



Norwegian University of
Science and Technology

Risk - A Cost to Allocate?

An Empirical Study of Business Practice

Sven Ivar Forland
Varun Upadhyay

Industrial Economics and Technology Management

Submission date: June 2011

Supervisor: Sjur Westgaard, IØT

Co-supervisor: Terje Berg, Handelshøyskolen BI

Problem Description

Research will be conducted as a continuation of the preliminary project conducted autumn 2010. The master thesis will concentrate on evaluating our previous framework for combining risk management and cost allocation, and thereby substantiate and improve or find reasons to reject it. All information from the preliminary project necessary for conducting the master thesis will be reproduced.

The research will focus on Norwegian banks because of national and international laws and regulations, such as Basel II, obligating them to handle and report risks extensively compared to other business sectors.

As for the design of the research, we will conduct depth interviews of as many risk officers as manageable within the time limits of the master thesis. Because of the qualitative properties of the framework, depth interviews are preferable rather than a simple survey aimed at a larger sample size. Thereafter the information obtained from the interviews will be applied in order to reach a conclusion regarding the topic.

Assignment given: 17th January 2011
Supervisor: Terje Berg
Co-supervisor: Sjur Westgaard

Abstract

This paper discusses the possibility and desirability of allocating risk to products in a way similar to those of allocating costs. The work is based on a study of cost allocation and risk management theory, as well as an empirical study of business practice in banks and power companies. As banks are handling risk in a comprehensive manner, they are chosen as a good source of information. Power companies are chosen because we believe they have some similar characteristics as banks. After outlining some cost allocation methods and their underlying assumptions, the activity-based costing (ABC) model is chosen as most suitable for allocation of risks. Next, enterprise risk management (ERM) is presented as well as different risk categories and risk measures. Furthermore, empirical results are used as basis for discussion, and we conclude this paper with an ABRM (activity-based risk management) framework, stating that it is in fact possible to combine ERM and ABC to manage risks. However, the desirability is questioned in terms of possible problems and drawbacks.

Acknowledgements

We would like to thank our project supervisors Terje Berg and Sjur Westgaard for their help in forming the idea behind this paper and all the guidance and continuous feedback they have provided us with. We would also like to thank all the companies that participated in the research for taking time to assist us.

As the authors of this paper, we take responsibility for any errors in the content.

Trondheim 1.6.2011

Sven Ivar Forland

Varun Upadhyay

Index

Problem Description.....	iii
Abstract	v
Acknowledgements	vii
Index.....	ix
Figures.....	xii
Tables	xiii
1 Introduction.....	1
2 Cost Allocation	2
2.1 Traditional Cost Accounting: Fully Distributed Cost, FDC	2
2.1.1 Inadequacies of FDC: The Cost of Diversity.....	3
2.2 The Activity-Based Costing Model, ABC	3
2.2.1 Treating the Overhead Costs as Variable or Fixed - A Look at the Assumptions .	4
2.2.2 Critics	5
2.3 Lean Accounting	5
3 Risk Management	7
3.1 Enterprise Risk Management, ERM.....	7
3.1.1 Macro Benefits	7
3.1.2 Micro Benefits.....	8
3.1.3 Amount of Risk	8
3.1.4 Challenges	9
3.2 Risk Categories	10
3.2.1 Market Risk.....	10
3.2.2 Credit Risk.....	10
3.2.3 Operational Risk.....	10
3.2.4 Business-Volume Risk	11
4 Activity Based Risk Management, ABRM.....	12
4.1 Market Risk.....	12
4.2 Credit Risk.....	12
4.3 Operational Risk.....	13
4.4 Business-Volume Risk	13
4.5 Suggested ABRM-framework.....	14
4.6 Top-Down or Bottom-Up?	15

4.6.1	Alternative 1: Appoint Risk to Already Identified Activities of ABC, Bottom-Up	15
4.6.2	Alternative 2: Use Risk Categories Instead of Activities in a Method Similar to ABC, Top-Down	16
4.6.3	Alternative 3: Combination	18
5	Methodology	19
5.1	Research Design	19
5.1.1	Qualitative or Quantitative?	19
5.1.2	The Interview	19
5.1.3	Respondents	20
5.1.4	Analysis	21
5.1.5	Validity and Reliability	21
6	Empirical Data and Analysis	24
6.1	Banks	24
6.1.1	Cost Allocation.....	24
6.1.2	Risk Management.....	24
6.1.3	What are the Banks Needs?.....	25
6.2	Power Companies.....	25
6.2.1	Cost Allocation.....	25
6.2.2	Risk Management.....	26
6.2.3	What are the Power Companies' Needs?	27
7	Discussion of the ABRM Alternatives	28
7.1	Direct and Overhead Risk	28
7.1.1	Alternative 4: Portfolio View, Bottom-Up.....	29
7.2	ABRM in Banks	31
7.2.1	Numerical Example of Alternative 4 – Concentration Risk.....	32
7.3	ABRM in Power Companies.....	34
7.4	ABRM in Industrial Companies.....	35
7.4.1	An Example of Alternative 1.....	36
8	Conclusion - Final Suggested Framework.....	39
8.1	Problems and Possible Drawbacks.....	41
9	References.....	42
10	Appendices	
	Appendix 1: Contract with NSD	

Appendix 2: Interview Guide

Appendix 3: Interview Results, Tabular Form

Figures

Figure 1: Two stage ABC model (Roztocki et al. 2004).....	3
Figure 2: Extension of an ABC model to include risk.	16
Figure 3: One stage and two stage top-down models for market risk.....	17
Figure 4: The first step of any cost analysis is to determine which cost is variable and which is fixed.....	28
Figure 5: Illustration of Alternative 4.	30
Figure 6: Schematic overview of Alternative 4.	33
Figure 7: Illustration of risk versus profit in a power company.	35
Figure 8: Alternative 1 applied on operational risk. Operational risk is allocated to products through activities.	37

Tables

Table 1: Properties of the different risks. 14

Table 2: Definitions of reliability and validity (Bryman 2008). 22

Table 3: Overview of the cost objects. 32

Table 4: Calculations of necessary risk capital. 33

Table 5: The relation between costs and capital held for operational risk. 38

Table 6: Overview of the ABRM alternatives..... 39

Table 7: ABRM in different business sectors. 39

1 Introduction

The topic of this paper is to look deeper into how risk in financial institutions is treated with respect to cost allocation. Our starting point will be the management accountant's general view: Costs should be allocated to products. We assume that financial institutions use some kind of product calculation, and will discuss if different types of risks should be part of the cost allocation which is carried out through the companies' traditional costing systems. Thus this paper rests on two fundamental assumptions: 1) Knowing different *products*¹ "true" costs, and 2) knowing risk factors with belonging impacts, both are of great importance for companies. These assumptions are not the main theme for this paper, but will be given some comments.

The trend the last few decades has been to use different methods for different purposes, for instance cost allocation for managing costs and risk management for handling risks (Miller & Napier 1993, Bjørnenak 1997, Otley 2008). At first sight the present paper may be considered as a step in the opposite direction: Risk and costs hand in hand in product calculation. However, this is not the intention of this paper. Due to the lack of studies on these relationships, we will be using an inductive, exploratory approach (Remenyi et al. 2002) in order to develop a deeper understanding of the phenomenon; how risk may be considered with respect to cost allocation. This gives us the following research question: Why and how could risk management and cost allocation be combined?

In addition to being a possible answer to calls for more research on the connection between management accounting, corporate governance and risk management (Bhimani 2009, Mikes 2009, Ittner and Larcker 2009), this paper will seek to contribute to the understanding of managing risks in a manner similar to that of cost allocation.

The rest of the paper is organized as follows: First there will be given a brief presentation of cost allocation emphasizing activity based costing (ABC). Then enterprise risk management (ERM) and different types of risk will be given a presentation, before the adequacy of the bundle cost allocation and ERM will be considered. Alternatives for combining the two will also be given. Thereafter a research will be done among Norwegian banks and power companies, and the empirical results presented. These results will be used to discuss the hypothetical alternatives, and possible drawbacks will be discussed.

¹ By product we mean any kind of physical product or service that a firm can offer.

2 Cost Allocation

To be able to discuss the combination of ERM and cost allocation, we will in this chapter give a brief introduction to the key elements of the latter. The underlying assumptions will also be highlighted and the pitfalls and possible benefits will be identified in order to further explore the subject. Bruns and Kaplan (1987) state that:

“Cost containment is a top manager’s number one problem”.

In order to create profit for the shareholders, the total cost must be lower than the total revenue of the firm. It is therefore of great interest to investigate what makes up the actual costs, in order to ensure profitability. This chapter will focus on the treatment of fixed costs, i.e. the overhead costs, and in a later part we will draw a connection to risk and discuss how it can be treated in the same manner.

The concept of cost allocation is that the overhead costs must be allocated to the different products and added to the variable cost, so that the total cost of the product can be known. Accordingly, in a manner that reflects each product’s contribution to the fixed cost.

There are several goals that can be accomplished by doing this (Bruns and Kaplan 1987):

- Identify the true cost of a product. This is important when a market price cannot be established and “*cost oriented pricing*” must be used (Bjørnenak and Fjell 2005).
- Identify the true cost of a customer. In bad times, companies usually put more effort in maintaining old customers rather than getting new ones. Identifying unprofitable customers will then be even more crucial.
- Prevent cross subsidising between products or customers. If the management incorrectly believes that a product is more profitable than another, this could lead to an unprofitable product mix and losses.
- Help identifying sources to increasing overheads and areas that should be subject to cost reducing actions.

We now present the most common cost allocation models to achieve a deeper understanding of possible strategies.

2.1 Traditional Cost Accounting: Fully Distributed Cost, FDC

The FDC is a simple method where the overhead costs are distributed to each product based on an arithmetic formula (McLaney and Atrill 2005). The denominator will always be a volume unit. In most cases, several products make use of the same machine or service. Workers will also be involved in several production processes at the same time. Because of this it is hard to tell exactly how much each product contributes to the overheads, and the total cost is therefore divided to each product on the base of for example machine hours, number of units produced or material costs (McLaney and Atrill 2005). With several different products, this method becomes more inaccurate (McLaney and Atrill 2005). For instance, when product

A incurs high engineering costs, while product B does not, it is obviously wrong to allocate the engineering costs based on total number of units produced. Another problem is that it fails to show the advantage of high production volumes, as will be explained below.

2.1.1 Inadequacies of FDC: The Cost of Diversity

Up to the late 1940s, companies were more focused (with fewer different products) than they are today (Bruns and Kaplan 1987), hence the FDC method was adequate. When the production line has only one product, that product is alone generating the overhead costs and these are easily divided by the number of units to calculate the fixed cost per unit. But as some overheads are proportional to the production volume, others are proportional to the number of products. The latter is the cost of handling the diversity (Bruns and Kaplan 1987). The number of different products and number of parts per product etc. are examples of drivers of this cost. If it is allocated equally to each unit produced of a product, this will add more cost to the high volume products than to the low volume products, and lead to cross subsidising between the products. Instead the cost should be divided to each product or product group, and then as a second step, be equally allocated to units produced of each product (Bruns and Kaplan 1987). Managers often know that products with a small production quantity are more expensive per unit than the high volume products, but there is still a large probability that the full cost is not taken into account when the traditional method is used (Bruns and Kaplan 1987). The shortcomings of FDC lead to the emergence of the activity-based costing model (Bruns and Kaplan 1987).

2.2 The Activity-Based Costing Model, ABC

The activity-based costing model focuses on transactions caused by each product (Bruns and Kaplan 1987). The overheads are, as in the traditional method discussed above, assigned to cost pools. But contrary to FDC, ABC does not allocate them directly. Instead a two-stage method is used (Roztocki et al. 2004):

1. Connect costs to activities.
2. Connect activities to products.

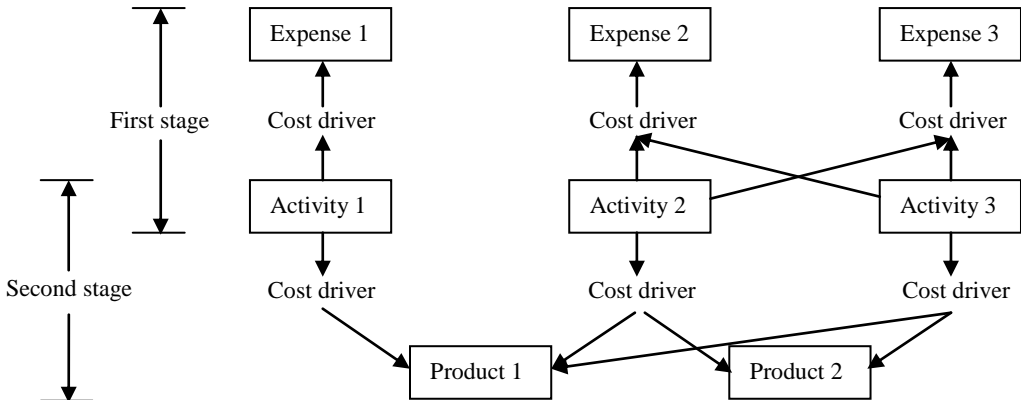


Figure 1: Two stage ABC model (Roztocki et al. 2004)

Under an implementation of ABC the desired accuracy level has to be decided. The cost of data collecting can be considerable, and small companies with limited resources can consider using best guess and existing data (Roztocki et al. 2004). The implementation starts with first identifying activities that are caused by the production, e.g. engineering, customer contact, redesign and modifications. Robin Cooper (1994) suggests that activities should be organized like this:

- Unit-level activities
- Batch-level activities
- Product-sustaining level activities
- Facility-sustaining level activities

The unit-level activities are executed for each unit produced. The batch-level activities are only proportional to the number of batches, and so on. This way of dividing the cost, prevent incorrectly shifting the unit cost from low volume products to high volume products, as previously mentioned.

For each activity, the cost driver then has to be decided (Cooper 1994). This is the link between activities and products. Given a certain detail level (number of cost drivers), the cost driver that best explains the cost of the activity is chosen (Cooper 1994). Looking at the shipping department as an example, the cost driver can be number of units shipped or weight per unit shipped etc. After this is done, the next step will be to assign the costs from the financial an accounting data to the different activities (Cooper 1994).

