and promotion of a common understanding of direction* holds improvement potential at both plants. At Iceland, this concerns communication of on-going projects and their following results towards *all* employees. At Salten, this mainly concerns those employees that are not a member of improvement teams. At Iceland, establishing an improvement room *with all the on-going A3s* will help visualize the on-going projects. Further, *quantifying the savings of the improvement projects* and *creating a visual follow-up sheet* resembling that used at Salten, will help communicate the results of improvement projects. This was also found to increase motivation at Salten.

*“I feel that those who participate in the improvement projects are motivated. When they see the results; that a group can, with the job they do, save for instance 1.5 million or 3 million. Then you see that people become motivated and think their work is fun.”* [Rune Skau, EBS coach]

However, in order to increase motivation and involvement among the employees out on the shifts, there needs to be an increase in EBS-related communication. A possible solution to this is targeting the meetings held in production, such as the morning meetings and the shift meetings. This is something both plants, independent of each other, have thought of.

*“We want to structure the shift meetings and give them a clear and visible content, where EBS, especially the improvements, has an active part in each meeting.”* [Rune Skau, EBS coach]

*“My issue with morning meetings should be that there is more of a discussion. The numbers are up there, there’s no sense in reading them. But I rather have more discussions on improvements that aren’t there. I think this is where we could get a lot more information out*

*to the teams and not just reporting their last production numbers.” [Wayne Faaland, EBS center]*

Another measure proven to be effective in increasing motivation and combating resistance to change is the *creation of short-term, visible results* such as the Kaizen actions performed at Salten. This is something Iceland should learn from, targeting departments where motivation for EBS is known to be low. This may also lead to an increase in involvement:

*“I think that these days it gives a bit credit to join the improvement teams. Eventually, when the results are becoming visible, people see that this is quite fun to work with. When we ran the Kaizen project in the workshop, those who participated could later on say that “We contributed to this result”. And that is for them a good feeling, at least that’s my impression”.* [Rune Skau, EBS coach Salten]

Another measure to increase employee involvement in improvement projects is to use *compensation mechanisms*. At Salten, the small increase in pay for those hours dedicated to improvement work serves as a carrot, but the modest amount helps to avoid that this compensation becomes the main motivation for involvement.

Finally, something that operators at both plants wanted more of, that will help increase motivation and involvement, is more *targeted training*. This means training employees in how to use tools and methodology on the plant, in common everyday situations. In fact, one of the main barriers to EBS internalization mentioned by operators at Iceland, was the difficulty in applying the tools and methodology learned through courses in their everyday situations.

### ***Implications for the EBS center***

The main implications for the EBS center concern helping the plants to become more independent in exchanging EBS-related knowledge, and thereby increasing the amount of EBS-related knowledge sharing within Elkem. In order to achieve this target, three suggestions are made:

- Develop intranet for virtual knowledge sharing
- Bring local EBS coaches when performing audits at other plants
- Create forums for physical knowledge sharing

In order to help promote sharing of EBS-related experiences, the EBS center should develop the new version of the company intranet to also constitute a virtual meeting place for local EBS coaches. However, this virtual forum will have to be designed to be as functional as possible in order for the local EBS coaches to use of their time to utilize it. The communication must be both-way, and the establishment of closer ties between the local EBS coaches is a prerequisite. The EBS center should therefore continue the practice of bringing along local EBS coaches when performing EBS audits at other plants. Empirical evidence suggests that this type of trips was considered very valuable by the local EBS coaches.

Another recommendation is to establish ‘physical’ forums for EBS-related knowledge sharing. Today, there are forums for the specialist fields, management meetings, division and plant manager meetings, and meetings for process engineers. Also, regular EHS forums exist within the foundry division. Consequently, establishing an EBS forum should be the next priority. However, the form and purpose of such a forum is of utmost importance in order to make contributed time and resources well-spent. This issue is well-said by Løkaas, one of the divisional EBS coaches:

*“It is a bit difficult to formalize such a process. “Let’s meet, let’s share experiences, what experiences shall we share today?” It becomes a bit forced.”* [Magne Løkaas, EBS center]

The forum should primarily be aimed at gathering the local EBS coaches, but could also include members of the HR team at each plant. The meetings would have to be on an annual or twice-annual basis, and have specific topics with concrete problems related to the EBS implementation at each plant. Several of the employees at both plants expressed opinions as to the content of such a forum:

*Because, again, EBS is not like so many, it’s a philosophy, a culture. To sit down and discuss culture, it’s very nice, I would probably enjoy it quite a lot. But would I benefit from it, apart from meeting the guys discussing something else? I don’t think so. And because it’s not that specific, discussing different tools, specific tools, maybe if we have some kind of a problem, some kind of improvement potential. But not to discuss EBS in general, I don’t believe in that.”* [Einar Thorsteinsson, Plant Manager Iceland]

*“I wish that we could have a forum in Elkem where the people involved in improvement work could meet once or twice a year to exchange experiences. (...) I feel the need for an environment where the improvement people from the different plants meet. We don’t have enough knowledge about each other.”* Rune Skau, EBS coach]

*“If we were able to make it into something concrete, that the meeting had an agenda, an intention. And that some learning objectives or points of improvement were developed. And if we don’t achieve that, there is no point in continuing. But if we see some improvement as a result of such meetings, new ideas and thoughts and so on, it would absolutely justify it.”* [Terje Aanesen, HR Manager]

The empirical evidence revealed that the divisional EBS coach within foundry, Wayne Faaland, is working on developing this type of forum, following the same structure as the monthly EHS meetings within foundry. This should however be implemented within all of Elkem’s divisions. The experience with the EHS forum implies that a similar EBS forum will contribute to increasing the use of EBS at the plants.

