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# Organic Salmon Farming

***An Assessment of Managerial and Organizational Implications, and the Internalization of Environmental Externalities***

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# Abstract

Organic salmon farming has emerged in the wake of tightened competition in conventional production as an initiative to internalize many of the claimed externalities most people associate with modern aquaculture. However, as Norwegian producers have largely dominated the commoditized salmon industry, in terms of volumes and cost-effectiveness, their incentives for diversification are confined (Georgakopoulos and Thomson, 2005).

Two case companies were chosen to explore the motives and means for diversifying into organic salmon farming in Norway, and to examine the managerial and organizational implications of this strategic decision. The project draws upon extant theories pertaining to the subjects of industry-based and resource-based strategy, management accounting and environmental management systems.

A qualitative research approach was taken to gather primary data, in the form of five semi-structured in-depth interviews. The respondents represented various management positions in two Norwegian aquaculture companies. An exploratory case study design was applied to enable cross-case comparisons and to fortify the findings. Secondary data, regarding company characteristics and related studies, was also collected to strengthen the results.

The research findings indicate that successful implementation is reliant on distinctive resources pertaining to human capital, well-integrated quality systems and cost control. The shift was made in conformity with the overall firm strategies rather than as a response to external pressure from various stakeholders. Management accounting played a key role in assessing, allocating and actively reducing the environmental costs associated with organic production. The implementation did not activate any large investments and the price premiums offset most of the excess costs related to certification compliance, enabling the companies to achieve margins which equaled those in conventional production.

Organic certification was, through the presence and usage of the abovementioned firm resources, revealed as an integrating mechanism for environmental issues in the organizations. However, the environmental performance of organic production was limited by a perceived disparity between the intended meaning of various certification standards and their practical implications, which in turn confines the purpose of advanced management accounting as a means for enhancing environmental performance.

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The project is the outcome of several important contributions.

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# 1 Introduction

The everlasting efficiency enhancements in modern salmon farming indicate the industry's potential of becoming a significant provider of food for future generations of mankind. While commercial agriculture has developed over centuries, large-scale aquaculture (i.e. the farming of aquatic plants and animals (Tacon, 2008)) is a little over forty years old. Yet, developments in feed efficiency and economic profitability in modern aquaculture are already ahead of agricultural progress, which is why aquaculture is enthusiastically referred to as the "Blue Revolution" (The Economist Aug 7th, 2003). In 2009, the Norwegian salmon farming industry achieved an average return on capital of 15 % without ever having to be subsidized, with mean feed conversion ratios (i.e. FCR; the amount of feed required to produce one kg of fish) of 1.21 (Directory of Fisheries, 2009). Total sales amounted to one million tons and NOK 22.4 billion, which correspond to approximately 14 million dinner portions a day (Statistics Norway, 2010).

However, salmon farming companies have repeatedly proved insufficient of balancing social, ecological and economic goals (Cabello, 2006; Naylor, 2005). This, alongside with the generally growing consumer awareness of farming practices and their effects, has led to the development of a complex net of stakeholders (i.e. all different groups of people whose life in some way get affected by a company's actions) continuously trying to maneuver the industry in what they believe is the right direction. Activists have had a tendency of addressing environmental issues from an ideological or absolutist point of view, as if social benefits are all that matters (Porter and Kramer, 2011). Governments and Non-Governmental Organizations (NGOs) often assume that trade-offs between social benefits are inevitable, complicating these trade-offs through their approaches. Asche (Dagens Næringsliv Jan 29th, 2011) argues that the Norwegian salmon farming industry is about to get ruined by the various stakeholders who lobby against its existence. Furthermore, he states that while the Norwegian government allow for lobbyists to influence their agenda, the industry is about to stagnate and may eventually die out if the current pressure continues. Similarly, Porter and Kramer (2011) argue that the successfulness of an industry cluster (such as the Norwegian aquaculture industry) inevitably depends on the collaboration within the private sector, as well as with government agencies and NGOs.

A variety of reporting schemes and key performance indicators has been developed as an attempt to reduce the environmental risks associated with salmon farming (OECD, 2009). Some are regulatory requirements institutionalized by law, whereas others seek voluntary commitment and are optional. Hence, satisfying stakeholder expectations and requirements

through environmental awareness has become a mainstream activity for most salmon farming companies. Porter and Kramer (2011) argue that these corporate social responsibility (CSR) programs are responses to stakeholder pressure and have appeared merely as an essential expense to sustain companies' reputation. Since CSR programs focus largely on reputation and have only a confined connection to business activities, social and economic integration may be achieved more effectively if governments learn how to regulate in ways that enable companies to align social improvements with their core business, rather than working against it (Dagens Næringsliv Jan 29th, 2011; Porter and Kramer, 2011).

As a result, although many companies perceive environmental obligations as obstacles to profit maximization, some have identified the increasing engagement towards sustainable development as an opportunity to differentiate products along this dimension (Samuelsen and Sogn-Grundvåg, 2009; Reinhardt, 1998). Demand for goods that sustain societal needs is continuously growing in advanced economies (OECD, 2009; Porter and Kramer, 2011). While most food companies traditionally concentrated on attributes like taste and quantity to drive consumer demand, the fundamental need for better nutrition is becoming a key element for suppliers to sustain competitiveness (OECD, 2009). This view has inspired companies and has opened for whole new ways of innovation, where integration between social and economic gains is created. In addition, Porter and Kramer (2011) argues that businesses are usually far more successful than governments and nonprofits are at marketing that motivates consumers to embrace healthier food and environmentally preferable products, thereby increasing the society's gains further. For this reason, some companies adjust their corporate strategy and invest in new methods and processes that satisfy both corporate economic and societal needs. Accordingly, the demand for reliable and credible high quality in food products has opened for organic product differentiation, where the characteristics being demanded are not primarily tied to the physical attributes of the product, but to the influence its production process has had on the environment (OECD, 2009). Through organic certification schemes the company is offered a way of aligning economic, ecological and social goals (Debio, 2008), assuming that buyers of organic salmon have a willingness to pay a price premium for environmental quality that exceeds the cost of certification compliance (Reinhardt, 1998).

The potential of the salmon farming industry as a sustainable provider of healthy food for future generations, and the continuation of aquaculture as a "Blue Revolution", is argued to be confined unless environmental issues are addressed more pro-actively (Georgakopoulos and

Thomson, 2005). The organic aquaculture concept is an attempt of balancing economic, ecological and social interests, where the goal is to improve the position of salmon farming as an important global provider of healthy food (Debio, 2008). Externalities arise in conventional farming when the companies create social costs that they do not have to abide, such as pollution (Porter and Kramer, 2011). Organic production is a way to "internalize" some of these externalities (Debio, 2008). While researchers such as Pelletier and Tyedmers (2007) and Tveterås (2000) has devoted much effort in determining the sustainability of organic salmon as a product, this study will approach the subject from a different perspective by examining if, or how, the organic certification scheme can function as an environmentally integrating mechanism. This will be done by mapping the motives and means of diversification, and whether implementation facilitates further involvement for dealing with environmental issues.

## 1.1 Research problem and background

The preceding introduction leads to the overall research question of this project:

> *What are the motives and means for diversifying into organic salmon farming in Norway, and what are the managerial and organizational implications of this strategic decision?*

The research problem is specified in four questions, to more fully meet the project objectives in an orderly and structured manner:

1 *Who invest in organic salmon farming, and what are their motives?*

The underlying impetus of organic aquaculture is the idea that consumers are willing to pay a price premium for products that provide greater societal benefits, for example by improving fish health and refrain from using chemicals and medicines, than in conventional production (Reinhardt, 1998). However, in an industry characterized by increasing social pressure from various stakeholders, slimmer margins caused by increased rivalry in commoditized aquaculture, and tighter regulations limiting the opportunities for further growth, the decision to adopt organic production methods might stem from various motives. This part of the study will shed light on the actual idea behind sustainable foods production and explore the motives for diversification.

2 *What kinds of investments are required by such a strategic decision, and how is profitability followed-up?*

Establishing organic production is a strategic investment that requires fulfillment of measurable standards, where the goal is to improve fish health and the environmental performance of

affiliated companies. Organic production is more costly than conventional aquaculture due to strict standards on inputs and operations that impose extra costs on the company. For this reason, it is also a strategic investment towards the environment, where the company's involvement in CSR is bound and set by the standards that the company must abide to maintain certification. This part will focus on revealing what is done to ensure that the decision of going organic will yield additional profits prior to the implementation, and if, how, and to what extent profitability is measured after the decision has been made. Visualizing the environmental costs associated with organic production may allow the company to both reduce costs and improve its environmental performance (Spitzer and Elwood, 1995).

3 *To what extent, and how is environmental sustainability embedded in the management control systems of companies diversifying to organic salmon farming?*

Obtaining and maintaining organic certification requires the fulfillment of several standards associated with sustainable foods production. In order to comply with these standards, as well as to maintain certification until the production batch is finished, the company needs a management control system that ensures that all variables are met at the lowest possible cost at all times. This part of the project aims at revealing how the management control system is altered when diversifying to organic aquaculture, and how efforts for fulfillment are embedded in business activities. This part will also explore whether companies participating in the organic certification system perceive compliance as a sufficient initiative in improving the industry's environmental influence, or if certification facilitates further involvement.

4 *How do management experiences of organic salmon farming companies differ from the expectations that formed the basis of their investment?*

Relatively few Norwegian companies have adopted organic salmon production in comparison to other great aquaculture nations such as Scotland (Georgakopolous and Thomson, 2005). Exploring the experiences of Norwegian companies taking part in the organic certification system can assist in identifying whether the degree of difficulty in implementing and operating the scheme is perceived to be lower or higher than anticipated. This might reveal whether the modest uptake of organic production stem from misconceptions pertaining to its profitability and level of difficulty, or if its low popularity in Norwegian aquaculture in fact is justified. It might also fortify the findings from the preceding research question by exploring how participation may have entailed organizational consequences besides those deriving directly from the certification standards.