2.2.1 Treating the Overhead Costs as Variable or Fixed - A Look at the Assumptions

Deciding whether or not the overhead costs can be considered as variable is of importance when looking at the assumptions of ABC (Yu-Lee 2001). In traditional cost allocation (FDC) the overheads are considered as fixed. With this in mind it does not make sense to change production variables in order to try and reduce the overhead costs, and it is not possible to claim that there is a connection between the activity levels (e.g. the production quantity) and the overhead costs (Yu-Lee 2001). Hence, the cost allocation works only one way, and is used to distribute the costs among the products in order to make sure that each product's contribution to cover the fixed cost is satisfying.

The ABC model does not regard any costs as fixed, but instead treats them as variable and possible to alter (Bruns and Kaplan 1987). According to Bruns and Kaplan (1987), this is especially valuable as many companies see their overheads as ever growing and hard to reduce². In order to discuss the validity of combining ERM and cost allocation later in this paper, we now take a deeper look at the conditions under which ABC provides relevant cost information (Noreen 1991):

² This reference is from 1987, and the companies' views might have changed since then.

- 1) “Total costs can be partitioned into cost pools, each of which depends solely upon one activity”.
- 2) “Cost in each cost pool must be strictly proportional to the level of activity in that cost pool”.
- 3) “Each activity can be portioned into elements that depend solely upon each product”.

We choose to sum up these conditions in to main assumptions: Proportionality and separability. These conditions will probably hold to variable extent in different situations. Homburg (2005) argues that:

“In practice, such a proportionality assumption is only justified if the resources consumed by activities are highly flexible”.

This leads us back to the above statement about the benefits of regarding the costs as flexible, and makes it a requirement instead. As most of the costs treated by ABC are related to human resources, it is not likely that the costs are very flexible in most companies (Homburg 2005). In chapter 4 we take use of these assumptions in order to consider the combination of ERM and cost allocation.

2.2.2 Critics

Several authors have criticized the ABC method. Most of the critics can be summarised as high costs of collecting information and noncompliance with the basic assumptions of separability and proportionality (Yu-Lee 2001, Homburg 2005). Because of the failure of these assumptions to hold, the ABC results will be biased and add little value because of the high information cost necessary to obtain a sufficient level of accuracy (Noreen 1991, Christensen and Demski 1995, Noreen and Soderstrom 1994). Yu-Lee (2001) and Homburg (2005) point out that a better cost-benefit will be achieved by not trying to collect high accuracy data, and instead focus on other ways to measure the products contribution to the profitability of the companies.

Competitive methods to ABC, like *balanced scorecard*³ and *lean accounting*, do also exist. After having read literature by Schneiderman (2006) and Maskell and Baggaley (2006), we believe that common for these methods is that they generally ignore allocation of overhead costs. We have chosen not to discuss the balanced scorecard method, but lean accounting is given a brief introduction below.

2.3 Lean Accounting

Lean accounting is a part of the philosophy of *lean manufacturing* that was developed by Toyota and Japanese companies (Maskell and Baggaley 2006). The ideas of *lean* affect all parts of the company, and try to increase efficiency by reducing waste, and make simple and

³ The balanced scorecard method was originally invented by Arthur M. Schneiderman in 1987, but Robert S. Kaplan has become more known for his publications on the topic. Schneiderman (2006) defines the method as “a systematic approach for marshalling an organization’s limited resources”.

understandable processes (Maskell and Baggaley 2006). As a part of this, lean accounting does almost completely ignore allocation of overhead costs (Maskell and Baggaley 2006). The argument behind this is that the complicated accounting statements are understood only by a few people in the organisation and that it therefore does not lead to any meaningful decisions (Maskell and Baggaley 2006).

3 Risk Management

After having looked at cost allocation, it is a natural step to explore risk management to gain a better understanding of how the two can be combined. Enterprise risk management, ERM for short, provides a general framework for how organisations can implement risk management in their businesses (Nocco and Stulz 2006), and this chapter will hopefully result in a better foundation for discussing the combination of cost allocation and risk management.

3.1 Enterprise Risk Management, ERM

Whenever a corporation or organization wants to manage its risks, it is intuitive to think that it can do so in two fundamental ways: Either one risk at a time or all risks viewed together in a systematic way (Nocco and Stulz 2006). The latter is often called enterprise risk management, and is believed to give a competitive advantage in the long run compared with organizations that consider risks individually (Nocco and Stulz 2006). This advantage comes from an improved ability to estimate the expected value of the firm, and also better understanding of unexpected losses (COSO 2004). COSO (2004) states that:

“Enterprise risk management is a process, effected by an entity’s board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.”

It should though be said that ERM does not eliminate risk (COSO 2004). Hence, the goal is to minimize the probability of bad outcomes to a desired level, and not to eliminate it. But what arguments are these statements based upon? Following is an outline of the macro and micro benefits of ERM.

3.1.1 Macro Benefits

At a macro level, ERM may allow senior management to control and/or maximize the risk-return tradeoff for the entire firm (Nocco and Stulz 2006). This gives the organisation access to the capital market in terms of for example investments in new projects. To explain this more thoroughly, let’s say an unexpected turn in the market affects a company’s expected operating cash flow. This will not only reduce the firm value, but also mean that planned future investments may have to be cancelled. By the use of hedging or other risk management, organisations can reduce the negative effects of a volatile market and thereby strengthen the ability to carry out business plans (Nocco and Stulz 2006).

In general companies should be guided by the principle of *comparative advantage in risk-bearing* in the question of retaining or transferring risk (Nocco and Stulz 2006). This principle implies that companies with little information about the future of the market variables should transfer risk, and vice versa (Nocco and Stulz 2006).

3.1.2 Micro Benefits

When a company takes on a new major project, it affects the total risk of the firm. If the latter is increased, the project's profit should at least cover the costs associated with extra risk and also have an adequate return on capital (Nocco and Stulz 2006). *Decentralization* can now be introduced as the interaction of the two following components: 1) Business managers evaluating their projects' risks and returns with respect to the effect on the firm-wide risk, and 2) business managers being given an incentive to do so by getting credited for their contribution to the total risk of the company (Nocco and Stulz 2006).

By using this implementation of ERM, the firm can achieve the optimal amount of risk, which will be discussed in the next section. The fact that more risk is taken into consideration at lower levels in the firm by transferring it from top management to business managers, can be seen upon as micro benefits.

3.1.3 Amount of Risk

Carrying excess equity capital purposed to cover operating risks is expensive, but one can reduce this amount by managing risks more extensively (COSO 2004). Hence, an important task of risk officers of a firm should be to find the optimal tradeoff between risk and equity (Nocco and Stulz 2006).

To explain better how the amount of risk should be determined, let us define *financial distress* as the case where a company experiences a cash shortfall (Nocco and Stulz 2006), as mentioned under the section on *macro benefits*. Nocco and Stulz (2006) state that:

“Management’s job is rather to optimize the firm’s risk portfolio by trading off the probability of large shortfalls and the associated costs with the expected gains from taking or retaining risks.”

Many firms identify a level of cash flow that they want to maintain under almost all circumstances. There is a probability that the firm will not be able to maintain this level, even after managing risks. At this point, the firm might have to start giving up planned projects. Many companies use *bond ratings*⁴ to define this point (Nocco and Stulz 2006). A firm could use risk management to reduce the probability that its rating will fall from the current one to the rating where it faces financial distress, ergo we call this the *probability of distress* (Nocco and Stulz 2006). An important part when reducing this probability is also to take into account the costs it will involve.

There are alternatives to using bond ratings when assessing the cost of distress. Among these are volatility and Value-at-Risk⁵, or in short, VaR. These methods will not be discussed here, since they are of less importance to the objective of this paper.

⁴ The bond rating assesses the credit worthiness of a corporation's debt issues.

⁵ Value-at-Risk is a risk measure. Jorion (1996) defines it to be “*the expected worst loss over a given horizon at a given confidence level*”. A similar definition is given by Duffie and Pan (1997) to be “*the loss in market value over a given time period that is exceeded with a small probability*”.

To conclude ERM as a framework, Nocco and Stulz (2006) have given the following steps:

1. The management determines how much risk the firm wants to take on, by choosing the probability of financial distress that they believe will maximize the firm value. When using bond ratings, it is important to consider the costs of reducing the firm's probability of distress.
2. After determining desired risk (as a bond rating, volatility, VaR, or similar), management finds an estimated amount of equity to support it.
3. Finally, top management decentralizes the risk-capital tradeoff by crediting business managers for evaluating their projects' risks and returns with respect to the effect on the tradeoff. This performance evaluation system creates an incentive for business managers.

3.1.4 Challenges

It might seem as an easy task to implement ERM in a firm, but what are the challenges related to it? Firstly, it is vital that the top management of the company understands that ERM is not just an academic tool, but actually a framework that could help in executing the business strategy and improve the firm's sustainability (COSO 2004). After accepting this, top management should introduce strategies that will create awareness around the importance of ERM at all levels in the company. This will strengthen the incentives given to business managers, and should also give them more motivation in doing their part of the risk-return evaluation (Nocco and Stulz 2006). Hence, COSO (2004) have given the following, more detailed, model to summarize the key parts of ERM:

1. Mapping the internal environment - The internal environment sets the tone for how risk is viewed in a firm, including the people, risk management philosophy, ethical values and the environment which it operates in.
2. Setting an objective – The firm sets an objective for the risk they want to carry, for example by identifying the desired probability of distress.
3. Identifying events – The firm maps the events that could have an impact on the achievement of objectives.
4. Assessing risks – Each event is associated with a risk and an opinion for how it should be managed, i.e. if they should be accepted, reduced, avoided or shared.
5. Making procedures – Procedures are made for how to ensure that risks are handled in a desirable way.
6. Communicating – The firm ensures that the chosen risk policy and procedures are communicated to all the people in the firm to create a better basis for a successful implementation of ERM.
7. Check and act – The process listed above is monitored and evaluated to find where modifications need to be made.

If these challenges are met, the firm should have great potential for succeeding in the implementation of ERM. It is to be pointed out that the cost of creating a valid assessment of a risk, as point four states, can sometimes vastly exceed the marginal benefit (Alviniussen and

Jankensgård 2009). Reputational risk can be mentioned as an example. Therefore, more attention should be given to estimating the risks of the most important future cash flows (Alviniussen and Jankensgård 2009).

3.2 Risk Categories

The previous chapter was summarised in a general framework for implementing ERM. However, it did not highlight the different types of risk, only how the total enterprise risk should be determined. To gain a more accurate understanding of how cost allocation and ERM can be combined, since that is the purpose of this paper, we believe it could be beneficial to divide the enterprise risk into categories and learn what each of them imply.

A company is exposed to several types of risk. Depending on the type of industry, some risks may be more prevalent than others. Credit risk for example, is most likely to be a more important concern for a finance institution than for a consumer goods producer. In the following chapters we have chosen to employ Buehler and Pritsch's (2003) partition of total risk into four main categories: Operational risk, market risk, business-volume risk, and credit risk. For this paper, we believe that these four categories are adequate for covering the total risk of a firm.

3.2.1 Market Risk

Market risk is connected to market price movements, such as stock prices, exchange rates, interest rates and commodity prices (Buehler and Pritsch 2003). For instance, a company with a large stock of a specific raw material can suffer great losses in write-downs in case of a price tumble. A way of reducing this risk is by hedging with the use of for instance futures or options.

3.2.2 Credit Risk

Credit risk is exposure to the risk of borrowers failing to meet their contractual obligations. As companies do a lot of their sales on credit, there's always a risk of some costumers being unwilling or unable to fulfil their obligations. Judging the customers ability to meet his obligations and adding a risk premium are normal measures to reduce this risk. Banks and insurance companies put much effort in categorizing their customers and try to identify risky and unprofitable customers.

3.2.3 Operational Risk

The Basel (2004) framework of 2004 has the following definition of operational risk:

“Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk.”

Examples include people failing to do their part of a process or noncompliance with health and safety requirements (Buehler and Pritsch 2003). What differentiates operational risk from risks such as market risk and credit risk, is that the operational risk is something that needs handling on a more regular basis (IOR 2010), as an unforeseen event can occur and require immediate action.

3.2.4 Business-Volume Risk

Business-volume risk is the risk for changes in demand for the products, caused by change in customer purchasing power, competitor supply, or new products entering the market. For this purpose it will be practical to distinguish between predictable changes due to the lifecycle of the products, and changes caused by whatever other event. For example, uncertainty about the volume of a new product introduced in the market will of course be higher even if market research is conducted.

The consequence of a change in volume will depend on several factors:

- Operational gearing of the company/product
- Competitiveness of the market
- The nature of the product (basic goods or luxury goods)

In situations where these factors differ between the products, their contribution to the overall risk also differs. For example if a product is the only product of its type on the market, competitors will be expected to enter the market, and sales will drop. If the market is mature and competitive, less drastic changes will be expected to occur.

4 Activity Based Risk Management⁶, ABRM

So far the theories behind cost allocation, ERM and different types of risk have been portrayed. These theories will now be used as a foundation to discuss why and how risk management can be integrated into a cost allocation model. Regarding the three cost allocation methods described in chapter 2, we find the ABC model to be the most suitable for a combination with ERM. This is based on the fact that we believe ABC has a higher accuracy and a more comprehensive structure than FDC and lean accounting. Regarding the fact that ERM is by many considered as a holistic approach (Alviniussen and Jankensgård 2009), we base the coming chapters on trying to find a more specific strategy that could be employed in practise.

To begin with, we will discuss how to find the amount of a certain type of risk, and ways to hedge it. There is also the question of what type of activity the risk should be connected to, i.e. unit-level activities, batch-level activities, product-sustaining level activities or facility-sustaining level activities. A comparison of the different types of risks with the assumptions of ABC will also be included.