*“We started this up in January and it was surprising to hear the feedback from the safety managers saying that “That was a good idea” and “We haven’t thought about that”. And then again, it’s not that difficult. It’s just that sometimes you get too hung up in what you’re doing and you can’t open your eyes for new ideas. So just bringing in five new ideas for fall protection or 5S and stuff like that, we learn a lot from that. And I know that people already*

*asked the safety managers to send them more information and they said that they'll implement some of these things.*" [Wayne Faaland, EBS center]

The want for increased knowledge sharing is strong within the investigated plants. A selection of citations expressing this need is therefore left to conclude this section.

*"I think this is something that we should use more in Elkem (...) to share competence between the plants.* [Unnur Sigurjónsdóttir, Local EBS coach]

*"I want to be able to go out and see other plants, see how they are doing it, because it's really a shame if there are good ideas out there, especially in the same corporation, it's sad if it is not shared."* [Hannes Ingolfsson, Team leader]

*"I think it would have been nice to meet people and discuss. I think that would have been a good idea. Of course, we have Oddgeir and Magne who are here from time to time to help us, and we can discuss matters with them. But without doubt, gathering people from different plants to discuss would not be a bad idea."* [Trond Steensen, Team leader]

*" (...) we see that in many cases we struggle with the same problems. And maybe someone else has found a solution, and why on earth should we keep struggling if we can just copy it?"* [Trond Steensen, Team Leader]

### ***Implications for managers of the parent company***

The last section concerns implications for the managers of the parent company, more specifically the headquarters of Elkem. The main focus of the headquarters related to EBS, should be to provide directions and resources for the plants to standardize positions across the plants. This will help facilitate knowledge-sharing within the plants, and increase efficiency of the EBS implementation process. Further, the findings at Iceland show that there is a need to create a stronger corporate culture, and to promote Elkem as a *multinational* and *multicultural* company.

The main suggestions to the headquarters of Elkem can therefore be summed up as:

- Standardize positions related to EBS across the plants
- Create a stronger corporate culture

Evidence suggests that an important barrier towards EBS-related knowledge sharing between Elkem plants is the lack of standardized positions across the plants. In order to better connect the positions and build stronger ties between the plants, positions such as that of the local EBS coach and the previously mentioned HR team should be standardized across the plants. Also, connecting positions such as team leaders at different plants will secure the exchange of *relevant* knowledge.

One important barrier to EBS implementation at Elkem Iceland was the low identity with the parent company, as the empirical findings suggest that this increased the resistance to implement EBS. The low identity seems especially attributable to two factors; the fact that the headquarters are perceived to have a low understanding of the existence of other cultures,

and the plant's limited knowledge of company values. In fact, the employees at Elkem Iceland view Elkem mainly as a *Norwegian* company, and not an international company. The findings suggest that this is partly due to the abundance of documents distributed only in Norwegian, and also the usage of the Norwegian language in international meetings. Elkem should therefore *translate all important documents* to English, and *consistently use the official language*, English, in international meetings.

In order to create a stronger corporate culture, it is important that employees at all Elkem plants know and can relate to the company values. Therefore, *the values of Elkem should be better communicated* to the plants. This seems to be particularly important in the case of foreign subsidiaries, as the findings suggest that cultural differences make it harder for them to identify with the parent company.

Implications for	Aim	Action
Local plant management	Formalize the structure of communication	Standardize the HR function
		Establish EBS team
		Establish improvement room
		Establish regular meetings
	Increase motivation for EBS among the operators	Increase communication of targets and promote a common understanding of direction
		Plan for and create short-term wins
		Use a compensation system to increase employee participation
		Increase targeted training
EBS center	Facilitate inter-unit sharing of knowledge and experiences related to EBS	Develop intranet for virtual knowledge sharing
		Bring local EBS coaches when performing audits at other plants
		Create forums for physical knowledge sharing
Headquarters of Elkem	Promote stronger ties between (i) the EBS-related positions at the plants (ii) the headquarter and foreign-based subsidiaries	Standardize positions related to EBS across the plants
		Create a stronger corporate culture



## **Appendix B: Case study protocol**

The purpose of this case study protocol is to guide the investigators in carrying out the data collection. First, a short introduction of the study is given, followed by a theoretical framework including the main research that the case study's theoretical propositions build on. Next, a general overview of the data collection procedure is provided, before an outline of the case study report is given. Finally, the interview guide is described, including the questions for the conducted focused interviews.