## 1.2 Purpose

Several studies have been undertaken to disclose the financial reporting efforts of fish farming companies' involvement in CSR (Schmitt and Wolff, 2007; Cummins, 2004). Less research has been devoted to explore how the interplay between managerial means such as the firm strategy, management accounting and management control systems influences, and is influenced by, a company's environmental performance. This study aims to depict how the environmental performance of fish farming companies is reflected in management accounting and management control systems. This can be explored in many ways. One approach would be to examine whether financial reporting of CSR activities reflects the actual conditions in the company's management control systems. Another approach is to focus on companies that have adopted certification systems that are specifically designed to enhance the production's influence on the environmental and fish health, and in turn how management accounting and control systems are utilized to facilitate environmental improvements. The latter approach will be the focus of this study.

The companies are analyzed by using qualitative in-depth interviews to reveal if, and how, the certification system alters the management's mind-set and the practical execution of operations. From this, the purpose is to identify the companies' underlying interest and commitment to reduce the negative environmental influence of production activities. Although this study does not intend to generalize, the findings could prove helpful in identifying important assets that contribute to the adoption of organic production and to improve the environmental performance in other organizations. By highlighting the costs and benefits of organic salmon farming, this study might also serve as a secondary source of information that could assist companies considering the adoption of organic production.

# 2 Theoretical framework

This chapter of the report aims at introducing and explaining essential concepts and relevant theories that can be used to shed light on why and how Norwegian companies implement the practice of organic salmon farming.

First, some extant theories and perspectives on strategic management are introduced, to explore underlying motives and relevant resources used in the adoption of organic salmon farming practices. Second, investment appraisal techniques are considered to investigate if, or how, the strategic investment is subject to any comprehensive investment appraisal before implementation. Third, management accounting theory is presented to study how the project's profitability is followed-up. Fourth, the interplay between strategy, environmental certification standards and environmental accounting is addressed, to examine whether and how adopting environmental certification standards may influence a firm's management control system with regards to environmental integration – that is how the firm integrates the environment to act in accordance with standards, and whether something is done to go beyond regulatory compliance.

## 2.1 Strategy

The main goal of strategic management is to attain competitive advantages by adapting the company to the choices and implementation of corporate strategy (Barney 2002). In developing competitive advantages through strategic management, three schools on why some companies persistently outperform other companies have dominated this research field (Barney 2002). The first perspective was first articulated by Porter (1980, 1996), and has given significant insight to how the external environment in which the company operates can offer opportunities to create and sustain competitive advantages.

The second approach focuses less on industry structure and market power, and more on how existing and obtainable internal resources of some companies more effectively respond to customer needs. Barney (2002) has largely devoted his research to the resource-based perspective, but suggests that the two explanations of persistent heterogeneity in company performance are not necessarily contradictory or mutually excluding.

The third school in strategic management is strategic marketing. In contrast to industry-based and resource-based theory, strategic marketing focuses explicitly on demand-side issues as the central factor in strategy formulation (Robertson and Yu, 2001).

By giving a brief overview on all three perspectives, the following sections outlines how a company's corporate strategy can be formulated by taking into consideration its external environment, its internal resources and its demand-side opportunities. The external environment depicts the current industry in which the company operates, and can offer opportunities to gain competitive advantages. The resource-based view focuses on how strengths and weaknesses within the company can be exploited to attain identified opportunities. Strategic marketing connects the identified supply-side opportunities to the demand-side by targeting a product towards a group of customers that outline a demand curve big enough to justify its production (Robertson and Yu, 2001).

### 2.1.1 Industry-based view

In contrast to his predecessors, Porter's *Competitive Strategy* (Porter, 1980) did not focus on situations in which companies can exercise market power. Instead, he looked at it from another angle and recommended that companies adopt strategies that allow them to become local monopolists (Jacobsen, 1992). Porter's *Five Forces That Shape Industry Competition* (figure 1) identifies the five most common threats faced by companies in their local competitive environments, and the circumstances where these are more likely or less likely to be present; threats from substitute products; the power of suppliers; the power of customers; the threat of new entrants; and, competition within the industry itself (Porter, 1980; 1996).


**Figure 1: The Five Forces That Shape Industry Competition (Porter, 1996)**

To a firm in search of competitive advantages, an environmental threat is any individual, group or organization outside a firm that seeks to reduce the level of that firm's performance (Barney

and Hesterly, 2010). Only the five most common environmental threats are included in the framework. However, the extent of present and potential threats may vary between industries.

The model focuses largely on external opportunities and threats and gives little attention to the demand-side, simply assuming that there is sufficient demand (Robertson and Yu, 2001). Given that demand exists, the framework serves as a tool for well-managed companies to search for a market niche in which the power of suppliers and customers is low, threats from new entrants and substitutes are low, and competition from other companies is minimal. However, if the chosen niche turns out to be deceptive, the exit barriers should preferably be low as well.

### 2.1.2 Resourced-based view

The term "resource-based view" was first coined by Wernerfelt (1984), and the idea has later been addressed and structured through various models and theories. This view suggests that a company's ability to gain and sustain competitive advantages is not only a function of its competitive environment, but is also dependent on the resources the company possesses and how they are utilized. Barney (2002), among others, has developed a useful framework that can be used to identify the resource-based competencies in firms. To map potential sources of advantage, companies can perform analyses of internal working conditions, i.e. their strengths and weaknesses. By utilizing particular resources the company can gain a competitive advantage.

Penrose (1959) described companies as bundles of productive resources, where the composition of resources within a company explained the heterogeneity in both performance and organizational structure of companies operating in the same industry. This is the assumption of firm resource heterogeneity (Barney, 2002). According to Barney (2002), the resource-based view also builds upon the assumption that some of these resources are either very costly to copy or inelastic in supply, i.e. the assumption of resource immobility. These underlying assumptions implicate that the sustainability of a competitive advantage relies on competing firms' ability and desire to copy it.

According to Barney (2002), firm resources are all assets, capabilities, competences, organizational processes, firm attributes, information and knowledge that firms possess and that allow companies to comprehend and implement strategies designed to improve effectiveness. Barney (2002) has conventionally divided these resources into four categories: financial capital, physical capital, human capital and organizational capital.

*Financial capital* is the various money resources that firms can utilize to conceive of and implement strategies. *Physical capital* includes the firm's physical technology; facilities/factories and machinery, geographical location and the accessibility of raw material. *Human capital* refers to the training, experience, assessment ability, intelligence and insight of a firm's individual managers and employees, i.e. the attributes of single individuals. *Organizational capital*, on the other hand, is the collection of attributes from all individuals within the company. Here, a firm's formal reporting structure, its formal and informal planning, its controlling and coordinating systems, as well as its culture and reputation are included. Together, these four main resource categories constitute a firm's set of resources (Barney, 2002).

### 2.1.3 Demand-side strategy and the link between strategy and society

There is a degree of compatibility between marketing and economics-based strategic models like those discussed in previous sections, in that they both generally recognize that organizations must utilize their competences to supply products with a demand that justifies its production. Langlois (2001) argues, however, that both Porter and strategists of the resource-based school give minor attention to demand-side. According to Robertson and Yu (2001), the resource-based strategists are more likely to emphasize on the selection of a product, rather than of a group of customers. On the contrary, the marketing approach oftentimes fails to address the supply-side.

Several authors have attempted to extend the economic analysis of business strategy, to allow for dynamic interaction between supply and demand, without gaining general consensus (Langlois, 2001). Thus, neither will this study strive to do so. Instead, it will focus on how strategy can be used to address external pressure and the rising concerns about the environmental performance of business activities by creating shared value through their products, i.e. a meaningful benefit for the society that is also valuable to the business (Porter and Kramer, 2006). Porter and Kramer (2011) defines the concept of shared value as policies and operating practices that improve the competitiveness of a company, while at the same time enhancing the economic and social conditions in the communities in which it operates. Shared value creation is concerned with identifying and enhancing interactions between social and economic progress.

The most influential stakeholders to business law and a company's reputation have become adept at holding companies accountable for the environmental influence of their operations (Porter and Kramer, 2006). Ranking companies on the performance of their CSR has become a mainstream activity for innumerable organizations, and activists and the media see to it that attention is drawn to the companies operating in the extremities. Accordingly, governments are

continuously changing the rules of the game to institutionalize society to corporate conduct. Porter and Kramer (2006) argue that the emergence of countless CSR reporting programs as a way to evaluate a company's environmental achievements fails to address the four arguments proponents of CSR have used to make their case, i.e.; moral obligation; sustainability; license to operate; and, reputation. Instead of focusing on the interdependence of business and society, they focus on the tension between them. Thus, companies participate in a confusion of uncoordinated CSR and charitable activities that neither make any noteworthy social impact nor strengthen the company's long-term competitive position, completely disconnected from the company's strategy (Porter and Kramer 2006; Nawrocka and Parker, 2008).

Porter and Kramer (2006) argue that the task and cost of solving all of society's problems is not the responsibility of individual firms. Instead, each firm should select issues that intersect with its particular business. The crucial strategic approach to address the society is not whether a cause is worthy but whether it presents opportunities to create shared value, i.e. choosing a unique position and a distinctive value chain to deliver on it (Porter and Kramer 2006).

There are three different, but mutually reinforcing, ways that a company can create shared value (Russo, 2008; Porter and Kramer, 2011);

1 By reconceiving products and markets;
2 By redefining productivity in the value chain; and,
3 By enabling local cluster development.