For this part of the paper, let us define hedging as any kind of activity that reduces or eliminates risk. The cost of hedging is included in the following chapter merely as a way to convert the risk into an amount comparable to the value of the products sold. This comparison can in some cases be guiding in deciding if the hedging strategy is profitable or not and hence in the question of retaining or transferring risk (Nocco and Stulz 2006), but this is not discussed in more detail because of the limited time scope of this paper.

4.1 Market Risk

The market risk is, as the name says, affected by market conditions. Each commodity type has a price history, and by the inspection of this one can calculate an expected risk in the means of volatility or VaR for the given commodity. The cost of hedging (in its original meaning) would be related to for example option or futures prices. The market risk is in our opinion separable, and can be connected to product-sustaining level activities, as some product types demand more capital than human work. To explain by example, if the production of a certain product demands a large amount of different machines, these have to be invested in and therefore imply some amount of equity risk. As we see it, currency and commodity risk is proportional to production volume, while equity risk is not because we consider it fixed on a short-term basis.

4.2 Credit Risk

As mentioned earlier, some companies categorize their customers and keep data of their credit history. Out of this data, probabilities of borrowers being able to meet their obligations or not

⁶ The phrase *activity-based risk management* is something we as the authors of this paper have chosen as a name for our proposed framework, and might not be the most describing name for the topic.

can be calculated and used as a risk measure. Hence, there could be one probability for each customer category. If reducing the amount of customers with high probability of not being able to pay back would be possible, one could say that the lost revenue due to lost sales could represent the cost of reducing risk. However, the ability to do so is only possible in some types of businesses, e.g. banks that have the opportunity to evaluate the customer before offering a product. The expenses related to processing this information, for example salaries to analysts, can also be seen as the cost of hedging.

Some businesses can discriminate customers on the basis of their pay-back ability in terms of setting different interest rates. If a product with various interest rates could be defined as different products, it might be possible to allocate risk in a more sensible way and connect it to product-sustaining level activities; hence we have to some extent separability.

So the risk and the cost of hedging, depends on the ability to consider the risk connected to the customer beforehand selling the product. Assuming that the percentage of customers failing to meet their obligations will be more or less constant, this will be directly proportional to the production level, and therefore variable.

4.3 Operational Risk

To take precautions to operational risk, one could examine the complexity of the process of manufacturing a product and hence the different operational risks connected to it, and thereafter rank the products. By doing so, one might be able to *hedge* operational risk by either reducing the amount of units produced, or increase prices to cover the expected future losses of low rank products, as far as it complies with market conditions. Another way could be to make procedures (attention directing) to assure the quality of the products. Estimating expected future losses can be done by looking at historical losses, and also be considered as the cost of the risk. However, the reliability of this estimate can be discussed because of the uncertain nature of operational risk (IOR 2010). Regarding these thoughts, it might be possible to relate risk to product-sustaining level activities, still keeping in mind the randomness of incidents occurring. Considering this, we believe a small amount of this risk is separable. As an example, a product requiring human labour would be more exposed to embezzlement. The operational risk is assumed proportional, since it is likely that when production volume increases the risk will also increase.

4.4 Business-Volume Risk

As mentioned above, the volume risk can be different for each product within the same company. We therefore believe that it is separable and possible to link to each product. A measure of this risk can be the probability distribution of the volume (Venter 2010). The likely duration of the volume change, which might be permanent or short term, should also be included (Venter 2010). This implies that a way to hedge the risk is to reduce the production volume, so that lost sales represent the cost. The business-volume risk could be proportional to number of product types based on the correlation between them. For instance, if a firm's

products are correlated, the overall business-volume risk will increase with the number of product types. However, the risk will not be proportional to the number of units produced.

4.5 Suggested ABRM-framework

To summarise so far the integration of ABC and ERM, our thoughts around the different types of risks considered in an ABC perspective are given in Table 1.

	ABC's overhead costs	Market Risk	Credit Risk	Operational Risk	Business-volume Risk
Risk Measure⁷		Volatility or VaR	Category probabilities	Ranking connected to complexity	Probability distribution
Separable	To some extent	Yes	To some extent	To some extent	Yes
Proportional	To some extent	To some extent	Yes	Yes	No
Variable	In the long run	To some extent	Yes	Yes	In the long run
Quantifiable	Yes	Yes	Yes	Complicated	Yes

Table 1⁸: Properties of the different risks.

Table 1 shows that not all requirements are fulfilled. But as we can see, this is not the case for ABC either, and yet it is widely used. In a real implementation of ABRM the implications of these errors must be considered when judging the accuracy of the result. In an attempt to improve the accuracy, one could consider to split the risk categories into narrower categories, e.g. market risk into commodity risk, currency risk and equity risk.

In our opinion all four types of risks are to some extent separable and variable with product type, and can thus be more or less linked to product-sustaining level activities. Taking this into consideration, we have given the following temporary summarised framework as guidance to firms that want to implement ABRM:

1. Map the risk appetite of the firm.
2. Decide on amounts of risk for the four main categories (i.e. market risk, credit risk, operational risk and business-volume risk) keeping in mind the desired probability of distress.

⁷ The risk measure tells us whether or not the risk is quantifiable.

⁸ It is vital to point out that Table 1 is strictly based on our thoughts and opinions, and should only be used as basis for further discussion on the subjects of this paper.

3. Make plans for handling risks in a way that ensures the decided amounts by applying ABRM, which also involves allocating risks to different product type activities.
4. Evaluate if ABRM has been successful in terms of the objective of the firm, costs and sustainability.
5. Act thereafter to make improvements, or end the ABRM process if not profitable.

This framework is based upon COSO's (2004) framework for ERM (given in part 3.1.4) and the general ideas of the ABC method.

An important factor to be noticed is that the hedging strategies mentioned above mainly consist of reducing product volumes of high-risk products. In real life this would imply a change in sales strategy which might not always be feasible. For example, if a business based upon one main high-risk product and some other trivial products with less risk was to reduce the production volume for the main product, this could have a serious impact on the sustainability of the firm. The reduction might even force the business into bankruptcy. But since this paper's focus is somewhat based upon discussing possible strategies of combining ABC and ERM, we have chosen to neglect this factor in our discussion.

4.6 Top-Down or Bottom-Up?

The results of Table 1 and the suggested ABRM framework have considered an approach that first determines the risk appetite and then decides on a product volume, also defined as a top-down approach (Smithson 2000). Models for quantifying operational risk in a financial institution are by Smithson (2000) divided in two categories: Top-down models and bottom-up models. Other literature shows the implementation of both top-down (Roztocki, Porter, Thomas, Needy 2004, Gunasekaran, Sarhadi 1998) and bottom-up (Kaplan 1987) approaches in ABC. So assuming one of these models to be used in ABRM would be an intuitive thought. Could it however be more realistic to appoint one of these models for each risk separately depending on the nature of the risk?

4.6.1 Alternative 1: Appoint Risk to Already Identified Activities of ABC, Bottom-Up

A bottom-up approach is used in this alternative, consisting of expanding an already present ABC model to include risk. When the activities and cost-drivers are already defined, the remaining task will be to study the risk present in each activity. For the model to be valid, it is important that the risk identified is proportional to each cost-driver as outlined in the assumptions of ABC in chapter 2. Further, the risk must be proportional to the execution level of the activity (i.e. when the activity is performed more extensively, the risk level increases proportionally).

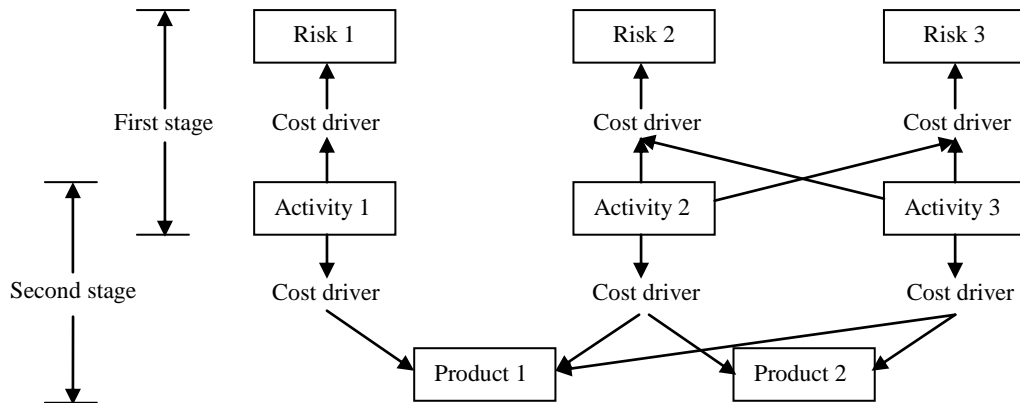


Figure 2: Extension of an ABC model to include risk.

This alternative is most suitable to identify the risk caused by internal events in the company, because these are most likely to comply with the requirements above. For example, it is not likely that any activity identified in an ABC implementation will be suitable to bear the risk of changes in business-volume. In the same way, the cost driver relationship between the activities and the products would not necessarily be valid when the risk is to be distributed. Let us look at the risk of changes in material costs as an example. The activity most related to this would be procurement or material handling (or equivalent). The cost driver of this activity could be the number of parts ordered, allocated to the products accordingly. If the risk of change in price of raw materials should be allocated to the products in the same way, this would most likely lead to faulty results, because the risk of changes in material costs would not be proportional to the same cost-driver (number of parts). A risk more likely to be proportional to the number of parts ordered by the procurement department (and hence the level of activity performed), would be the operational risk of the department. We therefore suggest that the extension of ABC to include risk is most suitable when treating operational risk, which is also confirmed by Table 1 stating that operational risk is complicated to quantify (hence, the bottom-up approach).

Adding the operational risk connected to the execution of each of the activities, will be similar to the process approach (bottom-up) explained by Charles Smithson (2000). Yet to our knowledge there is no literature indicating that this is done in a combination with ABC, benefiting from possible synergies. If an ABC implementation is already done, this will make the whole process cheaper and easy to implement. A functioning ABC model would most likely have identified and chosen activities in a way that all the company's operations are represented, and would therefore provide a good starting point for an investigation of operational risk.

4.6.2 Alternative 2: Use Risk Categories Instead of Activities in a Method Similar to ABC, Top-Down

Based on the information already available in an ERM system or evaluated by the market as required risk premium on financing, the company will know something about the total risk

they are facing. This could be the starting point for a top-down approach; also complying with the ABRM framework suggested in part 4.5.

The next step will be to divide the total risk into risk categories, in this paper’s case starting with the four main risk types defined by Buehler and Pritsch (2003). The detail level of the analysis will dictate how well these can be defined. If for example the company has few resources to spend on data collection, qualified guesses can be used to divide the four main types into narrower risk categories (see Figure 3). Unfortunately, this inaccuracy will limit the usefulness of the results, and some analysis should always be conducted.

For each risk it is necessary to identify the drivers of the risk. As an example we can look at the risk of increased interest rate on debt. It is fair to say that this risk can be related to the amount of capital necessary to produce each product. As each product probably will share some resources, a good indicator of capital use for each product could be machine hours per unit. Finally each product’s contribution to the risk would have to be calculated, summing up the different risk drivers associated with the product.

This alternative can be two-staged, likewise for ABC, or for less complicated implementations one stage could be satisfactory. Whether or not the second stage is needed depends on the properties of the risk. Below is a hypothetical example considering market risk.

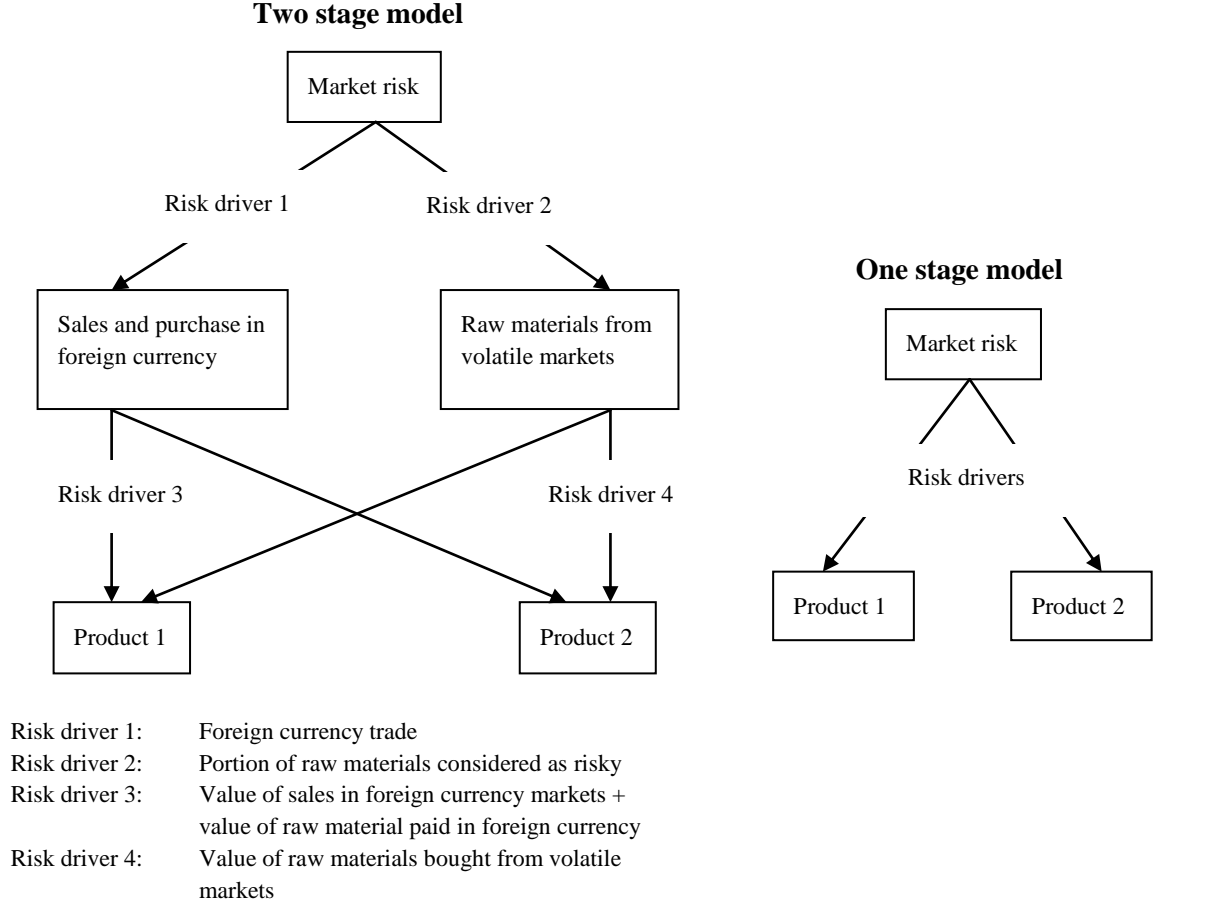


Figure 3: One stage and two stage top-down models for market risk.