### **Short introduction of the study**

This case study is written as the concluding part of a master's degree in Industrial Economics and Technology Management at NTNU. The study is conducted in collaboration with the materials producer Elkem, in particular the center of *Elkem Business System (EBS)*, and with guidance from the institute.

The aim of the study is to achieve a greater understanding of why the level of success with implementing XPS varies between subsidiaries within the same MNC. By taking a contingency perspective, this study investigates what factors influence the level of XPS implementation in MNCs. Also, the study identifies what factors influencing the XPS related knowledge sharing between subsidiaries, as inter-unit sharing is believed to explain some of the variation in XPS implementation success.

In order to investigate the question of inquiry, a comparative case study is conducted between two subsidiaries of Elkem. While one of the investigated plants appears to have achieved a high level of success with implementing EBS, the other has struggled with the implementation. The following research questions are proposed:

RQ1: Why has the implementation of XPS varied between the investigated subsidiaries?

RQ1.1: What factors influence the XPS implementation in MNC subsidiaries?

RQ1.2: What influences XPS knowledge sharing between MNC subsidiaries?

Based on the case study's findings, both managerial and theoretical implications will be discussed. The next page will present a theoretical framework, which describes the *main* research that this case study is based on.

Theoretical perspective	Potential Influencing factor(s)	Reasoning	Authors
Absorptive Capacity	Prior related knowledge, Intensity of effort, Cross functional communication, Use of HR practices, Use of gatekeepers, Organizational inertia,	<i>Absorptive capacity</i> of the receiving unit is identified as one of the most referred determinants of knowledge transfer (e.g. Lee & Wu, 2010; Szulanski, 1996, Gupta & Govindarajan, 2000). Subsidiaries differ in their absorptive capacity, and this affects the level of internal knowledge transfer.	Cohen & Levinthal (1990); Kim (2001); Minbaeva et al. (2003);Daghfous (2004); Minbaeva (2005)
Change Management	Prior change history, Top-and middle management support, Creating clear targets and a common understanding of direction, Planning for and creating short-term wins, Employee involvement	The implementation of XPS in subsidiaries can be a dramatic change in the organization, as it is often followed by changes in the organizational structure, replacement of managers, or adjustments to new routines. Also, an important ingredient in most company specific production systems is continuous improvement. This can be interpreted as small incremental changes that are conducted on an on-going basis.	Womack et al (1990); Schaffer & Thomson (1992); Kaye & Anderson (1999); Upton (1996); Beer & Nohria (2001);Bateman (2005); Kotter (2007)Walker et al., (2007); Brown & Cregan (2008)
Institutional theory	Institutional profile of host country, Relational context between subsidiary and parent company	The characteristics of a subsidiary's host country have been found to have an influence on knowledge implementation. Also, the relationship between the subsidiary and the headquarters is another important aspect of knowledge implementation identified through the literature review. Subsidiaries that identify with the parent company will easier understand the importance and value of new practices, and therefore implement them more easily.	Kostova & Roth, 2002; Szulanski, 1996
Corporate Socialization	Use of corporate socialization mechanisms, Use of IT, Existence of inter-unit links	Many studies in the conducted literature review emphasized the existence of close interpersonal networks in the organization as being an important factor for knowledge sharing (e.g. Ciabuschi et al., 2011; Minbaeva, 2007; Tsai, 2001). The importance of such networks for knowledge sharing is explained by <i>corporate socialization theory</i> .	Bolsani & Scarso, 1996; Tsai, 2001; Björkman et al., 2004
Agency theory	Motivational disposition at the sending unit, Perceived importance of knowledge sharing	The motivation of the sender to share knowledge was emphasized in the reviewed literature. <i>Agency theory</i> can therefore be used to explain the subsidiaries' reluctance to share knowledge with other units in the MNC.	Szulanski, 1996; Gupta & Govindarajan, 2000; Szulanski et al., 2003; Björkman et al., 2004;

## Field Procedures

The following section describes the sites to be visited, including contact persons, the data collection plan, the prior preparations for the researchers, and the interview schedule including employees to be interviewed.

Site to be visited	Contact person
Elkem Iceland Grundartangi Skilmannahreppur IS-301 Akranes, Iceland  Tel: + 354 43 20 200 E-mail: elkem@elkem.is Plant Manager: Einar Thorsteinsson	Unnur Sigurjónsdóttir  Tel: +354 86 06 163 E-mail: unnur.sigurjonsdottir@elkem.com Position: Local EBS coach

Site to be visited	Contact person
Elkem Salten NO-8226 Straumen, Norway  Tel + 47 75 69 81 00  Plant Manager: Arve Ulriksen	Rune Skau  Tel: +47 90 03 15 68 E-mail: rune.skau@elkem.no Position: Local EBS coach

## Data Collection Plan

- 1) Approximately one week to visit each plant
- 2) Conduct 8 focused with employees from different levels in the plant.
- 3) Direct observation of production facilities and procedures
- 4) Collect other documentation that will increase the understanding of the visited plant