While the following section will focus largely on the first approach of creating shared value, the second approach is addressed further in the section treating management accounting. The third approach will not be given much attention in the theoretical framework as it addresses the role of governmental and the various value-chain stakeholders' influence on the development of successful industry clusters (Porter and Kramer, 2011). Although highly relevant in the particular industry under investigation, a detailed discussion on the topic is beyond the scope of this study. However, the first approach proposes that a way to link strategy and society is to create shared value by privatizing the provision of public goods, i.e. to provide environmentally preferable products that allow for the company to charge consumers a price premium to cover its excess costs of production (Porter and Kramer, 2011; Reinhardt 1998).

### 2.1.4 Environmental product differentiation

Through environmental product differentiation, Reinhardt (1998) suggests that companies are able to create greater value for both the society and for the firm. The idea behind environmental

product differentiation is simple. A firm creates products that provide better environmental benefits, or that impose smaller environmental costs, than comparable products. A firm can also achieve this by producing its goods and services in ways that are less environmentally harmful than the production processes of its competitors (Reinhardt, 1998). Strategy theory suggests that to succeed, a firm must create a distinct value proposition that meets the needs of a chosen market segment. The company gains competitive advantage from how it configures the value-chain or the bundle of firm resources involved in producing, selling, delivering, and supporting its goods or services (Porter and Kramer, 2011). Such products usually impose higher costs to the producer, but similarly they enable the producer to charge a price premium or capture additional market shares, leaving it at least as well off as before (Porter and van der Linde, 1995).

However, in line with the two previously discussed schools of strategists, Reinhardt (1998) argues that the success of a product differentiation strategy along environmental lines depends on the characteristics of industry structure, the regulatory framework imposed by the government, and organizational capability that determine corporate success more generally. Companies are inevitably uninterested in providing public goods unless they find a way to recover the costs of doing so. Reinhardt (1998) argues that the success of environmental product differentiation relies on the existence of three interrelated requirements;

1 Willingness to pay
2 Credible information
3 Barriers to imitation

The first requirement implies that the firm must find, or create, a willingness to pay for environmental quality. The willingness to pay for public goods depends on ambiguous social expectations and strictly economic criteria. Environmental quality is usually a public good, in a sense that it can be enjoyed by everyone around it, and its consumption would be difficult and costly to limit. However, some environmental benefits are also private goods, such as the absence of pesticides in foods, which is believed to be directly beneficial to the human health (Reinhardt, 1998). Rangan, Sohel and Sandberg (1996) suggest that environmental product differentiation is more likely to create a willingness to pay if the product is preferred both from a health standpoint and from an environmental perspective, allowing the firm to bundle both sets of benefits in a differentiated version of a conventional private good. Moreover, the willingness to pay for environmentally preferable product attributes are assumed to differ across consumers, which indicates that market segmentation plays a critical role in product

differentiation strategies (Reinhardt 1998). Several studies have shown that environmental quality seems to behave as a luxury good, in the way that demand for environmental quality is elastic with respect to income (Kip, Vernon and Harrington, 1995; Richer, 1995). The distinction between *horizontal* and *vertical* differentiation offers an approach on how to segment markets. While *vertical differentiation* involves creating products that appeal to all customers, *horizontal differentiation* seeks appeal only from a particular group of customers. In that sense, Reinhardt (1998) argues that environmental differentiation can only be used as horizontal differentiation because not all consumers value environmental attributes. Moreover, a firm that provides both the conventional and the environmentally differentiated version of the same product may be seen as insincere by some consumers, hence putting the firm's reputation at risk (Rabin, 1998).

The requirement of credible information means that the firm must establish convincing information about the environmental attributes of its products. In any marketing situation, consumers want credible information that the products offer the attributes that the seller claims. In consumer markets where the product accounts only for a small part of the consumer's total expenditures, it may be tricky and costly to communicate credibly about the product's environmental attributes (Reinhardt, 1998). However, various approaches have been carried out to address this problem. To name a few, government-sponsored eco-labels, third party certification and self-certification initiatives are all schemes that help consumers to identify a product's environmental attributes. The eco-labeling schemes are designed upon the assumption that the consumer is willing to pay more for environmental friendly products, but needs help to identify and evaluate the credibility of available information. Although these schemes offer a way to establish credible information, they may also accelerate imitation and limit the differentiating firm's market position. Consequently, firms should carefully consider if their position will in fact improve before adopting an eco-labeling scheme (Reinhardt, 1998).

The third requirement implies that the firm's innovation must be defensible against imitation by competitors. Barney and Hesterly (2002) suggest that successful product differentiation reduces the threat of new entry by forcing potential entrants to absorb both the standard cost of beginning business, and the cost of overcoming the first-moving firm's product differentiation advantage. As with most other strategic aspects of business in a competitive market, companies need to anticipate their rival's response to their own strategic decisions. Therefore, when introducing an environmentally differentiated product, it is in the firm's best interest that the barriers of imitation are high. Strategic tools to prevent competitors from introducing similar

products include patent protection, unique know-how, market power and technological advantages (Reinhardt, 1998).

All things considered, environmental strategy, like any other aspect of strategy, needs to be formulated and implemented with a realistic view of industry economics and firm capabilities. Environmental policies must be included in the firm's core strategy and intersect with its particular activities (Porter and Kramer, 2006; Reinhardt 1998). Reinhardt (1998) argues that efforts to differentiate that are not integrated with the company's overall product positioning are more likely to fail.

## 2.2 Investment appraisal and management accounting

The theories outlined in the preceding section explained how profitable opportunities can be identified by a firm through the use of strategic analyses. In this section, the second and third phases in evaluating strategic decisions are presented. First, investment appraisal is discussed as a means for evaluating the potential profitability associated with each of the opportunities identified in the strategic planning. Second, the practice of management accounting is presented as a managerial tool for following up the profitability of the investment opportunity that appeared superior in the investment appraisal process.

### 2.2.1 Investment appraisal

Strategic planning assists managers in finding the profitable opportunities, whereas investment appraisals, or capital budgeting, give guidance in evaluating the profitability of available alternatives (Clark, Hindenlang and Pritchard, 1989). Bierman and Smidt (2007) define investment appraisal as a many-sided activity that includes mapping the landscape for profitable investment alternatives, investigating process design and marketing considerations to predict the consequences of carrying out the investment, and making economic analyses to determine the potential profits associated with each investment proposal. In summary, investment appraisal is simply a set of tools to assess the returns and risk associated with the commitment of funds to long-term projects (Clark et al., 1989).

Investment opportunities can, according to Clark et al. (1989), be classified as either mandatory or discretionary. Mandatory investments are those required to maintain or increase productivity in a firm's current line of business, whereas discretionary investments are those that represent potentials for new growth in related or different product lines (Clark et al., 1989).

Once goals and priorities for capital expenditures are established in the business strategy, the next step is to evaluate proposed expenditures in a systematic manner (Clark et al. 1989). Because the funds available for capital expenditures are limited in all organizations, managers are confronted with the dual problems of accepting, rejecting or postponing proposed investments. A variety of techniques for ranking the projects has emerged to assist managers in solving these problems (Bierman and Smidt, 2007). Several studies have examined the popularity of different techniques, and although some methods are better suited in particular industries the most frequently used methods are believed to be net present value (NPV), internal rate of return (IRR) and payback (PB) (Ryan, 2002).

Each method offers unique characteristics and has its own story to tell. As a result, most companies use two or more to provide managers with the information needed to make acquisitions and abandon decisions made in the strategic planning.

1 *Net present value*. This method requires the user to discount all expected after-tax cash flows. The discounted cash inflows are compared to associated outflows and the difference between the sums represent the investment's profitability. The outcome is known as the project's NPV (Bierman and Smidt, 2007).
2 *Internal rate of return*. Although this method also takes discounted cash flows in consideration when evaluating a project's profitability, the technique looks at it from a different perspective than the NPV method. This technique determines the discount rate that will exactly equate the present value of the cash inflows with the present value of the cash outflows, so that the NPV will be zero (Clark et al., 1989).
3 *Payback*. In contrast to the two preceding methods, payback does not require discounted cash flows, but is concerned with determining the number of years necessary to recover the cost of a project. It is then used in comparing the recovery period to the maximum payback period acceptable to management (Hazel, 1999).

Bierman and Smidt (2007) argue that four basic factors should effectively be considered in any good investment appraisal decision; time value of money; risk considerations; alternative investments, i.e. the opportunity costs; and, future opportunities. Opportunity costs of alternative capital uses will play an essential role in this study as cost differentials of conventional and environmentally differentiated products clearly amounts to the excess costs associated with providing the environmentally friendly product (Canavari and Olson, 2007).

The opportunity costs of a project measure net cash flows that could have been earned if the project under discussion had been rejected (Hazel, 1999; Bierman and Smidt, 2007). These are the cost of occupying internal resources that has an alternative productive use, and should be

considered in the investment decision if identifiable (Bierman and Smidt, 2007). If the acceptance of one project precludes the acceptance of another, the two alternatives are regarded mutually excluding (Hazel, 1999; Clark et al., 1989). If both projects are expected to yield higher returns on invested capital than if the resources were sold or rented out, the net cash flows that could have been earned from the project that was rejected constitute the investment's opportunity cost (Bierman and Smidt, 2007).

### 2.2.2 Management accounting

Every strategic investment needs to be followed-up to allow the managers of an organization to evaluate its economic implications. Similarly, strategic decisions should be analyzed by evaluating accessible alternatives and their expected outcomes before implementation (Drury, 2008). In general, managers of every organization are dependent on reliable information that can help them to identify how the business is currently performing, and how performance possibly can be improved (Seal, Garrison and Noreen, 2006).

Management accounting is concerned with the provision of such information to people within the organization, to facilitate decision-making and improve the effectiveness of existing operations (Drury, 2008; Horngren, Sundem and Stratton, 2008). In sharp contrast to financial accounting, where information is provided to shareholders, creditors and others who are situated outside an organization, management accounting serves as a voluntary tool for internal purposes only. Thus, Drury (2008) suggests that management accounting could be called internal reporting and that financial accounting could be called external reporting. The work of management, and the need for management accounting information, can be expressed by the three major activities that managers have the responsibility of carrying out, i.e.; *planning*; *directing and motivating*; and, *controlling* (Seal et al., 2006).