4.6.3 Alternative 3: Combination

It is likely that some risks can be identified at corporate level (through ERM or evaluations by the market) and further be separated and allocated using the method described in Alternative 2. But it is just as likely that this will be impossible for other types of risk. The final alternative will thus be a combination of the two previous ones, where a top-down approach is used for some types of risk and a bottom-up approach is used for others. The discussion so far indicates that bottom-up should be used for operational risk and top-down for the remaining three.

5 Methodology

A research was conducted to further investigate the possibility of combining ABC and ERM. Thagaard (2003) expresses the importance of giving account for methods used and explaining the choices that are made. Hence, this chapter will focus on how information was gathered, why it was gathered in the chosen manner, and whether or not the methods used were appropriate regarding the results of the research.

5.1 Research Design

5.1.1 Qualitative or Quantitative?

Punch (2005) states the following:

“Quantitative research has typically been more directed at theory verification, while qualitative research has typically been more concerned with theory generation.”

This is also indicated by Scapens (1990). It could be suggested that this paper is connected to a more or less untouched field of study, i.e. there is little existing theory. It would be challenging to make a quantitative⁹ research design, since making accurate questions on beforehand is difficult, and also the fact that for example a survey would only give a superficial view (Scapens 1990). The nature of this paper is exploratory; it seeks to understand current practice. This requires open questions and may lead to unexpected answers, so a qualitative approach is most appropriate (Punch 2005). A holistic approach resulting in nuanced data could be a great resource to the analysis (Scapens 1990).

5.1.2 The Interview

In-depth interviews¹⁰ were chosen for the case studies, where the alternatives were either by telephone or personal. The nature of the cases was of relevance when deciding between the two, as there was one main target group and another of less, but significant importance. For the main target group, personal interviews were chosen to create an atmosphere of openness and trust. However, Bryman (2008) argues that critics are concerned that the respondents can be affected by the personal characteristics (personality, age, gender, etc.) of the interviewers. For most of the other group, telephone interviews were chosen, this being a result of restricted schedule and budget.

Considering the questions of the interview, it was not easy to determine what questions would be most appropriate and give the most relevant information, as mentioned above. When preparing an interview guide it could be wise to ask the question: “Just what about this thing is puzzling me?” (Lofland and Lofland 1995). This was used as a rule of thumb for making sensible questions. The questions specifically targeting ABRM were put at the end of the

⁹ Bryman (2008) states that some writers regard the distinction between qualitative and quantitative research as a fundamental contrast, while others regard it as no longer useful.

¹⁰ There is a growing tendency for calling unstructured and semi-structured interviews for *in-depth interviews* (Bryman 2008).

interview to avoid affecting or leading the prior answers. We also did not reveal the topic of our thesis before at the end.

The personal interviews were conducted at the respective company's premises, as this is preferred to make the interviewee feel comfortable (Bryman 2008). There was an open dialogue, but we kept an interview guide¹¹ to keep the structure of the different interviews somewhat the same¹². A short form of the guide was sent to the respondents up front to give them the opportunity to prepare themselves. However, we noticed a variation in the amount of effort that was put into preparation by the different interviewees.

The interviews were tape recorded and later transcribed to make sure we did not lose any information. None of the interviewees had any objections against this, and we feel that it did not affect the answers in any manner. However, there were some noisy parts in the recordings, which led to incomplete sentences in the transcriptions, and possibly loss of relevant data.

A test interview was conducted with a person in a similar position from another business sector. The purpose of this interview was partly to check if we had the same understanding of terms and expressions as the responding companies, and also to get an idea of which questions that resulted in relevant information (Bryman 2008). The interview was not changed, and we also got an impression of the *business language*.

5.1.3 Respondents

This paper deals with risk management and cost allocation, and although the target group for the ABRM model presented was not clearly defined, Norwegian banks seemed as a good choice of respondents since they are the *extreme case* considering risk¹³. Risk is the basis for banks businesses, consequently they need to manage their risks in a comprehensive manner to be sustainable. Banks are also regulated by national and international laws, such as Basel II and Basel III. Considering this, interviewing banks would give us a professional and qualified insight in current risk practice, regardless of what the target group was to be. Power companies were also chosen as respondents, seeing how they have some of the same characteristics as banks in terms of for example trading and regulations. Other business niches were not chosen because of a possible lack of comprehensive methods¹⁴.

Considering the number of cases and which banks to chose, the primary goal was to interview the bigger banks and power companies, and not to find a representative selection. After initiating contact with a listed amount of firms, we ended up with 12 cases out of which five were banks, six were power companies and one was to be used for a test interview. The banks interviewed represented more than 80 percent of the market in terms of total assets (FNO 2011) and the power companies represented 57 percent¹⁵ of the market in terms of power

¹¹ See Appendix 2.

¹² Bryman (2008) defines these types of interviews as *semi-structured interviews*.

¹³ Scapens (1990) suggests doing research on extreme cases when there is little available theory.

¹⁴ This statement only expresses the authors' opinion.

¹⁵ The source of this information is not given due to confidentiality concerns.

production. Conducting 12 interviews would result in a wide basis for the analysis, seeing how the research was qualitative.

5.1.4 Analysis

There are not many well-established rules for analyzing qualitative data (Bryman 2008). We chose to use a tabular form¹⁶ as a first step, as suggested by Scapens (1990). Information was divided into different categories which we felt were important considering the papers objective. After analyzing some of the cases, another category was added seeing how we felt some important information was not being noted. We also had a category for special observations, in case there were facts that were hard to place somewhere else.

Since we were two people working on this paper, we analyzed half of the interviews each, and then switched interviews to double check what had been analyzed. This was done to make sure we were emphasizing the same information and to avoid biased results (Scapens 1990). However, biased results should not have been an obstacle or a drawback for the analysis since the objective was to gather information on current practice, and not to compare the companies.

After filling out the analysis table, a summary each for the banks and the power companies was written to transform the analysis into a more dynamic form. While doing so, we realized that changes had to be made to what we had previously written in the tabular form. Most probably, this was a result of the fact that we slowly gained a deeper understanding of the information. It could be called a maturing process, and we feel that dividing the analysis in two steps was a positive factor for the paper.

5.1.5 Validity and Reliability

“Three of the most prominent criteria for the evaluation of social research are reliability, replication and validity.” (Bryman 2008).

The three terms are more relevant for quantitative research, but have by some authors been modified to suit qualitative research as well (Bryman 2008). These modified terms are given a short description in Table 2¹⁷. Scapens (1990) defines reliability as the extent to which the data collected is independent of the researchers using it, and validity as the extent to which the data is *true*.

¹⁶ See Appendix 3.

¹⁷ Bryman (2008) lists four alternative criteria for qualitative research out of which three are mentioned in parenthesis in Table 2. The last one is *confirmability*, but this is not further outlined in this thesis because we have chosen to use the terms *reliability* and *validation*.

	Reliability (Dependability)	Validity
Internal	Whether or not the members of the research team agree on what they observe.	(Credibility) Whether or not there is a good match between the researchers' observations and the theory they generate.
External	The degree to which the research can be replicated. Other researchers should be able to adopt a similar method. (Difficult criterion to meet in qualitative research)	(Transferability) Not an appropriate term for qualitative research.

Table 2: Definitions of reliability and validity (Bryman 2008).

After the test interview, we felt confident about terms and expressions. However, during each of the next interviews, it became easier to both understand and explain the topics discussed. This could have affected the quality of the answers, but the shortage was not on the interviewee's side. The interviewees used the terms and expressions from the list of notes sent up front. Considering the facts discussed above, the answers should be in accordance with the questions, and the internal reliability strong.

As mentioned in section 5.1.2, respondents can be affected by the personal characteristics of the interviewers (Bryman 2008). Evaluating whether or not this happened is not an easy task, but seeing how this was our first time interviewing the respective business sectors, there could have been some changes in mood depending on how much of what was being said we were able to connect to. This would affect both the reliability and the validity.

To make sure that the respondents would feel safe to share information, a contract¹⁸ was signed with The Norwegian Social Science Data Services (NSD). This contract obliges the researchers to deal with information collected as confidential, and should strengthen the internal validity (Scapens 1990).

We were uncertain regarding if we had chosen the right business niche to research, considering that the target group for ABRM was not determined. Would the answers be such that there could be drawn parallels to other business niches, or should we have chosen respondents from various niches? The answers from the interviews were satisfying, and in accordance with what was hoped for up front. And if for instance production industry companies had been chosen, the answers might have been less insightful because of the possible lack of up-to-date methods. This was also an argument for not choosing a mix of respondents from different business niches. The banks and power companies interviewed were all leading actors in their markets, which makes it easy to trust the data collected. The internal validity seems strong, because the theory generated in this paper is very much based on the observations from the research. The interview being conducted by two people also strengthens the internal validity (Scapens 1990).

¹⁸ See Appendix 1.

However, after having conducted the interviews, we found out that there was a partition amongst the power companies. Some sold power to end-users *and* Nord Pool¹⁹, and others *only* to Nord Pool. The companies who only sell power to Nord Pool had less relevant answers, and interviewing these might not have been necessary. This was of importance when analyzing the interviews, and should have been discovered when deciding on a respondent selection. It also brings us to the question of whether or not enough companies were interviewed.

Under some categories of the analysis, there was a saturation in the answers (especially for the banks), i.e. the answers were more or less the same. Under others however, there was not. The reason for this might be that the banks were more equal in size than the power companies. Some of the risk officers in the power companies were part of small teams with only four to five people monitoring all the financial activities, while others had teams beneath them to rely their work on and had a higher degree of maturity. Interviewing more power companies may have resulted in a higher level of saturation, and hence increase the internal validity.

During the analysis process we discovered that some questions regarding cost allocation did not result in the comprehensive answers we wanted. More details could have been asked for, i.e. there was a bit of vagueness. There was also the fact that the interview treated both risk management *and* cost allocation, but most of the interviewees were risk officers of different ranks. Some of the risk officers expressed that they were not the right person to make inquiries to regarding cost allocation. Consequently, we considered follow up questions to clarify the vagueness as suggested by Scapens (1990). But after understanding that the banks structures and current cost allocation methods makes it very challenging to adopt ABRM through ABC, follow up questions did not seem necessary. We feel that our research could be replicated, requiring a very similar approach to the subject, but some small changes should be made. Hence the external reliability is medium to strong, even though this is challenging to assess when conducting qualitative research.

¹⁹ Nord Pool is a trading market for electrical energy, operating mainly in the Nordic countries (Nord Pool 2011).

6 Empirical Data and Analysis

The following chapter will summarise the findings of the research, and also include some analysis as this was inevitable in the process of determining what data to emphasize considering combining cost allocation and risk management.

6.1 Banks

6.1.1 Cost Allocation

All banks are significant participants in the Norwegian market, mature regarding cost allocation and have a method with its basis in ABC. However, the costs are allocated from the mother companies down to division/branch level only, and not further. Some banks have separate calculations for customer and/or product profitability. The latter and the ABC calculation are independent of each other, which implies that the ABC method is not fully applied down to product level. So whether or not these methods can be called ABC at all is questionable.

The purpose of the cost allocation is to find a performance measurement for the divisions/branches, or to find what drives the costs, while a separate calculation is done in order to find the customer profitability. Consequently, there is less focus on product profitability. One bank also states that the purpose of not using ABC all the way is that it requires fewer resources and is easier.

6.1.2 Risk Management

All banks consider risk as something that is both positive and negative, but the main focus is on the possibility of loss. The banks seem confident in their existing models and methods, which is expected considering that risk is the basis for their businesses and also all the laws and regulations they are obliged to follow. All banks²⁰ seem to have sophisticated risk management frameworks. Some call it ERM and some do not mention the term, but most banks aggregate their risk categories into one total risk. A major element of the risk management is to allocate equity to the different customers according to how much risk they impose. However, all five banks interviewed express that there is always potential for improvements, also mentioning to always consider the cost-benefit factor.

“We have come a long way, but there is always room for improvement, and one is never completely satisfied.” (Risk Officer in a major Norwegian bank)

The purpose of managing risk seems to be to assure that the return on risky capital is satisfactory through making the right decisions, and that all divisions of the company should know how to handle risk. Credit risk is given the most attention, since this is the major part of the total risk (around 90 percent).

The banks interviewed emphasize and measure the following types of risk:

²⁰ When the term *all banks* is used, we refer to the ones interviewed in relation with this paper.

- Credit risk: Ratings, probabilities, simulations, risk adjusted capital, VaR.
- Market risk: VaR, test model from the Financial supervision, probabilities.
- Operational risk: Simple Basel model (advanced Basel model in the future), collected data, one bank is working on a model in cooperation with the University of Stavanger.
- Business volume risk: Statistical models.
- Financial risk, strategic risk, liquidity risk.

All banks have more or less established systems to price risk, but it was not easy to get detailed information about these due to the design of the interview, and also due to confidentiality. One bank pointed out that they use customer parameters to calculate a price that reflects the capital cost of the customer. Other banks mentioned internal systems like IRB (Internal Rating Based) and EBCAC (Earnings Before Cost After Capital Cost)²¹. But as for cost allocation, it seems risk is priced with basis in customer profitability, and not product profitability.

6.1.3 What are the Banks Needs?

It seems that there are two main problems the banks are struggling with: 1) some of the banks mention that the low risk customers are subsidizing the high risk customers. They are not getting well enough paid for their high risk customers. 2) If a customer is added to the customer portfolio, the concentration risk could change and maybe force the bank to hold more capital. Who should pay for this increase; the last customer? This will be further discussed in chapter 7.2.