## Preparations for the researchers

- 1) Establish contact persons for each site and date for site visits
- 2) Schedule interviews with site personnel to be held during site visits
- 3) Get an understanding of the theoretical framework to be used, Elkem Business System, and the Elkem plants in Iceland and Salten
- 4) Develop interview questions
- 5) Arrange for available equipment to be available for the interviews

**Agenda for case study investigation**

Plant: Elkem Iceland

Date: 27. February - 01. March 2012

<b>Monday</b>		<b>Activity</b>	<b>Who*</b>	<b>Where</b>
13:30	14:00	Arriving at plant	Silje, Ingrid, Wayne	
14:00	14:15	<b>Presentation of agenda by students-</b> Background for the study, main objectives	Key personnel	Hekla
14:15	15:00	<b>Guided tour at the plant-</b> Direct observations	Unnur	All main processes and facilities
<b>Tuesday</b>				
07:00	08:00	<b>Morning meeting-</b> direct observations	Unnur Sigurjonsdottir (EBS-coach)	Main Entrance
08:30	10:30	<b>Interview</b>	Einar Thorsteinsson (Plant Manager)	Víti
11:00	12:00	LUNCH		
12:00	13:30	<b>Interview</b>	Unnur Sigurjonsdottir (EBS-coach)	Víti
13:30	15:00	Individual work with materials	-	Víti
<b>Wednesday</b>				
08:15	09:15	<b>Interview</b>	Thordur Magnusson (Production Manager)	Hekla
09:30	10:15	<b>Interview</b>	Sigrun Palsdottir (HR- Manager)	Hekla
11:00	12:00	LUNCH		
12:00	13:00	<b>Interview</b>	Wayne Faaland (EBS coach)	Hekla
13:30	14:30	<b>Interview</b>	Jon Atli Kjartansson (Team leader)	Hekla
<b>Thursday</b>				
08:15	09:15	<b>Interview</b>	Hannes Ingolfsson (Team leader)	Laki
09:30	10:30	<b>Interview</b>	Operator (maintenance)	Laki
10:30	11:30	<b>Interview</b>	Operator (production)	Laki
11:00	12:00	LUNCH		
12:00	12:30	Gathering of documents and other information	Unnur Sigurjonsdottir (EBS-coach)	Laki

Plant: Elkem Salten

Date: 13.March - 15. March 2012

Tuesday		Activity	Who*	Where
12.00	12.30	Arriving at plant	Silje and Ingrid	Meeting room Canteen
12.30	12.45	<b>Presentation of agenda by students-</b> Background for the study, main objectives	Key personnel	Meeting room Canteen
13.15	14.45	<b>Guided tour at the plant-</b> Direct observations	Rune Skau (EBS coach)	All main processes and facilities
Wednesday				
08.30	09.30	<b>Interview</b>	Arve Ulriksen (Plant Manager)	Meeting room Canteen
10.00	11.00	<b>Interview</b>	Lars Jonny Lundeng (Production Manager)	Meeting room Canteen
11:00	12:00	LUNCH		
12:00	13:00	<b>Interview</b>	Trond Steensen (Team leader)	Meeting room Canteen
13:30	14:30	<b>Interview</b>	Terje Aanensen (HR manager)	Meeting room Canteen
Thursday				
08.30	09.30	<b>Interview</b>	Rune Skau (EBS coach)	Meeting room Canteen
10.00	11.00	<b>Interview</b>	Hans E. Vollan (Operator)	Meeting room Canteen
11:00	12:00	LUNCH		
12:00	13:00	<b>Interview</b>	Ulf Pedersen (Team leader)	Meeting room Canteen
13.30	14.30	<b>Interview</b>	Stig Sivertsen (Operator)	Meeting room Canteen

### Outline of the Case study report

1. Introduction
2. Theoretical background
3. Methodology
4. Case presentation
  - a. Presentation of Elkem
  - b. Elkem Business System
  - c. The Elkem plant in Iceland
  - d. The Elkem plant at Salten
5. Empirical findings
6. Discussion of empirical findings
7. Conclusion

## Interview guide

The interviews will be open-ended and assume a conversational manner, but will follow a set of questions derived from this case study protocol. All the interviews will be recorded on tape, and later transcribed.

### Introduction to the interview

- Background for the study, and what we are investigating.
- The interview will be recorded on tape, but the interviewee has the option to read and accept the transcription before we use it in the master thesis.

Plant Manager - PLM  
Local EBS-coach –EBSC  
Production Manager- PRM  
HR-Manager- HRM  
Team leader- TL  
Operator - O

### Absorptive capacity

*The following questions are concerned with the absorptive capacity of the interviewee. What we want to know is whether the interviewee has a good ability, and a high motivation to receive knowledge.*

(PLM, EBSC, PRM, HRM, TL, O)

### Ability

- What is your educational background? Have you ever studied or worked abroad?
- For how many years have you had your current position in the plant?
- Can you relate the work you do with EBS to any former work experience? In this case, what type of experience (e.g. problem solving activities)?
- What type of formal EBS training have you received? Would you like to have more training?
- Which of the EBS tools do you use in your daily work with EBS?
- Are you in charge of performing any EBS training at the plant? If yes, who do you train? How do you feel your training is received?