*Planning* involves selecting a course of action and specifying how the action will be implemented. The implementation of actions should be in line with the overall strategic objectives of the firm, and be in balance with opportunities and capabilities of the firm which are made available by its internal resources. Strategic planning requires data on current operation's cost and sales data, provided by a management accountant, and projected cost and sales data of available alternatives (Seal et al., 2006). The plans of managers are often expressed formally in budgets, which is generally a quantitative description of the planning process. Managers use budgets to translate the organization's goals into action (Horngren et al., 2008).

*Directing and motivating* involves mobilizing people to carry out the plans and actions proposed in the planning process, to ensure efficient implementation. By motivating and effectively directing employees, the managers guarantee that routines and processes are functioning smoothly. Management accountant data, such as daily performance indicators and production and sales reports, are often used in this type of day-to-day decision making (Seal et al., 2006).

*Controlling* involves ensuring that plans and strategies are actually carried out, or appropriately adapted as conditions change. Part of the controlling function is to give feedback to managers indicating that operations are on track. Essential in the feedback process is the performance report, which compares actual results to the budget (Drury, 2008). Performance reports clarifies where operations are not functioning as planned, and where additional attention should be directed.

Management accounting information plays a vital role in all of these basic management activities (Seal et al., 2006). However, Bjørnenak and Olson (1999) argue that most management accounting textbooks are generally better in their coverage of variance analysis and cost allocation techniques than they are at identifying, describing and discussing many other important design characteristics of management accounting. Moreover, Bjørnenak and Olson (1999) suggest a generic framework that outlines management accounting as a two-dimensional system, consisting of a scope dimension and a system dimension as shown in figure 2. The framework is designed to highlight the differences in various management accounting models.

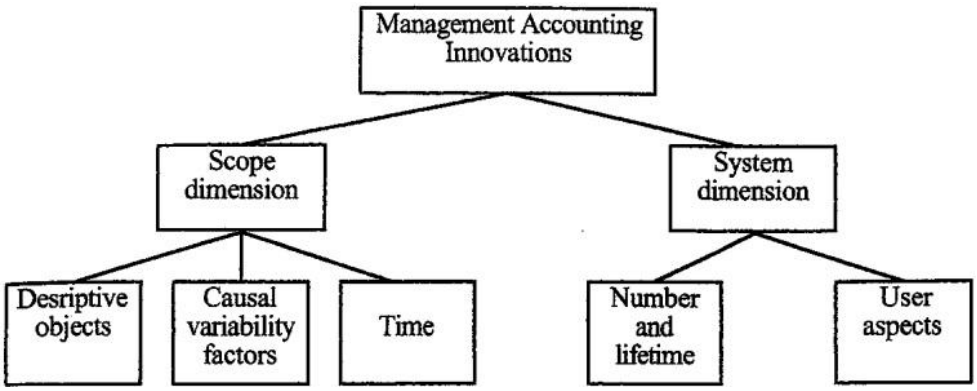


**Figure 2: A Generic Model for Unbundling Management Accounting Innovations (Bjørnenak and Olson, 1999)**

Bjørnenak and Olson (1999) argue that traditional management accounting has largely focused on the scope dimension - that is what shall be accounted for and for what period of time.

*Descriptive objects* define the focus of the accounting system and are usually related to products or departments. To understand the cost or performance of a product or a department, it is

necessary to understand factors affecting costs or performance, i.e. *causal variability factors*. Hence, causal variability factors are used to explain variations in the descriptive objects. A third factor defining the scope dimension of a management accounting model is the choice of accounting period (Bjørnenak and Olson, 1999). The reporting cycle of management accounting reports should fit the organization's needs, but firms have primarily focused on a fixed period, usually influenced by the reporting cycle of their financial reporting (Johnson and Kaplan, 1987).

The system dimension focuses on the link between the users of the system and how the system is designed (Bjørnenak and Olson, 1999). This dimension includes what Bjørnenak and Olson (1999) define as system attributes. System attributes may for example include the lifetime of a system, and whether the system is integrated with other systems or is considered a stand-alone system. The system is "continuous" if reporting is done on a permanent basis and has a long lifetime, whereas a "temporary" system has a finite lifetime and reports on an ad hoc basis until its purpose is fulfilled. The system dimension is also concerned with how the design is influenced by the user of the system – that is whether the system is specifically designed for a particular purpose, or if it serves as a generally applicable system.

Similarly, Johanson (2008) distinguishes a company's various information items that are important in decision making according to; the descriptive object's focus; whether the item is financially or non-financially quantifiable; what the item is actually measuring; if the measurement has an internal or external focus; whether it is measured ex post or ex ante; and, whether the lifetime is categorized as continuous or temporary. In contrast to the definition provided by Bjørnenak and Olson (1999), Johanson (2008) refers to single items of information when determining the lifetime, rather than in terms of the entire information system.

Horngren et al. (2008) stress the importance of identifying current trends in management accounting, such as the increased global competition and changing business processes. Without continuous adaptation to local requirements and conditions, Horngren et al. (2008) argue that accounting systems would soon be obsolete.

### 2.2.3 Criticism of conventional management accounting

As discussed in preceding sections, the environmental and social consequences of business activities have recently been devoted much attention. As a result, CSR has emerged as an unavoidable priority for business leaders in every country (Porter and Kramer, 2006). For the

same reason, a number of accounting researchers have started questioning the social consequences of conventional management accounting (Burritt, 2004).

Milne (1996) argues that corporate accounting in general, and management accounting in particular, has ignored several non-market activities that are associated with private organizations and their impact on the biophysical environment. Furthermore, he criticizes the formal decision analysis used in traditional management accounting for failing to address the social costs and benefits of corporate activities.

Burritt (2004) has identified a wide range of problems with conventional management accounting with regards to accounting for environmental issues. Among his criticism are the accusations that management accounting; assumes environmental costs not to be important; excludes environmental considerations in investment appraisals; does not account for externalities; and, that identified environmental costs are lumped in with general business overheads (Burritt, 2004). Externalities arise when companies create social costs that they do not have to bear, such as pollution (Porter and Kramer, 2011). As a result, governments must impose taxes, regulations, and penalties to force firms to "internalize" these externalities.

Similarly, Ball and Milne (2004) propose that businesses should visualize the environmental consequences of their activities through accounting practices. This will improve managers' awareness and assist them in reducing the social costs of activities. However, Ball and Milne (2004) argue that the concepts currently being taught in business school communities and practiced in business activities do not offer the appropriate tools to do so. Porter and Kramer (2011) argue that the traditional divide between economic and social concerns has led to a separation between the educational and career paths people in the public and private sectors follow. Thus, few managers have the understanding of social and environmental issues that is needed to move beyond today's approaches on external CSR reporting, and few leaders in the social sector have the managerial training and entrepreneurial mind-set required to design and implement business models for integrating social and economic goals (Porter and Kramer, 2011).

Milne (1996) argues that unless environmental sustainability is properly addressed from a decision-making perspective, management accounting may provide insufficient information to decision-makers to make informed decisions. Furthermore, as illustrated in figure 3, he suggests that successful sustainable development or, sustainable management, in organizational decision-making requires the integration of social, ecological and economic goals. Similarly, Hundloe,

McDonald and Wilks (1990) claim that "environment" should be broadly defined so that it at least encompasses sociological, ecological, and economic dimensions.

Social sustainability refers to the role an enterprise plays in a community – it contributes to the society's welfare, reduces conflict, and offers positive long-term perspectives for the people who are directly and indirectly concerned with the operations (Milne, 1996). Ecological sustainability is concerned with the question of whether a particular type of production consumes more of the natural resources than can be recovered. This can refer to *fossil* resources that, by nature, cannot be recovered at least in the time-span that is relevant for the business in question, or it can be about *theoretically* renewable resources, whose capacity for recovery is limited in quantity. Economic sustainability involves that every company has to find a suitable niche to survive in the complex interactions of markets and finances (Hundloe et al., 1990). It cannot survive by exploiting incidental sources of funding, but by offering a product or service that is sought after by the community at prices that cover production costs while being affordable by the costumers. Although this view on sustainability has been generally accepted, Milne (1996) argues that less agreement exists on how such a concept can be interpreted, and in turn how sustainability might be operationalized. Disagreement exists because of varying opinions on the emphasis that should be placed on the three fundamental sets of values, and because different approaches are taken to the integration process.

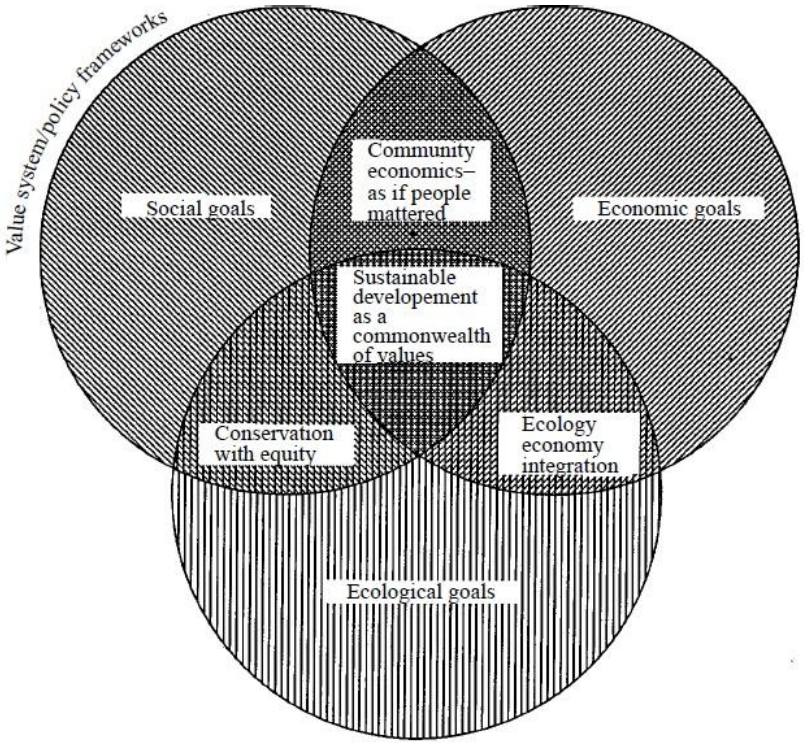


**Figure 3: A System Perspective of Sustainable Development (Milne, 1996)**

However, as mainstream corporate accounting tends to ignore a wide range of non-market activities that are associated with private sector organizations (Milne, 1996), environmental management accounting (EMA) has emerged as an alternative, or a supplement, to management accounting. The concept of EMA is outlined in the following section.