6.2 Power Companies

6.2.1 Cost Allocation

All the companies in the sample are structured with one parent company with several branches, and cost allocation is done from the parent company to the different branch companies, and not further. The main purposes indentified for allocating costs are:

- Fiscally: Due to a specific tax regime for the power industry, there is an intensive to allocate as much cost as possible to the production company where there is an extra 30 percent tax on revenues. This will transfer revenues from the high-tax branch company to the normal-tax branch company. Only one company states this motive explicitly, but it is presumably an incentive for all respondents.
- Juridical correct cost distribution.
- Correct billing of the services provided to the branch companies by the parent company.

The traditional full-cost method is applied for allocating costs in five out of six cases, and ABC in only one case. The power companies have less mature methods compared to the

²¹ These methods are not given a further explanation because their extent is beyond the scope of this thesis.

banks, and simplicity is regarded as more important than detailed information. Furthermore, the research indicates that cost allocation methods are not used to calculate product profitability in the branch companies. Some of the responding companies state that they use the gross margin method²².

6.2.2 Risk Management

Most respondents state that risk is uncertainty and has a downside and an upside. In practice however the downside gets more attention, since the power companies interviewed are owned by municipalities. The municipalities depend on a stable low-risk income and are therefore generally risk averse.

It appears to be little spread in the risk management methods. The general procedures are that the board gives a trading-limit framework. This results in a hedging/trading strategy, which gives guidelines on for example how much presale should be done considering predictions of future market price movements. Accordingly, the risk management consists of follow up of these guidelines. Types of risks mentioned here are market risk and business-volume risk, and all companies report these as quantitative numbers, e.g. VaR or hedge ratio measurements. The more advanced companies do Monte Carlo simulations of how predicted market prices and volumes affect income.

Another aspect of the risk management is the *practical* risks; the risk of an event to occur, such as a breakdown of transmission lines, errors in project execution, accidents etc. Managing operational risk is done in a more qualitative way. Analysis, expert evaluations, past experience etc. are used to identify the potential risk factors and their likelihood and impact. Hence, the risk measurement is a two-dimensional property of probability and consequence. However, one of the companies reports having no measurements of operational risk at all, so there is a spread. Some of the respondents also state that they assure against some of this risk through external assurance companies. The purpose of managing operational risk is awareness and understanding as well as mitigation.

The power companies sell electricity to either or both end-users and the power exchange market (Nord Pool). The answers on how risk is included in product pricing naturally depend on this. Some of the answers given are more vague, only commenting that it is difficult to include a risk component in the price. This could also mean that the interviewee misinterpreted the question. On the other hand, a few companies state that the revenues from trading are measured by risk adjusted return on capital, and even use the Basel II requirements in order to calculate the capital needed. The latter companies are more focused on trading, and have little or no sales to end-users.

Basically, there is no way to directly add a risk premium to the power price when sales are done to Nord Pool, as the price is fixed by equilibrium in the market²³.

²² This seems as a good choice e.g. in the case of sales to Nord Pool, where the price is rather fixed.

²³ However, it is reasonable to assume that the market price over time will include a risk premium.

“Trading in power companies is basically the same as trading in banks.” (Risk Officer in a Norwegian power company)

Being exposed to the electricity spot price is for power companies what credit risk is for banks: the risk premium is equivalent to profits. As for end-user sale, there are basically two types mentioned in the interviews:

- Spot price with a fixed fee, no risk for the seller.
- Fixed price, but unknown volume. Hedging can be done by buying future contracts in the financial electricity market.

In both cases above, the intention is to pass the risk to the customer by either selling at spot price with a fixed fee, or offering a fixed-price deal where the hedging costs are taken into account. All companies probably have models for calculating the hedging costs and the fixed fees. However, it is worth mentioning that these calculations seem to be independent of the risk management as whole, as for example operational risk is not included in the price.

6.2.3 What are the Power Companies' Needs?

The companies in the research had different opinions regarding whether new methods could be useful. While many of the interviewees draw parallels to banks, they also mention that they have no need for a risk management at the same level as the banks. The companies state that in the case of end-user sales, it could be beneficial to have better methods for pricing risk more correctly to each customer, also considering the cost-benefit factor. Furthermore, one company states that competition in the future will harden and companies with reckless spending and poor risk management are likely to face trouble.

7 Discussion of the ABRM Alternatives

So far theory, ideas on how to implement ABRM and empirical results on the topic have been presented. The focus of the following sections will be to apply the empirical results in order to confirm, alter or reject the ABRM ideas given prior to the research. Whether or not ABRM is suitable for business sectors other than banks and power companies, such as production industry, will also be discussed.

7.1 Direct and Overhead Risk

In a complex environment with different products sharing resources, the cost of these common resources can either be left as they are; a common overhead expense, or they can be allocated to different products with an intent to gain better control and understanding of the cost. But does the term *overheads* also exist for risk? The empirical results show that a major difference between risk and overhead cost is that the overhead cost is connected to internal activities, while the risk is mostly connected to external events (except from the operational risk). The company has to profit from taking this risk, and eliminating it is not the goal. Therefore the best parallel between overhead/direct cost and overhead/direct risk might be that overhead risk is the risk connected to sharing of resources and correlation effects. The direct risk is hence proportional to each product and allocation is therefore trivial. In Alternative 2, market risk is used as an example because we believed that market risk was an overhead risk. One of the steps was to separate the market risk into e.g. sales in different currencies. However, sales in foreign currency can be strictly connected to the sales of each product, and can therefore not be called an overhead risk. The first step should therefore be to determine which part of each risk category that is overhead and which is direct. It might also be that a category is only overhead or direct. This is illustrated in comparison with ABC below.

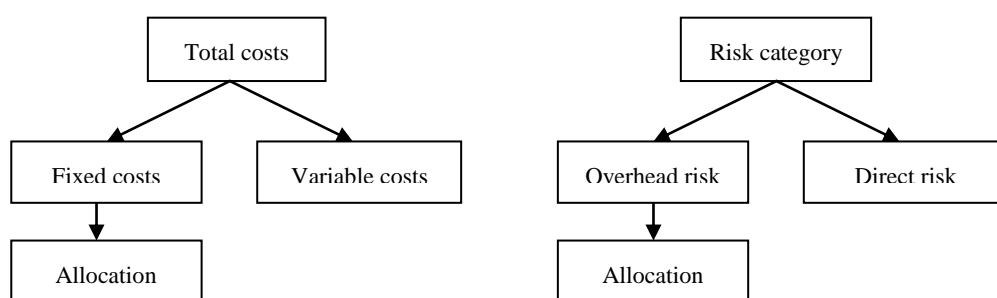


Figure 4: The first step of any cost analysis is to determine which cost is variable and which is fixed.

In contrast to cost allocation, it might not be obvious which part of a risk category that is overhead and which direct. It is also possible that whether a risk type is overhead or direct can differ between companies or business sectors, which became apparent in the empirical study conducted. In banks for instance, the credit risk is a direct risk connected to each customer, and the latter are also the primary profit/cost objects. For a production company it is more common to measure profit per unit sold, while credit risk can still be related to the customers.

Credit risk then becomes an overhead risk. So, depending on what the cost/profit objects are, the same risk has to be treated differently. This adds two necessary steps to the general ABRM framework:

1. Determine what the cost objects are.
2. Analyze and break down each risk category in order to determine which is overhead and which is direct with respect to the cost objects.

7.1.1 Alternative 4: Portfolio View, Bottom-Up

A new alternative will now be presented based upon the empirical findings and discussion in section 7.1. In Alternative 2 we assumed that the information about how much total risk the company faced was available through the already present risk management or ratings by the market. We assumed that the numbers were calculated and ready to be allocated. However in some cases this information can be inaccurate and difficult to separate into various risk types. For certain risk types where correlations are important a bottom-up alternative with an allocation can provide attention-directing information even if the risk management already is extensive, but also if information is inaccurate and challenging to separate.

For each product or cost object we previously stated that there is some direct risk proportional to each product, and also some overhead risk. Alternative 4 consists of first identifying all relevant risks for each single cost object, and then determining the correlation effects which will represent the overhead risk²⁴.

²⁴ It could be said that this is a calculation of risk rather than a pure allocation, as is the subject of this paper. But the focus and the result will be aimed at an allocation.

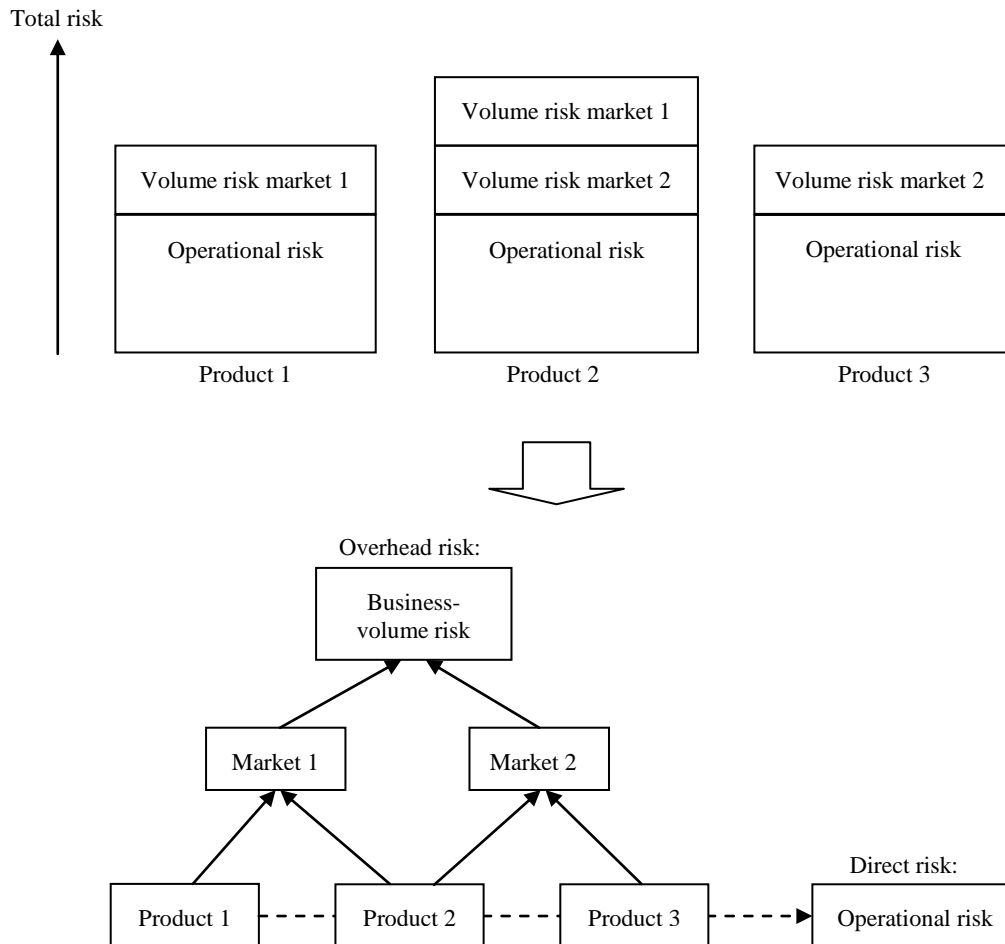


Figure 5: Illustration of Alternative 4.

In the above example the market is divided into two uncorrelated markets, market 1 and market 2. Hence the volume fluctuation in product 2 is correlated with some of the volume fluctuations for product 1 and product 3. The different market divisions can be geographically separated or separated in other ways, but the main issue is to investigate how sales of the different products are correlated. Negative correlation effects can also occur, e.g. concentration risk (this will be shown in an example in chapter 7.2.1). The operational risk is in Figure 5 regarded as proportional to production level and is therefore a direct risk. But for which situations and risk categories could this alternative be useful?

While we believe that the analysis necessary in order to implement Alternative 4 can provide useful attention-directing information for many different companies and industries, it seems that it is most suitable when the company has a *portfolio* view on its cost objects. As the method is bottom-up, it must be necessary to analyze each product standing alone and later study the correlation effects. A complicated production process with a lot of sharing of resources can make this more difficult, but also more beneficial.

7.2 ABRM in Banks

The business niches will be the basis of the following discussion, where the different alternatives will be evaluated emphasizing the risk categories. Whether ABRM can solve the problems identified by the companies interviewed will also be considered.

Due to the lack of cost allocation to product/customer level, Alternative 1 is not considered an option for banks. However it seems feasible to implement Alternative 2 and 4. In addition to being a cost effective solution, ABRM must also replace or integrate with existing methods. Perhaps an already comprehensive risk management is an obstacle for ABRM?

The clearly most important risk for banks is credit risk. It is already well handled and we choose to classify it as a direct risk (in the case of banks). The credit risk is connected to each customer, which is rated and judged carefully. Since the banks have a portfolio of customers, the total credit risk must be calculated taking into account possible diversification effects. The concentration risk has a negative diversification effect, emerging when a larger proportion of the customers are in the same business sector. This risk could for example be calculated as the deviation from the best possible diversification. Once calculated, the concentration risk must be taken into account when judging the profitability of that customer group. As we recall from chapter 6.1.3, handling concentration risk was mentioned by some banks as a difficult task.

Operational risk is an overhead type of risk that should be allocated if it is probable that some customers cause more operational risk than others. For instance, a big customer is likely to cause more operations and therefore a larger probability of operational errors. Even though the profitability of that customer should outweigh the increase in operational risk, allocating operational risk could give valuable attention-directing information.

Another problem identified by some of the banks is the risk of cross subsidizing between customers. Pricing the customers precisely is important, but factors such as when a customer goes from a low risk category to a higher, or when a loan is priced too low in hope of getting profit from the customer in other ways (stock trading etc.), complicates matters. It is not likely that ABRM provides a solution to this, as ultimately ABRM would depend on the same risk models as the ones used to evaluate customers today.