### Motivation

- What is your personal opinion on EBS? What do you think are the most important benefits and disadvantages from implementing EBS at this plant?
- What factors do you think complicate the work with EBS in this plant?
- What is your own motivation for working with EBS at this plant?
- How would you assess your own EBS effort? How about compared to other employees at the plant?
- Do you feel that you take part in the decisions on how EBS is to be carried out in this plant?
- How are the goals and results related to EBS communicated and visualized in this plant? Are both short- and long-term goals communicated and visualized?

- g) Do you think that there is still much to gain from continuing the work with EBS in this plant?
- h) What is your impression of the overall motivation among the plant workers for carrying out EBS work? Are there any differences based on e.g. position or among the different operating teams?
- i) Do you notice any variations in the plant's EBS-effort? E.g. depending on time of year, before and after visits from the divisional coach, financial situation of the plant etc.

### Perceived cultural distance

*The following questions are concerned with the cultural differences between the sender and receiver of knowledge. What we want to know is if cultural differences, or the institutional profile of the host country, act as a barrier to knowledge transfer between the sending and receiving unit.*

(PLM, EBSC, PRM, HRM, TL, O)

- a) Do you think that there are any cultural differences between Norway and Iceland? In that case:
  - What are the most significant cultural differences?
  - Have cultural differences led to any complications with understanding or implementing EBS? How, why?

### Relational distance

*The following questions are concerned with the relational context between the sending and receiving unit. The level of dependency, trust, and identification between the units determines the relational context.*

(PLM, EBSC, PRM, HRM, TL, O)

- a) Do you think of your plant as being part of a corporate family? Is there a common "Elkem culture" across the different plants?

(PLM)

- b) To what extent is the plant dependent on the parent company for essential resources such as capital, technology and expertise?
- a) Is the EBS implementation an important criterion when the plant's overall performance is evaluated?
- b) Do you receive any rewards based on the success with implementing EBS?
- c) Is there any type of information you prefer not to share with the EBS-center? What about the headquarter?
- d) Would you feel comfortable with the headquarter having access to the EBS audits of this plant? Why, why not?

### HR-management

*The following questions are concerned with the role of human resource management in relation to EBS implementation. What we want to know is what kind of HR practices are performed at the plant.*

(HRM)

- a) How are local staffing procedures performed? Describe the process potential candidates go through
- b) What types of training-activities aimed at increasing the workers EBS-knowledge are initiated by the HR-department at the plant?
- c) On what basis are promotions given?
- d) In which ways are superior work-performances recognized?
- e) Are any flexible working practices such as flexi-time, job rotation or part-time work practiced at this plant? Why, why not?

### **The use of corporate socialization mechanisms**

*The following questions are concerned with the use of corporate socialization mechanisms. What we want to know is whether the company facilitates inter-unit trips and visits, training involving people from multiple units, and joint problem solving between employees.*

(PRM, TL, O)

- a) Who decides what are the most critical processes to be improved at the plant (the rolling top five)?
- b) How do you decide what cases the A3 methodology should be applied for, and who is developing the A3 sheet?

EBS recently got its own site on the intranet system of Elkem where you can share information on EBS and read about others experiences:

- c) What type of information do you think would be useful to share on this site?

(PLM, EBSC)

- d) Have you ever been visiting other plants to observe how they have implemented EBS?
- e) When you attended the EBS University, did you exchange information and experiences with employees from other plants? Who do you think benefited the most from this information exchange?
- f) Have you received any useful information from employees on how the EBS implementation can be improved at this plant?

EBS recently got its own site on the intranet system of Elkem where you can share information on EBS and read about others experiences:

- g) What type of information do you think would be useful to share on this site?

### **Perceived measures**

*The purpose of the following questions is to find a perceived measure of the senders' ability and motivation to share knowledge.*



(PLM, EBSC, PRM, HRM, TL, O)

- a) What is your opinion on how the EBS training sessions you have received have been carried out?
- How capable would you say the instructor was of performing the EBS training?
  - Has the instructor of this training session managed to make the EBS material easy to understand and use in your daily work?
  - Do you feel that the instructor has been committed to the task of sharing EBS with you?
- b) Who do you go to for help if you have any problems with the EBS implementation?

**Ending of interview**

- Ask for the e-mail address and if we could send some questions if any uncertainties show up at a later point in time.
- Thank the interviewee for his/her time and for sharing useful information with us.

## Appendix C: Findings from Documentation

### Records of EBS activity at the plants

		Elkem Iceland	Elkem Salten
a)	Participation in training activities		
	EBS University	25 %	22 %
	EBS Academy	30 %	0 %
	EBS team leader school	0 %	16 %
b)	Extent of improvement work		
	Improvement teams	Analysis teams: 1 Critical process teams: 6 Improvement teams: -	Analysis teams: 1 Critical process teams: 3 Improvement teams: 10
	Number of improvement projects completed in 2011	-	17
	Total savings due to completed improvement projects in 2011	-	10,25 MNOK
c)	Other		
	Number of EBS Universities hosted by the plant	2	4
	Number of visits paid by the EBS center in 2011	4	13

#### **A: Training activities**

Three types of formal EBS-related training activities are carried out across the plants: EBS University, EBS Academy, and EBS team leader school. A closer description of each activity is given in section 4.2. The participation in each activity is given as the percentage of the plant's current employees who have attended the given activity of the total number of employees currently working at the plant.