### 2.2.4 Environmental management accounting

The importance of environmental cost management is rising in many organizations, and Drury (2008) outlines three main reasons for this. First, environmental costs can be significant for some industrial sectors. Second, regulatory requirements involving significant fines for non-compliance have increased remarkably during the past decade. Hence, identifying the least costly method of compliance has become a major objective. Third, society demands that companies focus on becoming more environmentally friendly (Drury, 2008; Seal et al., 2006). Environmental accounting is a technique that assists organizations in administering environmental costs, and has many meanings and uses. It can support national income accounting, financial accounting or managerial accounting (Spitzer and Elwood, 1995). This study will focus entirely on environmental management accounting (EMA) as a tool for internal business decisions. A comprehension of environmental costs is essential for the proper understanding of EMA. Spitzer and Elwood (1995) define environmental costs in two dimensions; *private costs* refers solely to costs that directly impact a company's bottom line; *societal costs* refer to costs of individuals, society and the environment for which a company is not legally accountable. This study will focus largely on EMA for private costs. However, it should be noted that societal costs are indirectly addressed as many of the standards in organic certification focus on reducing the costs of society and the environment for which a company is not legally accountable. Hence, reducing the cost of compliance will by design reduce the associated societal costs.

Because managers today have little knowledge about, and are partially incapable of handling environmental costs, these costs are oftentimes ignored and lumped in general overhead, or even excluded from total costs (Seal et al., 2006; Spitzer and Elwood, 1995; Drury, 2008). EMA offers ways to visualize these costs, allowing the firm to both reduce costs and improve its environmental performance. Just as management accounting refers to the use of cost and performance data in managerial decision-making, EMA refers to the use of environmental costs and performance in business decisions and operations (Spitzer and Elwood, 1995). Types of management decisions benefiting from environmental cost information include those relating to

product pricing, cost control, product and process design, risk management, waste management, environmental compliance strategies and capital investments.

EMA is a tool for facilitating the creation of what Porter and Kramer (2011, 2006) define as the second type of shared value; by redefining productivity in the value chain. A firm's value chain inevitably effects, and is affected by, a variety of social issues such as health and safety, working conditions, natural resources and water use. Shared value can be created when societal problems create economic costs in the firm's value-chain. Although most of these problems are usually seen as externalities (i.e. social costs that the firm does not have to bear), some of them actually inflict internal costs on the firm. Redundant packaging and greenhouse gases does not only cause harm to the environment, it also impose costs to the business. Porter and Kramer (2011) argue that this type of shared value is not social responsibility, charity, or even sustainability, but a new approach to achieve economic efficiency.

Identifying environmental costs is crucial to the application of EMA. Drury (2008) suggests that private environmental costs can be identified and classified in four categories according to their nature of appearance:

1 *Environmental prevention costs* refer to the costs of activities undertaken to prevent the production of waste that could be harmful to the environment. This category includes costs incurred in the design and operation of processes to reduce pollution, training employees, and obtaining certification relating to meeting the requirements of international and national standards (Drury, 2008).
2 *Environmental detection costs* are the costs deriving from ensuring that a company's activities, products and processes conform to regulatory laws and voluntary standards. Costs included in this category are those relating to inspection of products and processes to ensure regulatory compliance, monitoring contamination by running tests, and auditing environmental activities.
3 *Environmental internal failure costs* refer to costs incurred to eliminate or reduce waste to levels that comply with regulatory requirements. These costs derive from actions taken by the firm to avoid the discharging of contaminants produced in activities, and include the cost of disposing toxic materials and recycling scrap.
4 *Environmental external failure costs* arise after discharging waste into the environment, and are costs incurred from activities to clean up various waste discharges and environmentally harmful externalities. Drury (2008) argues that this category influences a company's reputation the most in terms of adverse publicity.

Spitzer and Elwood (1995) present a framework which is used to classify these environmental costs further in four categories, according to their nature of measurability (figure 4); conventional costs; potentially hidden costs; contingent costs; and, image and relationship costs.

*Conventional costs* such as raw material, capital goods and supplies are usually included in cost accounting, but are seldom considered environmental costs (Spitzer and Elwood, 1995). Yet, decreasing use of these factors and reductions in waste of raw materials are environmentally preferable as it reduces both environmental damages and consumption of nonrenewable resources. These costs are sometimes overlooked, but are still important to include in decision making, whether they are seen as environmental costs or not.

*Potentially hidden costs* include three categories. *Up-front costs* incur prior to the operation of a process, system or facility, and can for example refer to design of environmentally preferable products or processes. They can easily be forgotten when managers and analysts focus on the operating costs of processes and systems. *Regulatory and voluntary environmental costs* and *back-end costs* are costs that are either treated as overhead or may not be entered into management accounting systems at all. Examples are costs of current operations that will incur in the future, when for example a facility needs to be decommissioned, or to comply with regulations that are not yet in effect but have been announced.

*Contingent costs* are costs that may or may not occur in the future, i.e. events that with an uncertain probability will take place and in turn incur costs for the firm. These costs can for example include being fined for future accidental releases of contaminants.

*Image and relationship costs* can include the costs of annual environmental reports and community relations activities, and are incurred to affect the subjective perceptions of management, customers, employees and communities (Spitzer and Elwood, 1995).

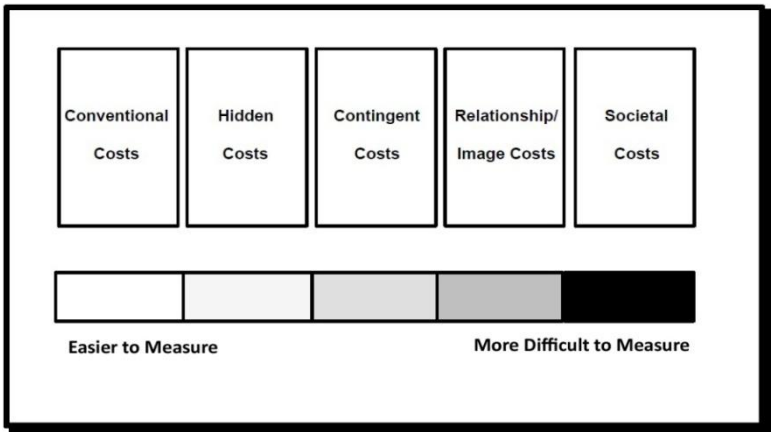


**Figure 4: The Spectrum of Environmental Costs (Spitzer and Elwood, 1995)**

From this classification it becomes clear that environmental costs include; costs incurred to comply with environmental laws; cost of pollution control and noncompliance penalties; and, other costs incurred for environmental protection, even if they are not explicitly required by regulations or go beyond compliance of regulations (Spitzer and Elwood, 1995).

EMA can, according to Spitzer and Elwood (1995), be employed by all sorts of companies operating in almost every industry. In conformity with conventional management accounting, EMA is a flexible tool that can, depending on the corporate needs, interests, goals and resources, be applied at different *scales* and *scopes* of coverage. Examples of different scales at which EMA can be applied include; individual production line or group of production lines; product or product line; and, facility, department, or all facilities at a single location. Regardless of what scale is applied, the scope of EMA needs also to be defined. Here, the firm decides whether EMA should only cover conventional costs, or include potentially hidden, future, contingent, and image/relationship costs.

According to Burritt (2004), EMA has been observed to play a part in companies applying different types of costing systems, including; activity based costing (ABC); life-cycle costing; total quality management; and, cost reduction and process re-engineering. As regulations for further environmental improvements are carried out, the role of EMA is assumed to become increasingly important (Spitzer and Elwood, 1995). Correspondingly, Schaltegger, Burritt and Petersen (2003) argue that EMA provides a core element in any environmental management system and in eco-control. Spitzer and Elwood (1995) suggest a four step approach in applying environmental costs allocation:

1 Determine scale and scope
2 Identify environmental costs
3 Quantify those costs
4 Allocate costs to responsible process, product, system, or facility

Understanding the environmental costs and performance of processes and products can promote more accurate costing and pricing of products, and assist firms in the design of more environmentally preferable processes and products for the future. This can in turn result in competitive advantage with customers (Spitzer and Elwood, 1995).

## 2.3 Environmental certification standards as an embedding mechanism

The aim of this section is to present an analytical structure for examining the interplay between strategy, environmental certification standards and management accounting.

The analytical framework in this section draws upon the methodology and findings of a research study performed by Pérez, Ruiz and Fenech (2007). Pérez et al. (2007) explored how four catalysts for change that derive from environmental management systems (EMSs), such as EMAS, could enable the integration of environmental issues and values in companies. EMAS stands for the Eco-Management and Audit Scheme, and is the European Union's voluntary reporting scheme that various companies use as an instrument for improving their environmental performance on a continuous basis.