Maybe the most important observation from the analysis of the banks is the importance of what is chosen as cost object. Because banks are customer oriented, they do not focus on the profitability of for example the product *savings account*. Allocating cost and risk to these products therefore provide little or no information of interest. It has been clear that some products impose a higher operational risk for banks, and in these cases a higher fraction of the total operational risk should be allocated. This leads to a situation where risk must be allocated to both products and customers²⁵.

²⁵ We have chosen to not discuss this topic any further because customers are their main focus.

7.2.1 Numerical Example of Alternative 4 – Concentration Risk

It is probable that Alternative 4 is the most suitable for banks, due to their portfolio view on customers. In this section we will provide a hypothetical numerical example regarding allocation of credit risk in order to illustrate a possible implementation in a bank. Capital allocated is used as a measure for credit risk. The cost objects are a number of corporate customers from various industries.

The first step in the method outlined is to analyze each cost object and search for correlations. In this example we have done this by organizing them in groups within the same business sector, defined by the industry beta.

Customer group	Industry beta	Amount Invested	Weight	Weighted beta
Business sector A	0.55	10	0.09	0.05
Business sector B	0.65	10	0.09	0.06
Business sector C	0.75	10	0.09	0.07
Business sector D	0.85	10	0.09	0.08
Business sector E	0.95	10	0.09	0.09
Business sector F	1.05	10	0.09	0.10
Business sector G	1.15	10	0.09	0.10
Business sector H	1.25	10	0.09	0.11
Business sector I	1.35	10	0.09	0.12
Business sector J	1.45	20	0.18	0.26

Table 3: Overview of the cost objects.

A factor of big importance is how corporate customers cause concentration risk in the portfolio. This happens when the size of a customer is large relative to the other customers in the portfolio, or when geographical concentration or concentration of many companies in one industry makes the total portfolio less diversified. In this example we simplify by only looking at concentration due to a larger amount invested in one industry sector. In a more realistic scenario other types of concentration should also be taken into account.

The banks use comprehensive models to calculate how much capital to allocate based on a number of parameters. In this example we have constructed some very simplified equations:

$$C_i(\beta_i, I_i) \sim \beta_i \cdot I_i$$

C_i is the risk capital needed for customer group i , correlations not taken into account. This is a function proportional to the beta β_i and the capital invested I_i . We calculate the concentration risk applying a separate formula:

$$D_i(\beta_p, \beta_{opt}, I_p) \sim \beta_p - \beta_{opt} \cdot I_p$$

D_i is the extra capital needed to be held for customer group i , and is proportional to the deviation from the optimal portfolio beta caused by the larger amount invested in i , as well as the total amount invested.

In this example a higher amount is invested in business sector J, which leads to concentration risk and a higher portfolio beta. In order to calculate the increased amount of capital needed for cost object J, we first calculate the beta for the portfolio:

$$\beta_p = \omega_1\beta_1 + \omega_2\beta_2 + \dots + \omega_n\beta_n$$

$$\beta_p = 0.09*0.55 + 0.09*0.65 + 0.09*0.75 + 0.09*0.85 + 0.09*0.95 + 0.09*1.05 + 0.09*1.15 + 0.09*1.25 + 0.09*1.35 + 0.18*1.45$$

$$\beta_p = 1.04$$

We then calculate the beta in the case of equal weights:

$$\beta_p = 0.1*0.55 + 0.1*0.65 + 0.1*0.75 + 0.1*0.85 + 0.1*0.95 + 0.1*1.05 + 0.1*1.15 + 0.1*1.25 + 0.1*1.35 + 0.1*1.45$$

$$\beta_p = 1.00$$

The result is an increase of beta for the portfolio of 0.04. Illustrative calculations of C_i and D_i are shown in the table below, and a figure is also shown.

Customer group	β_i	I_i	C_i	D_i
Business sector A	0.55	10	1.1	0
Business sector B	0.65	10	1.3	0
Business sector C	0.75	10	1.5	0
Business sector D	0.85	10	1.7	0
Business sector E	0.95	10	1.9	0
Business sector F	1.05	10	2.1	0
Business sector G	1.15	10	2.3	0
Business sector H	1.25	10	2.5	0
Business sector I	1.35	10	2.7	0
Business sector J	1.45	20	5.8	4.4
Sum			22.9	4.4

Table 4: Calculations of necessary risk capital.

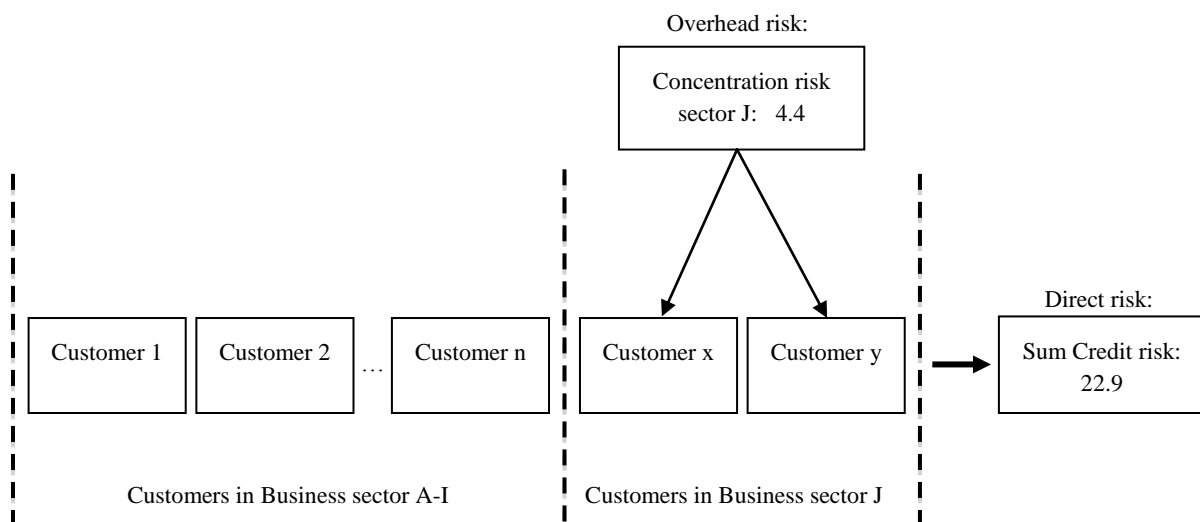


Figure 6: Schematic overview of Alternative 4.

7.3 ABRM in Power Companies

The most important economical risks for power companies are market risk and business-volume risk. By some of the companies, the term market risk is used to cover both. Currency rates (sales at Nord Pool is done in Euros while sales to private customers and salaries are in NOK) and price fluctuations are major components of the market risk. The business-volume (amount of sold electricity) is also a factor of big importance. Between price and volume however there is some natural hedging, because high prices tend to give lower volumes and vice versa. In addition there is also an amount of operational risk, and the question is: should this be allocated? The power company eventually sells only one product²⁶, electricity. If all risks were proportional to the amount of electricity sold/produced, an allocation of risk would provide no new information.

Because the electricity is sold in various *products*, we use these as the cost objects when further investigating the possibilities of the ABRM method. These products are basically sales to Nord Pool and sales to end-users. Sales to end-users can be further divided into spot price or various types of fixed price products.

When a power producer sells electricity to end-users, the profit comes primarily from the production part, while the sale in itself is a trading activity generating a marginal extra profit. In one of the companies that have sales to both Nord Pool and end-users, the end-user sale turnover is about 40 percent of the total turnover. The production generated an EBIT of 290 MNOK, while end-user sales only had an EBIT of 0.8 MNOK²⁷. It would be appropriate to allocate risk connected to production and activities upstream of sales to end-user sales and Nord Pool sales, if there was any reason to believe that the risk distribution was different from the end-user sales/Nord Pool sales-ratio.

For operational risk it is clear that most of it is connected to the production phase. Operational risk could then be allocated in the same proportion as the ratio between sales to end-users and to Nord Pool, for example 40/60 percent as mentioned earlier. However, we do not see any clear advantages of doing so, as all the end-products have approximately the same influence on the operational risk. It seems natural to focus on control and mitigation of the operational risk, which is normal today, rather than to allocate it.

For the volume risk it is necessary to analyze the historical demand fluctuations for each product. In order to do this it is necessary to know more about the power market dynamics. A retail company (selling to end-users) has a certain amount of customers with an expected power consumption at a given moment ahead in time. If the company also is a producer, it can choose between buying all electricity from Nord Pool, buying some from Nord Pool and produce some itself, produce all itself, or produce more than it needs and sell the surplus to

²⁶ Other activities as constructing transmission lines, providing broadband connections etc. are not included in the analysis of this paper.

²⁷ www.purehelp.no

Nord Pool. The price and volume depend on demand and marginal production costs²⁸. If we assume that the price at the end-user market and Nord Pool are strongly correlated, it is implied that the price and volume risk are the same for both markets.

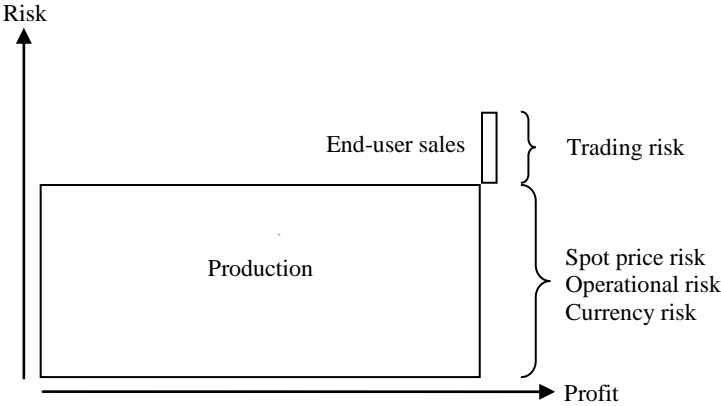


Figure 7: Illustration of risk versus profit in a power company.

Prior to the research we stated that Alternative 1 might be the best option for handling operational risk connected to internal processes in a company. However this requires an existing ABC implementation, which most of the power companies interviewed do not have. Because most of the operational risk is connected to the production of only one commodity, a top-down approach seems feasible. For the market risk it is also likely that the total risk is known, and we therefore believe Alternative 2 is the best option. Regarding the discussion about overhead/direct risk, the price and currency risk can be regarded as direct risks because they are proportional to the volume. When a company is exposed to different markets through various products and/or by geography, the business-volume risk can be challenging to separate, favouring Alternative 4. For power companies however it is probable that the volume fluctuations are more or less the same for the whole market, making Alternative 4 unnecessary.

7.4 ABRM in Industrial Companies

The reason why we have chosen to discuss an ABRM implementation in the industrial sector is that they have a product focus and presumably also a significant amount of the four risk categories presented earlier in this paper. A further discussion follows below.

The research of this thesis gives clear indications on what types of risks that are most important for banks and power companies. However, we do not have empirical knowledge regarding how industrial companies emphasize risk. The discussion on how industrial companies can implement ABRM must therefore be based on a hypothesis stating their main risk categories.

²⁸ For a hydroelectric power company this equals the *water value*. This is an optimization of producing now, or saving the water in the magazines to when future prices are expected to be higher. We do not explain this any further in this paper

To narrow down the scope of industrial companies, let us consider the manufacturing industry. The manufacturing industry can in a way be compared with power companies, seeing how the core business is production and sales for both. Applying the four risk categories defined by Buehler and Pritsch (2003) and the results from the research, it is clear that market risk and business-volume risk are important for power companies (see section 6.2.2), and it should not be faulty to state the same for the manufacturing industry. Raw materials are needed for the production, hence market risk is present, and sales depend on the demand, so business-volume risk is also a considerable factor²⁹. Of course, the magnitude of these risk types varies with the company's product portfolio.

However, the distinction between the two business sectors may be in their use of ABC. Turney (2008) states that by the late nineties ABC was extensively used by industrial companies, and it was actually triggered by electronics and automotive businesses' growing competition. On the other hand, our research shows that power companies use the full-cost method rather than ABC. These facts could imply that the manufacturing industry applies ABC more extensively.

Credit risk and operational risk are the two other risk categories mentioned by Buehler and Pritsch (2003). Manufacturing companies do a lot of sales on credit, which means that there is a possibility that the customer fails to meet its obligation. Depending on the complexity of the products it is also likely to expect some occurrence of machine failure and/or people failing to do their part of a process. Consequently, without pointing out one as more crucial than the other, all four risk categories are significantly present in the manufacturing industry, and this leaves us with a basis for discussing the implementation of ABRM.

7.4.1 An Example of Alternative 1

As mentioned, there are implications that the manufacturing industry uses ABC extensively. The manufacturing industry also distinguishes itself from banks in having a product focus instead of customer focus. Hence, Alternative 1 becomes relevant for this business sector. In fact, Alternative 2 and 4 also seem relevant, where credit risk is an overhead risk and the three other categories direct risks³⁰. An example where operational risk is allocated to products applying Alternative 1 is given in Figure 8. However, concluding on the feasibility or discussing whether the method used in Figure 8 is reasonable is not straight forward without an empirical background, and conducting a research on it is to the extent that it could be a separate thesis. We will still try to give a superficial view of the process.

Figure 8 shows the bottom-up method from Alternative 1 applied for operational risk in a fictitious manufacturing company. The activities and the distribution keys are the same as for the cost allocation of the company, the only difference is that the expense categories are swapped with total operational risk. The numbers to the left in the activity boxes represent the

²⁹ Manufacturing companies can hedge the business-volume risk by making contracts on future sales, as for the power sector.

³⁰ Business-volume risk can be partly overhead.

costs allocated to the respective activities, and the number to the right is the amount of capital held for operational risk.