The results show that the participation at EBS University is quite even between the plants. However, while the EBS Academy has been held at Iceland and not at Salten, the EBS team leader school has been conducted at Salten and not at Iceland. When asked about the team leader school, the local EBS coach explains that the plan is to arrange such a school. However, the problem lies in translating the training material to Icelandic, a common obstacle to all types of EBS-related training where the training material is in English or Norwegian.

#### **B: Improvement work**

At plant level, there are three different types of EBS-related teams: *analysis teams*, *critical process teams* and *improvement teams*. The analysis team meets quarterly and run advanced statistical analysis based on long term historical data. The critical process teams solve process problems on furnaces through a systematic approach, while the improvement teams run improvement projects according to the plant's Rolling Top Five list.

Both of the studied plants have one analysis team, while Iceland has six critical process teams, compared to Salten's three critical process teams. In terms of improvement teams, Salten has ten formal teams, while Iceland does not have a preset number of teams. In fact,

the way improvement work is carried out at the plants varies a lot between Iceland and Salten.

As a result of a HR project initiated at Salten in 2011, the plant has formalized the structure of the improvement work carried out. Every improvement team reports once a month. This is done at a regular meeting held every Friday between 08:00 and 09:00, where two or three improvement teams report status according to the A3. The HR-manager is responsible for leading the meeting, which is carried out according to specific pre- defined rules:

- No one is allowed to sit during the meeting
- A3 must be in A3-format
- All information must be updated in front of the meeting
- The department sponsor and team leader must at the minimum be present

The team leader presents the status according to the A3 and follow-up points are noted down and followed up at the next debriefing. A yearly plan is made so that every team knows when to show up. Other participants in the meeting are the local EBS coach, the financial manager and the plant manager



Further, the savings made through the improvement projects are quantified in monetary values. A follow-up sheet is used to document the status of the improvement projects.

At Iceland however, there is not a set specific number of improvement teams at the plant which report to the top management. Rather, the improvement work has more of an independent structure, carried out within each department. Consequently, the number of projects carried out each year and the savings due to completed projects are not quantified.

*“Unfortunately, we can’t say how many projects were started or how much was saved, since we do not keep track of that, e.g. We do not keep track of which ones are related to improvements work the teams have worked on.”* [Unnur Sigurjónsdóttir, Local EBS coach]

**C: Other**

Salten has hosted twice as many EBS Universities as Iceland (four EBS Universities at Salten versus two at Iceland). Also, there is a large difference in number of visits paid by the divisional EBS coaches of the EBS center during 2011. At Iceland, the number of visits paid by the divisional EBS coach Wayne Faaland was estimated by the local EBS coach to four visits. At Salten, two of the divisional EBS coaches visited the plant, Magne Løkås and Oddgeir Samseth. Løkås had a length of stay at the plant equal to four weeks, dispersed across ten visits. Samseth had a length of stay equal to one week, dispersed across three visits.

**Elkem Iceland: Results of employee survey**

In October 2011, an employee survey was conducted at Elkem Iceland. The survey was distributed to all employees currently working at the plant, which resulted in a response rate of 96 %. The form of the survey is a set of statements of which employees were asked to tick off the box that best reflected his or her level of agreement. On the basis of the responses, the result of each question is scored on a scale from 1 to 5, reflecting the five response alternatives given (*strongly disagree*, *tend to disagree*, *neither nor*, *agree* and *strongly agree*).

The result of the survey shows that there are three areas in particular which show the lowest score. These are:

Question	Strongly disagree (1)	Tend to disagree (2)	Neither nor (3)	Agree (4)	Strongly agree (5)	Average Score
24: I have a good knowledge of the work of other groups within the company	5 %	12 %	25 %	44 %	15 %	3,53
29: Elkem staff works as a whole	7 %	13 %	26 %	46 %	8 %	3,35
45: I receive adequate information about important events and changes within the company	9 %	12 %	27 %	39 %	12 %	3,34