The analytical framework introduced by Pérez et al. (2007) will in this study be used for the purpose of evaluating environmental certification standards as a equally embedding mechanism for environmental performance. Although the organic certification standard is not identical to the EMAS, it is similarly considered an environmental certification standard and the underlying philosophy is quite similar (Schaltegger, Burritt, Petersen, 2003). They both require the firm to have a policy related to the environment, there must be on site review of the policy, and there must be clear objectives of the organization regarding the environment. The main difference between EMAS and other environmental certification systems, such as organic certification, is how environmental issues are addressed by the participating organization (Schaltegger et al., 2003). In EMAS, the firm's performance is evaluated by the environmental impact of its organizational activities and processes. In environmental certification schemes the firm's environmental performance is expressed through the particular production process of the goods or services it provides.

Pérez et al. (2007) identified four interrelated mechanisms deriving from the EMAS requirements that could help to motivate the creation of different intangible assets, which in turn could enable the integration of environmental issues and values in companies. They were called catalysts for change and include; training and awareness building; continuous environmental improvement; integrating stakeholders' interests; and, organizational learning. On similar grounds, environmental certification requires; training and awareness building of all employees involved in the scheme; procedures that enable the organization to meet the regulations for certification on an ongoing basis; procedures and processes that ensures minimal social influence on the local community and its stakeholders; and, an overall commitment of sustaining the natural resources controlled by the participant (Debio, 2008).

The framework therefore seems adequately applicable as a fundament in analyzing the environmental certification standard of organic salmon on similar grounds as the EMAS.

### 2.3.1 Analytical framework

Pérez et al. (2007) suggest that voluntary environmental certification standards such as EMAS can be conceived as an environmentally integrating mechanism. From the EMAS requirements, four impetuses for integrating environmental issues in the organization were identified; training and awareness building; continuous environmental improvement; integrating stakeholders' interests; and, organizational learning.

*Training and awareness building* allow the firm to offer employees appropriate and advanced training, so that they are well-equipped to participate in activities that are included in the certification program. Training and awareness building may improve the environmental knowledge, skills and expertise of participants, and facilitate greater commitment by managers (Pérez et al., 2007), which in turn enhance employee productivity (Porter and Kramer, 2011).

*Continuous environmental improvements* can help the firm to identify new goals and find ways to achieve them (Pérez et al., 2007). This can be done by trying new production technology and alternatives or by reducing waste and emissions. By doing so, they may eliminate inefficiencies or make new environmental investments to go beyond what is required to maintain certification.

*Integrating stakeholders' interests* means that the certification program requirements can facilitate communication between the firm and the various stakeholders that shape the firm's local community. This can allow for the firm to organize and prioritize the various interests in such a way that satisfying them becomes easier. By taking various parties into consideration, firms can establish mutually beneficial trust-based relationships that integrate both perspectives in organizational decision making.

*Organizational learning* signifies that by evaluating the effectiveness of past actions, the firm is able to develop insight, knowledge and associations that can help to improving the effectiveness of future actions. Pérez et al. (2007) suggest that this can promote changes to internal values, routines, and rules that represent collective learning.

Pérez et al. (2007) argue that the overall interaction of these four catalysts for change can initiate the development of intangible assets that enhance environmental performance. The evidence collected in the study suggested the development of six intangible assets;

1 Awareness of employees
2 Environmental knowledge, skills and expertise of employees
3 Commitment of managers

4 Cross-functional coordination and communication
5 Integration of environmental issues in strategic planning process, and
6 Use of management accounting practices

These are all driving forces for the integration of environmental issues and values in the organization. According to the presence and usage of these intangible assets, Pérez et al. (2007) suggest that companies can be placed in three categories of environmental embeddedness. The categories represent a hierarchy in a sense that the lowest level of embeddedness has to be fulfilled in order to reach a new category. In which category a particular firm falls depends on the overall integration of environmental issues in the management control system, denoted by the six intangible assets presented above. The framework described by Pérez et al. (2007) is outlined in figure 5 below.

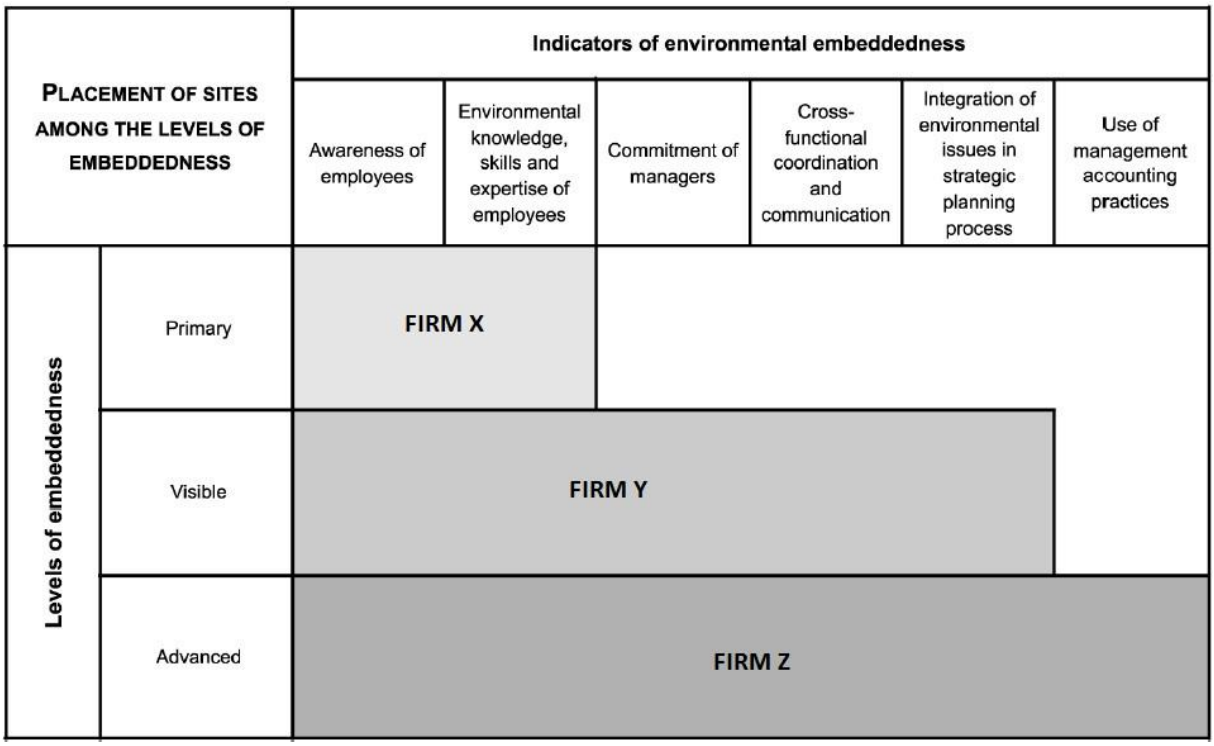


**Figure 5: Levels of Environmental Embeddedness (Pérez, Ruiz and Fenech, 2007)**

The term "embeddedness" is often used in sociology and refers broadly to involvement in multiplex social relations (Moody and White, 2000). An explicit operational definition of the term has rarely been given. Instead, Moody and White (2000) argue that it describes the importance of social networks for actors, and indicates that actors integrated within social networks face different sets of resources and constraints than those who are not a part of such relations. Accordingly, embeddedness will in this study be used to describe the integration of environmental issues in a firm's organizational culture.

*Primary embeddedness* includes no more than the most necessary conditions to maintain certification, implicating a minimal level of environmental integration in the management control system (Pérez et al., 2007). To be placed in this category, two critical intangible assets have to be present; the awareness of employees and the environmental knowledge, skills and expertise of employees. Both assets derive directly from the certification requirements, and imply that the organizations in this category do only what is necessary to stay certified.

*Visible embeddedness* requires the organization to integrate environmental issues in organizational structures and strategies. On top to the possession of intangible assets found in the primary level, three additional intangible assets are required to be categorized as visible; the commitment of managers; cross-functional coordination and communication; and, the integration of environmental issues in strategic planning process. This can include incorporating environmental issues into investment decisions, interests of going beyond the certification requirements, and the use of technology that improves environmental performance. All these factors can enhance the commitment of managers.

*Advanced embeddedness* is only achieved if all five intangible assets found in the visible level are present, in addition to the use of management accounting practices to deal with environmental issues. Pérez et al. (2007) argues that this level guarantees the integration of environmental issues over time. By implementing more advanced management accounting practices to deal with environmental issues, the commitment of managers will increase, which in turn leads to reinforced long-term environmental engagement.

For example, if firm X holds title only to the two assets referred to as “awareness of employees”, and “environmental knowledge, skills and expertise of employees”, it would be placed in the primary level of embeddedness. Similarly, if firm Y possess all the five first intangible assets, but lacks systematic management accounting practices to record costs related to its environmental performance, it would clearly be placed in the visible level as illustrated in figure 5. A firm Z that holds title to all six intangible assets would be placed in the advanced level of embeddedness.

However, to meet the objectives of this study the author has identified the necessity of placing more emphasis on the management accounting function, as the framework Pérez et al. (2007) propose seems to put only a one-dimensional emphasis on the use of this asset; either you have it or you do not have it. While this view may be sufficient in analyzing some environmental certification standards, cost control and performance measuring is particularly important in

commoditized industries such as that of aquaculture (The Directory of Fisheries, 2009). For that reason, the author has added an additional dimension to the framework, corresponding to the scope of management accounting practices applied by the firms. The rationale is that aquaculture companies are assumed to all have advanced cost control systems, but that the systems to varying extents are used actively to adjust operations and incorporate environmental issues.