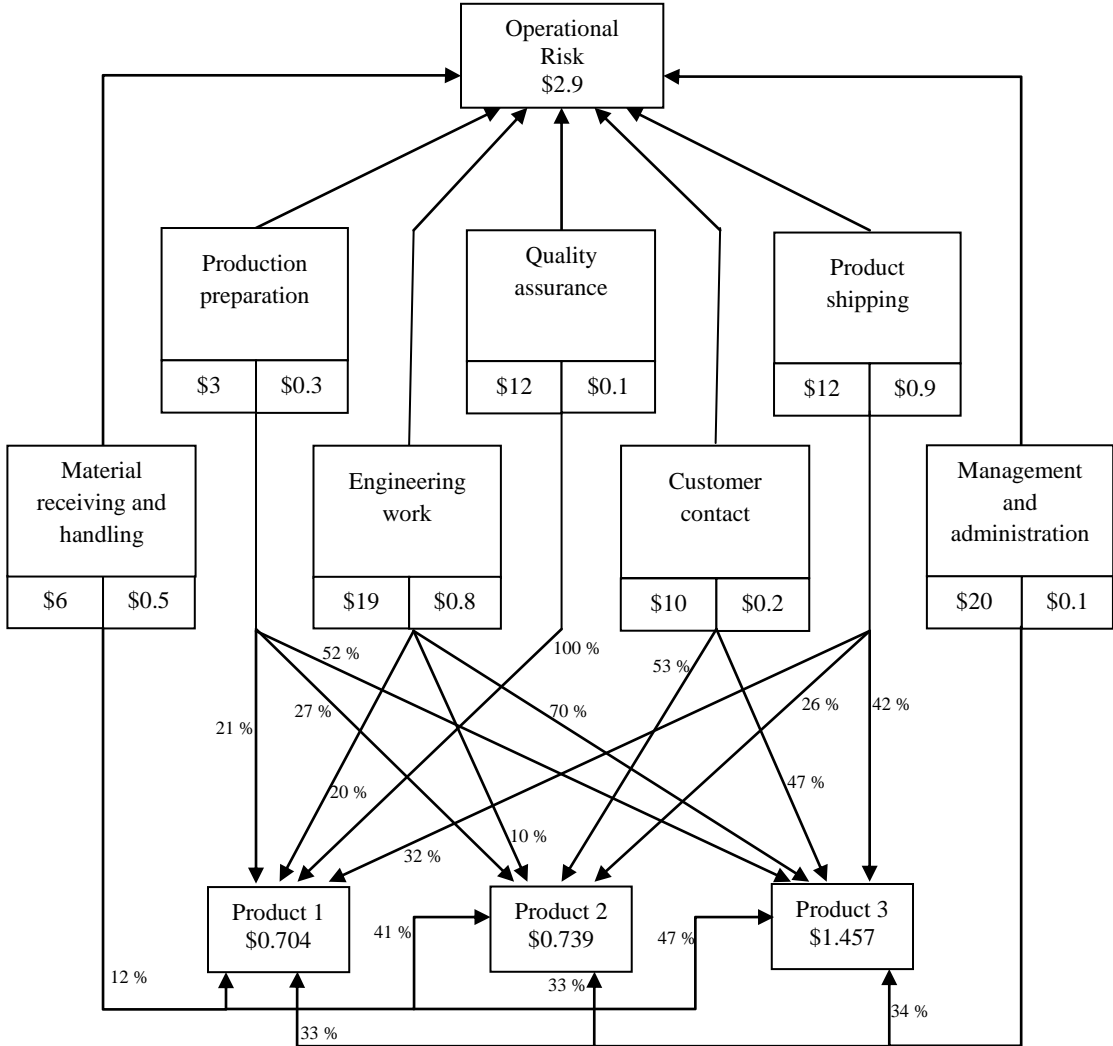


Figure 8: Alternative 1 applied on operational risk. Operational risk is allocated to products through activities.

The amounts of capital held for each of the activities are in the given example only qualified guesses related to the costs, but we will try to explain the basis for the guesses in Table 5.

Activity	Basis for determining capital held for operational risk
Material receiving and handling	Probability of late arrival or wrong handling.
Production preparation	Probability of machine malfunctions or human errors.
Engineering work	Probability of failing to meet customer demands or cost overruns.
Quality assurance	Probability of quality assurers failing to do their job, e.g. a quality improvement project having a negative effect.
Customer contact	Probability of corruption, misguidance or entering bad contracts.
Product shipping	Probability of sending merchandise to the wrong customer or damaging the merchandise.
Management and administration	Probability of corruption or embezzlement.

Table 5: The relation between costs and capital held for operational risk.

As Figure 8 shows, product 3 holds 50 percent ($1.457/2.9$) of the total operational risk. This observation is valuable information in itself, but can also be used either in pricing risk more correctly or even altering the production and hence sales volume of product 3.

It should be noted that the potential for improvement should be bigger for the manufacturing companies compared to the bank and power sector. Our opinion is that industrial companies are less mature, at least considering risk management, and could benefit from implementing ABRM or similar methods³¹.

³¹ It should again be noted that this statement is not based on facts or empirical data, it is merely the authors' opinion.

8 Conclusion - Final Suggested Framework

The objective of this paper was to explore why and how cost allocation and ERM could be combined. To answer the second question, we found it suitable to use ABC as a cost allocation method and came up with three different alternatives for completing the task. Alternative 3, developed prior to the research was a combination of the top-down and bottom-up alternatives. A new alternative (Alternative 4) was presented after evaluating the empirical data, and can also be combined with one of the other alternatives. We therefore find it appropriate to exclude Alternative 3 from the ABRM framework, since a combination of the remaining alternatives seems necessary for *any* implementation of ABRM. An overview is shown in Table 6.

	Appropriate for	Requires existing ABC	Requires ERM
Alternative 1 Bottom-up	Operational risk connected to internal processes	Yes	No
Alternative 2 Top-down	Market, credit and business-volume risk	No	Yes
Alternative 4 Bottom-up	Overhead risks	No	No

Table 6: Overview of the ABRM alternatives.

Furthermore, we have discussed which alternatives are appropriate for the three business sectors presented. A summary is given in Table 7.

Business sector	Alternative 1	Alternative 2	Alternative 4
Banks	Not suitable due to lack of ABC	Suitable for operational risk, attention-directing information	Suitable for overhead risks (market and credit risk)
Power companies	Not suitable due to lack of ABC	Suitable for all risks	Unnecessary
Manufacturing industry	Suitable for operational risk	Suitable for remaining risks if top-down is appropriate	Suitable for remaining risks if complexity is higher and bottom-up appropriate

Table 7: ABRM in different business sectors.

As Table 7 states, it is apparent that the ABRM alternatives are most applicable for the manufacturing industry. Banks and power companies require alternatives that do not depend on existing ABC implementations. However, the ABC mindset is noticeable in Alternative 2 and 4, which indicates that the ABC hypothesis has not been in vain.

This has led us to the following steps, which make up what we call the final ABRM framework:

1. Map the risk appetite of the firm.
2. Analyze and determine amounts of risk for Buehler and Pritsch's (2003) four main categories³².
3. Find out if the risks are direct or overhead with respect to cost objects.
4. Make plans for handling risks by selecting the appropriate ABRM alternatives from Table 6 (top-down or bottom-up).
5. Evaluate if ABRM has been successful in terms of the objective of the firm, costs and sustainability.
6. Act thereafter to make improvements, or end the ABRM process if not profitable.

As point 4 states, the selection of alternative must be done considering the wishes and available resources of the company. As an example, a firm with a low budget might not have the resources to carry out a comprehensive analysis.

To answer the question of *why* ERM and ABC should be combined, a possible answer to this could be to achieve a more accurate result when calculating the costs, as stated as one of the objectives of ABC in chapter 2. This could be done by trying to include the *cost* of the risk as discussed in chapter 4 (referred to as the cost of hedging). We believe this cost will be possible to calculate for most types of risks. However the impact of the risk cost may differ with types of risk, and quantifying it may in some cases lead to the faulty impression of control and increase the error margins instead of reducing them. The risk quantified as hedging costs allocated to a product can also be used in comparison with the risk costs implied by the market. This could indicate whether or not the company has an appropriate hedging strategy. However, calculating an implied risk cost from market prices might in practice be difficult and/or misleading.

Another aspect at least as important is the value of the knowledge obtained through implementation of the final ABRM framework. We believe that the analysis of the risk driver relationships, as well as the analysis of each risk type itself (as exemplified in Table 1), provide a deeper understanding of the actual risk exposures and is useful in directing attention to the different risks. Believably, ABC and ERM combined will lead to a more complete risk-management in the company, as the different risk types are treated at several levels of the organisation, compared to an all-ERM strategy where risks are not connected to product types.

³² Other risk categories can of course be applied, but in this paper we choose to emphasize Buehler and Pritsch's (2003) definitions.

Regarding the question of whether or not the ABRM model would be of purpose or not, this is not easy to answer before having applied it in the real world and judged its results (even after having conducted a research of banks and power companies). However, the present paper is only meant as an introductory discussion to the topic, and will hopefully provide some innovative input to the world of risk management.

8.1 Problems and Possible Drawbacks

As stated in section 2.2.2, several of the ABC assumptions might not necessarily be valid in real life situations. While applying a method similar to ABC on risk, we have tried to consider the implications of those assumptions, and this is basically used as an argument for the plausibility of our new suggested framework. However, the nature of risk is not the same as the nature of costs, and there is no guaranty that the same assumptions are adequate when considering risk. Especially the matter of correlations between the different risks, and the risk measure, should be further investigated when discussing the separability of the risks. A reason for the development of ABC was that the overhead costs seemed ever increasing (Bruns and Kaplan 1987), but ever increasing overhead risks cannot be used as a reason to defend implementing ABRM³³.

Due to the emergence of other *improvement programs*³⁴, like balanced scorecard and lean manufacturing, the ABRM framework could be considered as a *step backwards*. These new methods focus on simplification, and this philosophy might conflict with the detail level and analysis required by our framework. There is always a risk that an improvement program leads to more non-value-adding work in the company, only making it more complex and increasing the costs. The fact that banks already have complex risk management strategies, as the empirical results show and addressed in the beginning of section 7.2, could also create problems when trying to implement ABRM with respect to compatibility.

Holding on to the thoughts around the detail level of the ABRM framework, the complexity of it might result in decisions not being made because of people interpreting it differently, as indicated for the ABC model in section 2.3 on lean accounting.

Maiga and Jacobs (2003) look at the implementation of ABC together with the balanced scorecard. Their study claims that even though both improvement programs are individually effective, when implemented side by side they will compete for priority and reduce the performance. It is therefore nearby to think that this could also happen when other improvement programs are implemented together with ABC, keeping in mind that ERM is quite different from balanced scorecard.

³³ We have no indications stating that overhead risks are increasing.

³⁴ Methods like balanced scorecard and lean accounting are referred to as *improvement programs* in this paper. The name is not an attempt to indicate if these programs do in fact have an improving effect.

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10 Appendices

Appendix 1: Contract with NSD

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES



Harald Hårfagre gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nso.uib.no
www.nsd.uib.no
Org.nr. 985 321 884

Sjur Westgaard
Institutt for industriell økonomi og teknologiledelse
NTNU
Alfred Getzvei 3
7491 TRONDHEIM

Vår dato: 24.02.2011

Vår ref: 26141 / 3 / AMS

Deres dato:

Deres ref:

KVITTERING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 25.01.2011. Meldingen gjelder prosjektet:

26141	<i>Risk - A Cost to Allocate? An Empirical Study of Business Practise</i>
Behandlingsansvarlig	NTNU, ved institusjonens øverste leder
Daglig ansvarlig	Sjur Westgaard
Student	Varun Upadhyay

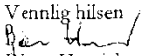
Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstiller kravene i personopplysningsloven.

Personvernombudets vurdering forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, eventuelle kommentarer samt personopplysningsloven/-helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/forsk_stud/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://www.nsd.uib.no/personvern/prosjektoversikt.jsp>.

Personvernombudet vil ved prosjektets avslutning, 14.06.2011, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Bjørn Henriksen


Anne-Mette Somby

Kontaktperson: Anne-Mette Somby tlf: 55 58 25 83
Vedlegg: Prosjektvurdering
Kopi: Varun Upadhyay, Othilienborgveien 18, 7033 TRONDHEIM

Avdelingskontorer / District Offices:

OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. nsd@uio.no
TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. kyre.svanav@svt.ntnu.no
TROMSØ: NSD, HSL, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 43 36. marlin.arnundersen@uit.no

Personvernombudet for forskning



Prosjektvurdering - Kommentar

Prosjektnr: 26141

Prosjektet innebærer intervjuer med Finans-/risikosjefer i norske banker og industriselskap. Veileder og student vil kontakte informantene direkte gjennom e-post og telefon. Det skal i henhold til prosjektmeldingen gis muntlig informasjon til informantene og det vil innhentes muntlig samtykke.

For at et samtykke skal være gyldig i henhold til personopplysningsloven må følgende informasjon gis:

- Navn og kontaktinformasjon til student og veileder
- Hva som er formålet med prosjektet
- At det er frivillig å delta og at man kan trekke seg fra deltakelse når som helst uten å gi en begrunnelse
- Dato for prosjektslutt og hva som skal skje med innsamlet materiale når prosjektet avsluttes

Datamaterialet vil ikke inneholde personlige opplysninger.

Lydopptak skal behandles på pc, og opplysningene skal behandles aidentifisert på privat pc. Det vil også bli benyttet bærbar pc. I tillegg til student og veileder vil ytterligere en student og biveileder ha tilgang til datamaterialet.

Prosjektslutt er angitt til 14. juni 2011. I følge prosjektmeldingen skal datamaterialet anonymiseres innen prosjektslutt. Personvernombudet minner om at dette vil innebære å slette eller skrive om direkte og indirekte personidentifiserende opplysninger i transkripsjoner, samt å slette lydopptak.

Appendix 2: Interview Guide

Costs

1. What is the source of your cost allocation?
 - a. (General ledger?)
 - b. (Calculations separate from the financial accounts?)
2. How do you allocate these costs?
 - a. (Volume based?)
 - b. (Activity based?)
 - c. (Which method do you use?)
3. Why do you use this method?
4. What is the purpose of the cost allocation?
 - a. (More accurate pricing?)
 - b. (Performance measurement?)
 - c. (Attention directing?)
 - d. (Better control?)