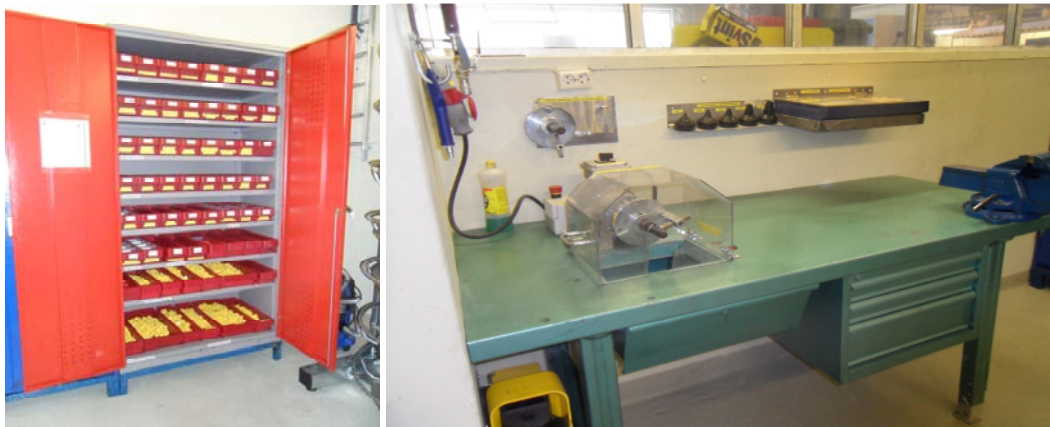
**Results from direct observation at the plants**

At each plant, a guided tour of the plant was carried out. During each tour, pictures were taken of interesting observations, which did not concern restricted intellectual property of the company.

During February and March 2011 a Kaizen action was carried out at Salten. The target for this Kaizen action was the plant's hydraulics room. The state of the hydraulics room was worn-down and the layout was disorganized, with a cluttering of broken and new equipment making the room difficult to clean. The state of the room January 2011:



A committee of employees was set down to carry out the Kaizen action. A target state of the room was defined, followed by a set of tasks defined to reach the target state. These tasks included cleaning out the room, sorting the equipment, and painting the walls. Further, a standard was established, defining the function of the room, as well as which equipment is to be found. During the guided tour at the plant, the investigators were shown the room. The pictures below were taken by the investigators, showing that the results of the Kaizen action performed in the Hydraulics room were still maintained one year after the action. The state of the room March 2012:

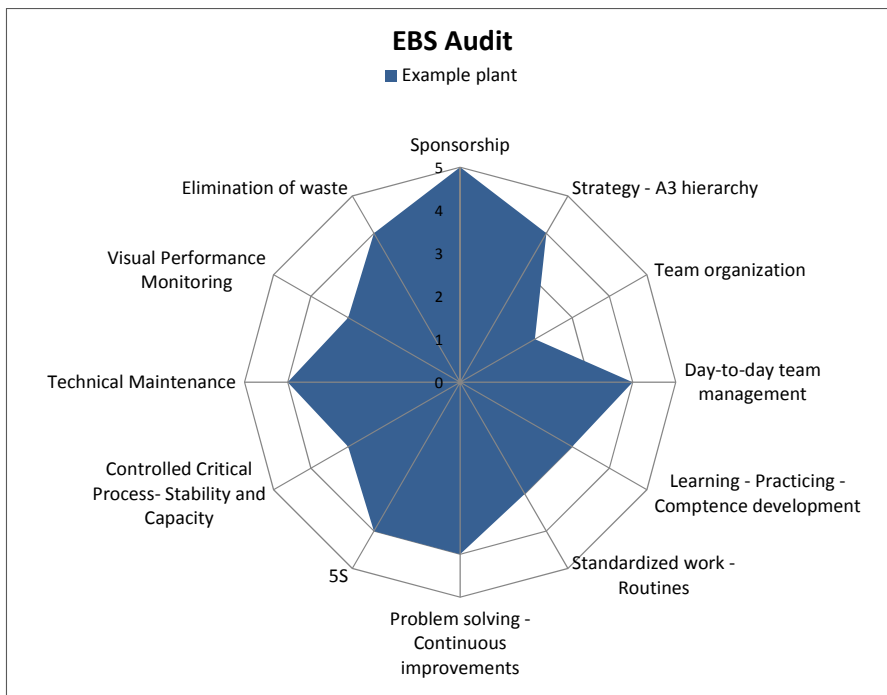
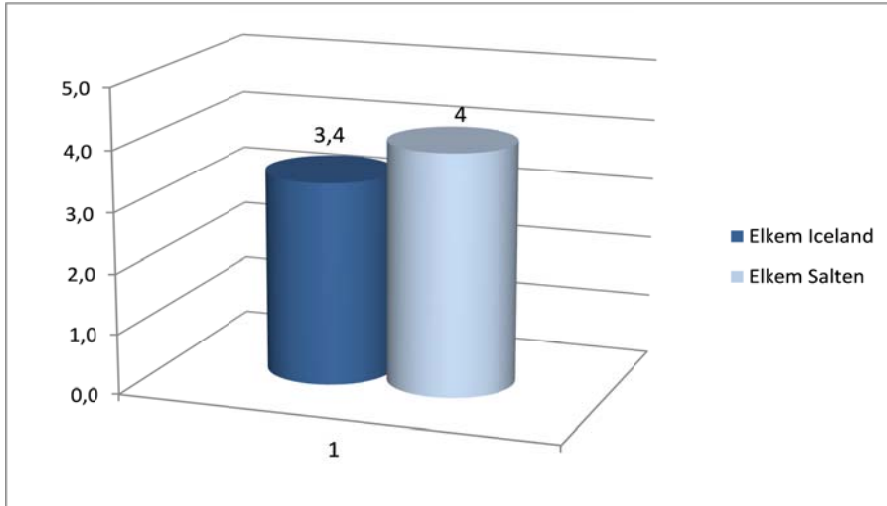


Another interesting direct observation was the appearance of the visitor's cards issued to allow access into the main areas of the plants. At Iceland, this card displayed the former name of the plant, giving little indication that this was an Elkem plant. In comparison, the visitor's card at Salten showed the Elkem logo.