The scope of management accounting practices builds upon figure 3, and Milne's (1996) proposed relationship between sustainable development and management accounting. Based on this view, Milne (1996) argues that a firm can approach environmental resources in three feasible ways, denoting the scope of management accounting as a tool for environmental integration. The first approach is called "*no accounting for nature*", meaning that environmental resources are either ignored or considered only for their commercial use value. Milne (1996) argues that this approach is consistent with conventional management accounting and focuses entirely on economic goals, giving minor attention to ecological and social business issues. The second approach is called "*accounting for externalities*", meaning that a firm can integrate ecological and economic goals by gathering and analyzing information on the environmental impact relating to different decisions and operations. Here, management accounting is not only used as a tool to reduce costs associated with regulatory compliance, but also as a tool to identify and actively reduce the negative environmental impact of business operations. The third approach is called "*accounting for sustainability*" and includes the integration of economic, social and ecological goals in business operations, to ensure that the business successfully safeguards environmental resources without compromising the needs of future generations (Milne, 1996). A firm taking this approach would not only use management accounting as a tool for reducing environmental costs, but attempt to leave the environment at least as well off as if it seized to exist.

The three approaches constitute the second dimension of the analytical framework, denoted by the "scope of advanced embeddedness" in figure 6. At the right hand side of the figure, there are six categories in which a firm can be placed, depending on the presence of the five intangible assets and the level of management accounting practices.

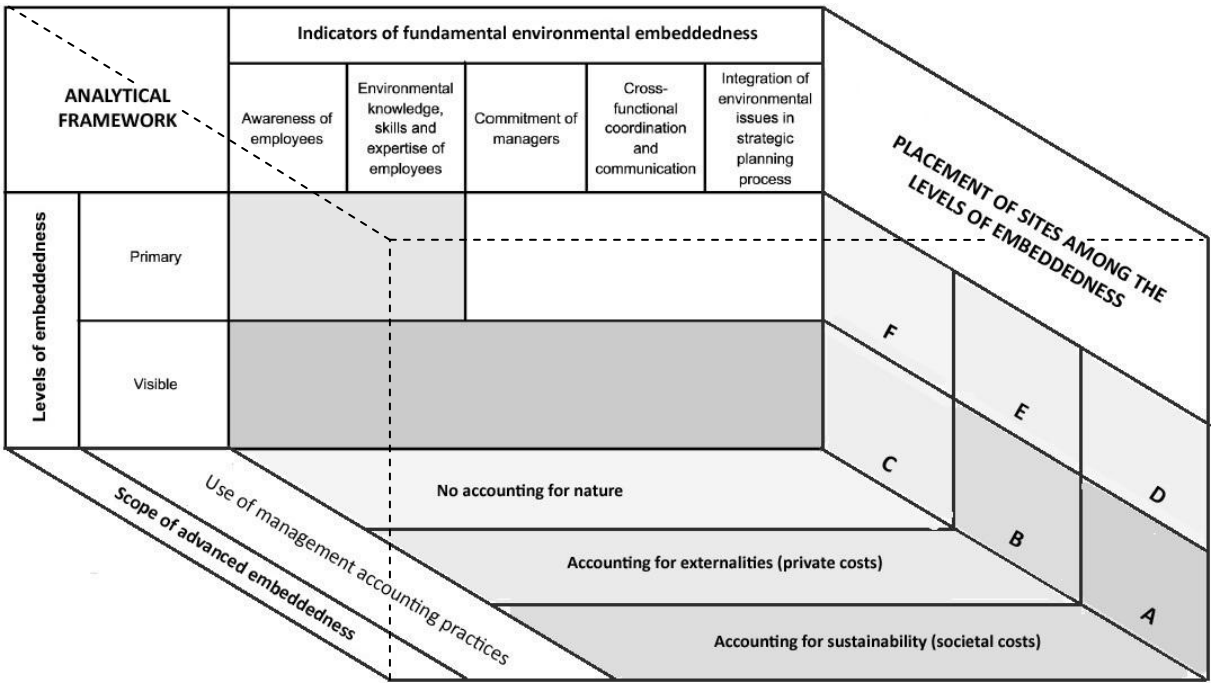


**Figure 6: Analytical Framework**

In this modified framework, a firm is placed either in the primary or visible level depending on the presence of the five first *fundamental* indicators of environmental embeddedness. Advanced embeddedness is recognized only if all five assets in the visible level are present in addition to the second or third scope of management accounting practices. Although Pérez et al. (2007) suggests that the *primary level* includes only two intangible assets, it can be useful also to observe the exploitation of management accounting practices. The primary level consists of squares F, E, and D. It has to be noted, however, that square D is more of a theoretical classification than an obtainable level of embeddedness, as it seems hard to believe that a firm in possession of the two first intangible assets merely would devote considerable effort in operating its business sustainable. On the other hand, there might be firms that care little about the environment, but succeeds in reducing environmental costs due to extreme cost control.

Companies included in the visible embeddedness category are placed in square C. Obviously, only two of the defined management accounting levels are considered to engage advanced embeddedness, i.e. accounting for externalities and accounting for sustainability. As a result, advanced embeddedness refers to companies placed in squares B and A.

In general, the evidence gathered by Pérez et al. (2007) suggest that the more the catalysts for change are promoted and connected, the more likely it is that a certification scheme will foster intangible assets that can facilitate the integration of environmental issues in an organization.

## 2.4 Summary

Figure 7 is developed by the author to structure and summarize the theoretical framework that was presented in the preceding chapter, and that will be applied to approach the research questions in the case analysis and discussion. The three main steps in the decision-making process and implementation of organic salmon farming are in figure 7 illustrated through the following activities; strategic decision; investment appraisal; and, the performance measuring of the investment. How environmental issues are integrated in the management control system stem from these three main steps, which were structured in the analytical framework (figure 6) in the final section of the literature chapter.

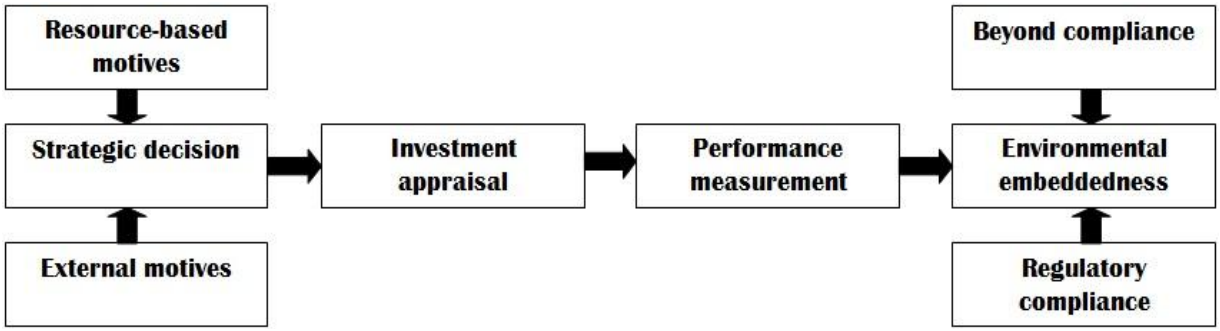


**Figure 7: Theoretical Framework**

In analyzing the first research question, involving why some firms diversify into organic salmon farming, and who does it, the use of strategic management theory is perceived as an appropriate approach to examine their motives.

As can be seen from figure 7, the first research question relates to the three boxes at the left hand side. Since the analysis of secondary data indicates that firms involved in organic production have different backgrounds with regards to size and investment motives, both internal and external surroundings seem relevant. The external view can reveal the industry attractiveness from a competitive force perspective, whereas the internal analysis may provide insight to which internal resources and competencies are required to succeed in this industry. External motives may include positive price and demand estimates, lower rivalry than in conventional production, risk diversification, limited alternatives to expand and so on. Internal resources can for example include adequate locations, low establishment costs due to former environmental investment profile, or access to human capital that eases the implementation and operation. Furthermore, environmental product differentiation theory is included to examine the potential of organic certification as a profitable diversification strategy. The managers' belief

that the requirements for successful environmental differentiation are obtainable can also serve as motives for diversification.

The second research question is illustrated in figure 7 by the two boxes placed in the middle, named investment appraisal and performance measurement. To answer the second research question regarding if and how profitability is evaluated prior to, and after implementation of organic aquaculture, investment appraisal theory, management accounting and environmental accounting is considered. Investment appraisal practices will be used to explore whether the diversification decision was subjected to any quantitative evaluation techniques, or if it was based largely on management intuition and price-forecasts.

Conventionally farmed salmon is a commodity good produced in large scales, which signifies the need for cost monitoring to maintain control and competitiveness. The fundamental idea of organic aquaculture is to reduce the social, ecological and economic risks associated with salmon farming, by internalizing some of the externalities associated with conventional farming (Debio, 2008). In addition, the environmental sustainability of the salmon farming industry has recently been contested by a variety of stakeholders (Georgakopoulos and Thomson, 2005). These aspects indicate that the use of EMA seems highly relevant for salmon farming in general, and organic production in particular. By visualizing the costs of complying with environmental requirements and certification standards, EMA may serve as a tool for greater cost control and recognition, in turn leading to reduced compliance costs and enhanced environmental performance (Spitzer and Elwood, 1995).

Finally, an analytical framework was introduced for examining the third research question, i.e. the extent at which environmental sustainability is being integrated in the management control system of organic salmon farming companies. From what can be interpreted from annual reports of potential companies to be included in the analysis, the candidates seem to put varying emphasis in responding to the environmental implications of their operations. This indicates that the results can reveal that companies may be placed in different categories of the analytical framework, depending on their overall environmental embeddedness as denoted by the three boxes on the right hand side in figure 7.

# 3 Empirical background

The aim this chapter is to provide the reader with an opportunity to enhance his or her knowledge and understanding of the industry and concepts under investigation.

## 3.1 History and development of Norwegian salmon farming

When the first net cages for salmon farming were put to sea in the 1970s, the basis for a series of events that would lead to significant industry growth was formed. In the wake of its emergence, a technology consensus was established in traditional fish farming, involving specifications on what was considered a "good location" for salmon farming and the basics of net cage systems (Aarset, Jakobsen, Iversen and Ottesen, 2004). Joint technology made the starting point for a mutual identification and communication between salmon farmers that had never before existed. The reason for the net cage technology's success was its superiority over other methods. As a result of the technology consensus, the authorities were given the opportunity to regulate production capacities by license-based rules. Hence, the legal framework for licenses strengthened the hegemony of the net cage technology further (Aarset 1999).