Risk

1. What do you understand with the concept of risk?
 - a. (How is risk understood?)
 - b. (What is the purpose of managing risks?)
 - c. (Compliance or strategic advantage?)
2. Does your company have any guidelines for the risk management?
 - a. (At which level in the organization?)
3. Can you explain your implementation of the risk management?
 - a. (ERM?)
 - b. (Balanced scorecard?)
 - c. (Other methods?)
4. How often is risk a topic for the Board?
5. What initiates the risk discussion?
 - a. (Written guidelines?)
 - b. (Supply from CEO?)
 - c. (Demand from BoD?)
6. Who initiates the risk areas under discussion?
7. Which areas are emphasized? (What is reported?)
 - a. (Financial?)
 - b. (Operational?)
 - c. (Strategic?)
8. Who is preparing the report?
 - a. (Who is actually reporting?)
 - b. (CEO, CFO, CRO, etc?)
 - c. (What does the board notice say? Triangulation)
9. How are the reports concluded and being followed up?

- a. (What do the minutes say? Triangulation)
10. What categories do you divide your total risk into, and which is most important?
- a. (Market risk?)
 - b. (Business-volume risk?)
 - c. (Credit risk?)
 - d. (Operational risk, etc?)
11. How do you measure risk?
- a. (VaR?)
 - b. (Probabilities?)
 - c. (Scenarios, etc?)
 - d. (For the different categories?)
12. Do you price risk from any of the categories into cost objects?
- a. (To customers?)
 - b. (To products, etc?)
13. If risk is not considered in product pricing, do you have another way to make sure that the risk-adjusted profit for each product is satisfying?
- a. (Is each product treated separately, or is only the overall risk-adjusted profit considered?)
 - b. (Do you use quantitative models?)
14. Do you feel that your existing risk and cost methods are adequate, or would you be open minded considering new methods? (Maybe both?)
- a. (Too extensive?)
 - b. (Too simple?)
 - c. (Providing valuable information?)
15. If risk is not considered in product pricing, do you see any advantages of implementing such risk into cost allocation?
- a. (More accurate pricing with respect to risk categories?)
 - b. (Optimal product combination?)
 - c. (Reducing amount of equity capital needed by reducing nonsystematic risk?)
 - d. (To be used in comparison with risk implied by the market?)
 - e. (Provide deeper understanding and directing attention?)

Appendix 3: Interview Results, Tabular Form

Analysis of the Cost Allocation Part

Interview object	Maturity (Low, medium, high)	Method and distribution key	Purpose	Detail level (To which level are the costs allocated)	Possible to include risk	Special observations/comments
Bank A	High	ABC-like method. Cost allocated directly to source if possible, otherwise by risk weighted assets and full-time equivalents. Separate calculations for customer profitability with risk weighted assets as distribution key.	Customer profitability and performance measurement for the different branch offices and divisions.	Branch offices and administrative divisions are cost centres. Separate calculations for customer profitability.	Risk weighted assets are distribution keys. This might work as a key for risk allocation as well?	Investigate further the concept of risk weighted assets. Capital is allocated based on how much risk the branch office is taking.
Bank B	High	ABC-like method. Costs are directly allocated if possible, otherwise equally or some other way.	To know what drives the costs in order to be cost effective. The method currently applied is "best practise", something they have been doing for some time and are used to.	The allocation stops at the level it can no more be allocated. "You should talk to somebody in the economy department".	Cost allocation stops at division level, so ABRM will not work here.	Oppfølgingsspørsmål nødvendig.
Bank C	High	Mix of traditional and ABC?	Customer (and product) profitability, and to be able to analyze what's profitable.	Costs are allocated to products and customers. The interviewee also says they are able to see profitability down to branch and case officer levels, which must imply that costs are allocated here.	Cost allocation stops at division level, so ABRM will not work here.	Oppfølgingsspørsmål nødvendig Oscar Kamberg. Varum er ikke sikker på om dette er nødvendig her. Jo, kanskje for å finne ut av om de bruker ABC eller ikke. Dog tipper jeg at systemet deres er ABC-inspirert, med forandringer med tida.
Bank D	High	Basis in ABC, has been made some changes over time.	Customer profitability, resources are used. Product profitability.	Costs are allocated to divisions. Thereafter bank offices are followed up by "bidragsmetoden".	Cost allocation stops at division level, so ABRM will not work here.	Are currently working on a project to see if the costs are being allocated correctly, if the right keys are being used.
Bank E	High	Not ABC, but a simpler allocation. Costs are distributed where income is generated. From customer areas down to branches, the årsverks are distribution keys. Needed resources are reported and costs are then distributed accordingly from the top.	The method is easy to apply and cheaper than for example ABC. The customer areas and branches are given incentives to focus on the costs they can affect instead of the costs allocated to them. Get a good overview of the real earnings of the branches and keep focus on products the clients	Costs allocated to customer areas/branches and thereafter to smaller branches, for example one branch office.	Cost allocation stops at division level, so ABRM will not work here.	

Energi A	Medium	Claimed ABC-like method. Distribution keys are numbers of employees and financial ratios.	need. Juridical and fiscally correct cost distribution	Concern costs are allocated to the different branch companies	Few details known.	
Energi B	High	Traditional method. Distribution keys.	Fiscally correct cost distribution seems to be most important.	Probably to divisions. The profitability of each division is judged by the contribution method. Follow-up question		Oppfølgings spørsmål til økonomi avd. Hva er fordelingsnøkklene, og til hvilket nivå fordeles kostnader.
Energi C	Guessing Low	All cost are allocated to "hedging", which is one of two business areas, the other is trading. Follow-up question on distribution keys	We have no purpose to allocate the costs any more accurately than we already do. Keep it simple.	Follow-up question	Hard to say without more information.	The person interviewed is "Leder for krafthandel og analyse" and the management of the company is organized such that everybody takes a part in different tasks such as trading and hedging. There are few people working in relevant divisions of Energi C. Follow-up question needed.
Energi D	Low	Transaction based. Running costs at the mother company is allocated to the daughter companies based on the service they order. Apparently costs are distributed by rough estimations.	No information. Follow-up question	No information. Follow-up question	No information	
Energi E	Medium(- high)	Not ABC. Full cost/traditional method if the price is beneath the market price. Distribution keys are employees, number of computers, etc (which are traditional keys).	ABC is unnecessarily complicated. Purpose is to calculate prices between companies in the corporation, and to obtain an effective measure considering the operating results of the business areas.	Seems like costs are allocated to the different business areas, the different AS 's, and distribution keys are as for traditional cost allocation.	Bottom-up or top-down might work. That the company works on AS-level might be an obstacle, but maybe the risk management could be done on AS-level. However, this might again lead to inefficiency in the total risk management. The risk categories are not aggregated into one total risk.	The business areas are divided into separate AS's (don't know the proper definition for a Norwegian AS in english).
Energi F		Traditional cost allocation parent company level. Distribution keys are number of employees. For end-user sale contribution method. Follow-up question on distribution keys	No information. Follow-up question	Probably to branch company level.	No information	

Analysis of the Risk Management Part

Interview object	How is risk understood (as a business potential, as a problem)	Type of risk management	Purpose of risk management	How is risk included in product pricing	Risk categories and measurements	Individual risk types aggregated to calculate total risk (yes,no)	Willingness to implement new methods	Special observations/comments
Bank A	"Risk is everything". Risk is a cost.	The interviewee states that it is hard to not call their risk management for ERM. Bank A also uses a balanced scorecard which includes credit risk and operational risk. A group risk section was newly established to get a more holistic view of the risk.	Capital is allocated from the mother company according to the risk exposure. The return on this capital (ROC) must be satisfactory. It is also a good measure of the risk.	Customer parameters used to calculate a price that reflects capital cost of the customer.	Credit risk: risk models Operational risk: Simple Basel, Advanced Basel in the future Quantitative risk (business volume): Statistical models Business risk: function of variation in income (changes in capital cost)	Total risk measurement is the allocated risk capital. Unclear if this mathematically corresponds to the sum of each risk type.	The finance crisis showed that the risk management was inadequate. Improvements are needed.	Low-risk customers subsidize high-risk customers. Problem for the banking sector, a concern in Basel II & III. Bank A has their mother company in another country, which gives guidelines and allocates capital, and also takes on all the market risk and liquidation risk.
Bank B	Possibility of losing money.	Bank B has strategies, policies, "even routines" and frameworks to guide risk management. Risk is a part of their balanced scorecard. From what the interviewee says, I would call it ERM.	Every division should know how to handle risk, so risk management is present from top to bottom.	If one type of risk is the source for some known expected losses for one product or client, that value is somehow allocated to the price. Some types of risks are equally included. The interviewee states that for now, this is a very qualitative approach.	Varies Credit risk: Probability of losses, simulations. Financial risk Counterparty risk Market risk: VaR Operational risk: Collect data. Simple Basel. Advanced Basel in the future	Total risk aggregated from credit risk, financial risk, counterparty risk, etc.	Risk pricing could be done in a more sophisticated manner. Cost allocation could also be more precise. But, considering a cost-benefit point of view, the interviewee is not certain that it would pay off to do it more thoroughly.	
Bank C	Risk is deviation from the expected results. Both negative and positive. Mainly negative since	ERM: Enterprise Wide Risk Management. The board decides on a superior risk policy. The policy says that there should be interdependency between those who expose	Because taking risk is the core business, managing (understanding and controlling) the risk is important.	IRB system. Risk capital is included in these systems at branch and case officer levels. Credits with equal risks are tried priced equally, but	Credit risk: Risk adjusted capital. Market risk: VaR (extreme volatility) Business risk: Statistical model	Risk adjusted capital is total risk measure.	Some details can be improved. The focus on risk adjusted profitability is there, and Bank C feels it has a good structure. The	The interviewee is "leader for risikoanalyse" and had a lot of detailed knowledge on all risk aspects of the firm.

	Events that affect the company economically			user sale, and in projects. The risk component will cover the cost of the trading (hedging), not the total risk.	Counterparty risk: Not very big. Operational risk: Risk mapping	measure	risk management than banks, but because of the nature of the business the risk management is seen as adequate	
Energi B	Risk is uncertainty both ways. For projects and operations, the downside risk is the main focus, while for economical risk both upside and downside is considered.	QRM (Quantitative Risk Management) Risk matrix and S-curve. Enterprise wide focus, ERM inspired.	Compliance, but also to have a learning effect from projects and get a comparative advantage	Risk not directly priced in sale to the Nordpool. Do some end-customer sale related to trading, where risk I included in the price. For investments risk is more taken into account.	Market/business risk (includes currency and interest rates) Finance and Credit risk, Project risk Operational risk VaR, profit at risk, probabilities and consequence.	NO	Believes that the idea can be interesting for financial institutions where market price of assets are more easy available. For energy sector the risk of crosssubsidising is less, and it might not be worth it.	<i>"Tiss du ser på forventingsverdi kan man få det samme beløpet enten med ting som skjer ofte med lav effekt eller noe som skjer skjøldent men med høyt tall. Derfor har vi spredd oss i to dimensjoner"</i>
Energi C	Uncertainty regarding probabilities of future outcomes, and what the future outcomes might be.	Not ERM. Reputational risk and similar are not considered. Regarding financial and operational risk, the board decides on a framework for the finances including maximal losses and restrictions on VaR. This gives a kind of a rectangle for taking action. Financial administration is included in a balanced scorecard.	The detail level of frameworks given by the board indicates that the purpose is to stabilize future income. "Hedging" department has a crucial role here. Energi C is partly owned by local governments, hence they have to assure the governments regarding future income.	For instance in the trading division, risk is included when calculating required rate of return applying models given by Basel II (something to do with equity). The timing of sales is essential in pricing risk.	Mainly market risk and currency risk. Financial risk, business-volume risk and credit risk are also mentioned during the interview. Nothing on operational risk, which the interviewee clearly dislikes. Measured in hedge ratios (percentages) and VaR.	It seems that which risk categories are discussed depends on the current situation of the risks. Hence I do not think that the risks are aggregated into one total risk.	The interviewee states that he is satisfied with existing methods, where he does not find the cost allocation part of much relevance, but the risk management he feels is at a high level already. At the same time, he feels that all "sluttkrøftermaer" need to price risk.	Seems like the risk framework is very accurately defined. Partly owned by local governments.
Energi D	Risk is both the possibility of losses and gains	Risk related to safety of technical installations are regulated for de sector. Implementation of Risk management as a management tool has started a year ago, but low interest form top management has made	Previously risk management seems to have been done for compliance reasons. However, risk management is now considered as a tool used to reach goals in the form of improvements.	The sales to Nordpool are considered trading and compared to banking, implying that the trading should generate a risk adjusted income. No information on end-	Operational risk, financial risk, strategic risk and project risk. Measurements VaR, number of incidents and power disruptions.	Ambiguous information.	Is still in the implementation phase of current risk management system, not mature enough for new methods yet.	Problems with implementation of the risk management due to lack of commitment and interest from the top management.

Energi E	Risk is both upside and downside. Events that affect the company economically	it difficult . EasyRiskManager, probably similar to ERM.	Maintain a minimum credit rating	user sales. Tries to include a risk component in the price in end-user sale, and in projects. The risk component will cover the cost of the trading (hedging), not the total risk.	Market risk: Balance and rating simulation. Counterparty risk: Not very big. Operational risk: Risk mapping	Risk for lower rating is proposed as a total risk measure	Acknowledgement of a less comprehensive risk management than banks, but because of the nature of the business the risk management is seen as adequate	
Energi F	Risk is deviation from desired outcome. Risk is also seen as unwanted exposure. If the strategy is exposure to the spot-price, any deviation from this is seen as risk.	ERM perspective. Also a dynamic hedging strategy is seen as important to reduce the risk and make more profit.	No information, other than that the owner is risk averse and therefore the strategy is to lower the exposure to spot-price, and do more pre-sale when low prices are expected.	Most of the risk is passed on to the customer in end-user sale.	Market risk: Quantitative. Qualitative for other types of risk like operational risk, HSE etc.	Probably not	Believes that competition will harden and that a better cost control will be crucial. Believes that risk is not considered good enough in end-user sale in the power industry. When the margins decrease this will be more important.	Risk is deviation from desired outcome. Risk is also seen as unwanted exposure. If the strategy is exposure to the spot-price, any deviation from this is seen as risk.