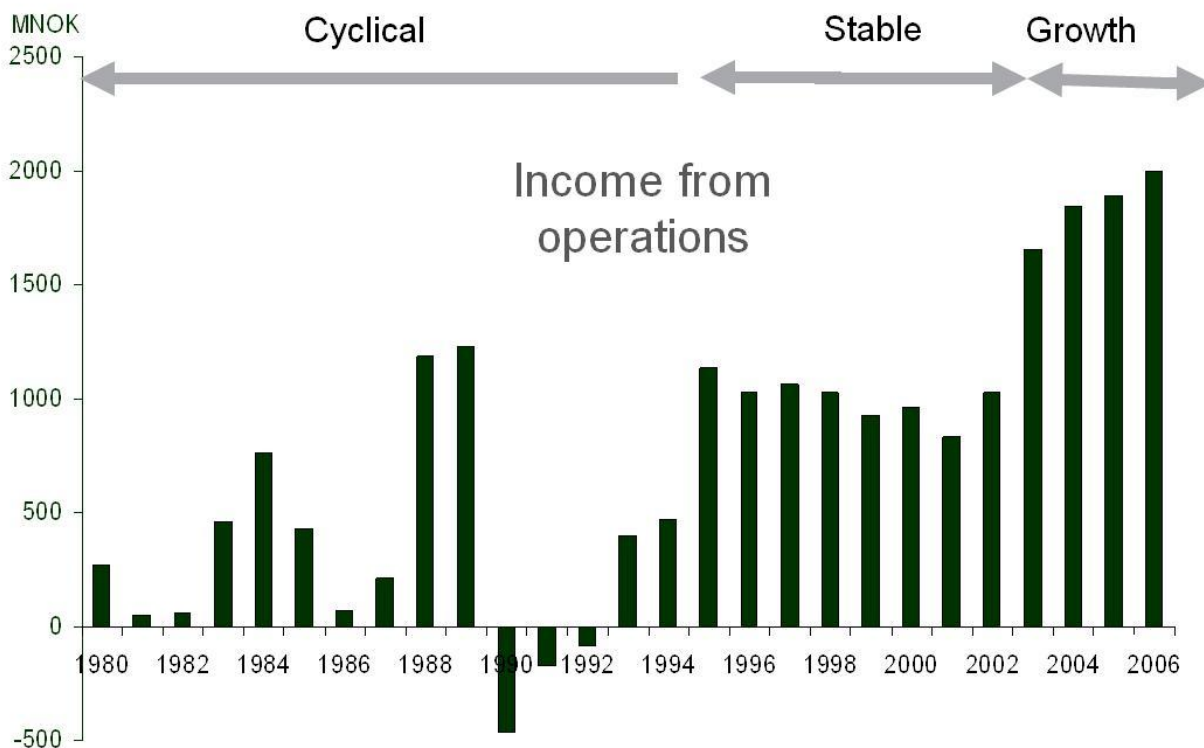
### Appendix D: Results on EBS audits of the investigated plants 2012

The results on the EBS audits held by the EBS center at the investigated plants in 2012 are considered confidential material, and could therefore not be published. However the average score of each plant is showed in the first figure, followed by an illustrative figure of the spider diagram used for measuring the level of EBS implementation (with random scores).



### Appendix E: Performance indicators after EBS was introduced in Elkem

These figures show how the income from operations and the injury rate has developed in the years after EBS was introduced in Elkem.



## Appendix F: Overview of the cited EBS tools and methodology

	Explanation
Rolling Top Five	A management tool to decide the top five prioritized improvement areas at each level in the plant.
5S	5S is a systematic method for creating and maintaining a common standard for order and structure in a workgroup or workplace. The five S stand for: Sort, Structure, Shine, Standardize, Sustain
A3	<p>A3 is a tool used to solve problems and tackle challenges. It is a systematic method for progressing from problems/challenges to implementation and measurement of results.</p> <p>The A3 contains:</p> <ul style="list-style-type: none"> <li>• <b>BC (Business Case):</b> What problems have we identified or what challenges do we face?</li> <li>• <b>Current condition:</b> How do things work today? Why is there a problem or a challenge? Analysis of causes.</li> <li>• <b>Target condition:</b> How is the solution that solves the business case? What should the new process look like?</li> <li>• <b>Action plan:</b> How do we implement the Target Condition? What actions are required, who should do it and when?</li> <li>• <b>Measurement/control:</b> How do we confirm that our solution actually produced the desired results?</li> </ul>
Standardized work (standard practice)	Precise procedures describing how to conduct a work task reducing variations and defining the basis for improvements.
Kaizen	Continuous improvement to create more value with less waste, either focusing on the whole value chain or on an individual process.