The existence of international markets with a high willingness to pay was another condition for continuous growth and success (Aarset et al., 2004). To compensate for declinations in prices on account of increasing supply, the processes were constantly made more efficient. By the time Norwegian salmon farming reached the 1990s, fish diseases were almost absent and the license utilization was improved considerably. In addition, the fish feed and production technology had become more efficient, which in sum led to a positive development as the industry moved towards the millennium. Table 1 shows the average production per man-labor year in kg.

**Table 1: Production per Man-year (Directory of Fisheries, 2009)**

| Year | Production per man-year |
|---|---|
| 1985 | 30 254 |
| 1990 | 61 401 |
| 1995 | 152 418 |
| 2000 | 306 974 |
| 2005 | 391 127 |
| 2006 | 392 397 |
| 2007 | 436 694 |
| 2008 | 402 027 |
| 2009 | 452 700 |

The fish farming industry was traditionally characterized by locally owned small-scale companies, but moved in a new direction when the fish farming ownership legislation was revised in 1991 (Jakobsen, Berge and Aarset, 2003). External ownership and concentrated ownership interests became common. According to Aarset (2004), the ten largest companies accounted for 8 % of

total salmon and trout production in 1990, whereas corresponding figures for 2001 equaled 46 %. Interestingly, the development towards a narrower and more concentrated market structure was not due to external acquisitions, seeing that existing companies has roughly speaking grown exclusively through acquisitions in their own region. Several Norwegian companies also started expanding internationally through ownership and control of fish farming companies in countries such as Scotland, Canada and Chile (Jacobsen et al., 2003).

Efficient and sustainable salmon farming requires locations and surroundings that can offer suitable circumstances, i.e. the right water temperature, currents and so on. Traditionally, the most appropriate regions for Norwegian salmon farming has been Western and Central Norway (Aarset et al. 2004). In the 1980s, some of the northern counties of Norway were also found applicable for aquaculture. Today, we find salmon farming in most of the coastal counties, with a production stronghold in Western Norway.

All in all, Norwegian salmon farming has experienced remarkable growth and technological enhancements the last couple of decades, where feed efficiency, automation and labor-saving production technology have served as key facilitators. While production has gradually grown the last ten years, average production costs have declined (figure 8) (Directory of Fisheries 2009). Despite the industry's seemingly endless efficiency improvements, technology seems to have been unable to cope with the industry growth ratio the last couple of years. Thus, diminishing returns have led to the new tendency of product differentiation, where value-adding has offered companies alternative ways of selling their fish (Samuelsen and Sogn-Grundvåg, 2009).

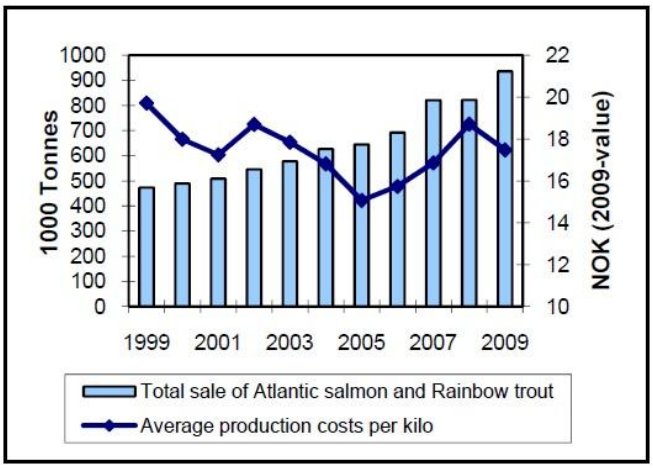


**Figure 8: Total Sale and Average Production Costs per kg of Atlantic Salmon and Rainbow Trout (Directory of Fisheries, 2009)**

Samuelsen and Sogn-Grundvåg (2009) identified ten existing ways of differentiating Norwegian salmon, such as; product quality that makes the fish unique; geographical location that awakes

associations of freshness etc.; technology that makes it possible to slaughter, pack and bring the fish to the consumer quicker than competitors; and, organic production that focuses on reducing medicine and chemicals in addition to using feed processed exclusively by fish offal.

This study will solely be focusing on the practice of differentiating Norwegian fish through organic certification, because this is the differentiation method that until now has come furthest in facing future challenges in salmon aquaculture.

## 3.2 Efficiency and sustainability of salmon farming

The sustainability of salmon farming is a heavily debated subject in which several stakeholders are involved (Tveterås, 2000; Pelletier and Tyedmers, 2007). The production efficiency and dimension of fish farming has increased noticeably the last couple of decades, which has called upon a discussion of its environmental impact. The rising attractiveness of fish farming as an industry is partly due to its high level of efficiency compared to other sources of food provision, which may be illustrated through the feed conversion ratio (FCR). FCR is a useful way of portraying efficiency in terms of how much feed is required to produce one kg of food (Directory of Fisheries, 2009). According to Tveterås (2000) the average FCR of Norwegian salmon farming has declined from almost three kg in 1980 to above one kg required in 1997, from where the FCR has been rising steadily from 1,19 in 1997 to 1,26 in 2009 (Directory of Fisheries, 2009; Aarset et al., 2004). Compared with other food industries such as poultry, pig, sheep and cattle farming, where FCRs range from respectively two to eight, salmon farming is considered to be a relatively efficient source of food. It has to be noted, however, that the low salmon feed ratio can be misleading as salmon feed itself is a highly processes product (Tveterås, 2000). Although numbers may be outdated due to the rapid enhancements in salmon farming, figures from 1997 suggested that the processing of fishmeal required up to five kg of forage fish to produce one kg of commercial feed (Tacon, 1997). The forage fish is mainly offal based, which has raised a debate on whether it has any alternative use, or should be considered waste. However, this is a question that goes far beyond the frames of this study.

As feed constitute for fish farming companies' largest cost factor, reducing the FCR has been a pressing concern (Tacon, 2008; Directory of Fisheries, 2009). In addition, the major drop in FCR from 1980 to 1997 may also be explained by the slightly different way to regulate total production per license in this time period. Until 2003, total production per license was limited by a feed quota defining the maximum allowable feed usage in production (Aarset et al., 2004).

Quotas were equal for all licenses, which gave companies incentives to increase feed efficiency and thereby boost production.

Another advantage of salmon as a farmed species is that its nutrition yield is higher than any other species and animal in industrial production (Tveterås, 2000). By comparing the yield of a given amount of feed in four common species, salmon utilizes its feed more effectively than any domestic animal regarding energy and protein retention (table 2) (Hillestad, Austreng and Åsgård, 1996). Not only does this imply higher figures for retaining nutrition, but it signifies that waste production in agriculture meat production is correspondingly higher.

**Table 2: Comparison of Yield of a Given Amount of Feed in Four Common Species (Hillestad, Austreng and Åsgård, 1996)**

| | *Salmon* | *Poultry* | *Pigs* | *Sheep* |
|---|---|---|---|---|
| Protein | 30 | 18 | 13 | 2 |
| Energy | 27 | 12 | 16 | 1 |

However, it is the pollution, and not the revolution, that most people associate with the sustainability of modern aquaculture (The Economist Aug 7th, 2003). And concerns are numerous; waste from production sites can accumulate and damage parts of the sea; excessive use of antibiotics can put both marine and human health in jeopardy; escaped fish may spread sea-lice to wild stock, or pollute its genetics by breeding with wild fish; the overuse of fish oil and fishmeal in feed production has better alternative uses.

Although the industry has indeed harmed the environment in its emerging years, notable improvements have already been made. The use of antibiotics in Norwegian aquaculture is claimed to have been reduced by more than 99.5 % in the last fifteen years (Aarset et al., 2004), and the nitrogen loading of the water, which is a measurement of the release of waste, is less than 17 % of what it was in the 1970s (The Economist Aug 7th, 2003). Meanwhile, concerns such as overuse of fish oil and fish meal remain unaltered. It is estimated that in 2006, the aquaculture sector consumed 68.2 % of total global fish meal production and 88.5 % of total reported fish oil production (Tacon, 2008). These figures have increased during the last decades on the expense of, respectively, feed for farm animals and fuel production. The Norwegian salmon industry, however, subjectively claim that more, and healthier, food is produced today from these resources today than ever before. Nevertheless, serious environmental claims have reached the stakeholder agenda, pressuring the salmon farming industry for compliance. Progress is present, but pro-active actions and enhancements seem essential before salmon farming can be well thought of by the general public. This leads to the discussion of organic

salmon farming as a potential contributor to enhanced consciousness of environmental concerns in salmon aquaculture.

## 3.3 Organic salmon farming: concept overview and rules for certification

### 3.3.1 The concept of organic salmon farming

The purpose of organic production is founded on a holistic view that embraces the ecological, economic and social aspects of the production, both in a local and a global perspective. The underlying idea is that organic aquaculture should constitute for a positive part of nature and the marine environment (Debio, 2008).

The superior goals of organic aquaculture are among others to; produce high quality foods in quantities which are sufficient and fairly distributed; consider social influence on local communities; develop a stabile aquatic ecosystem; manage the natural resources in such a way that harmful effects on the environment are avoided; create an environment that favors the organisms' natural behavior and needs; and, to secure local stock from being negatively influenced by the aquaculture activities (Debio, 2008).

Practical implications descending from these goals, with regards to the actual production procedures, involve; approximately halved stocking density of fish in the cages; a very restricted use of medication; no use of artificial coloring agents and toxic agents to prevent net-fouling; the use of wrasse (also known as cleaner-fish) instead of chemicals and antibiotics to prevent sea lice problems; the use of certified organic feed based on ingredients from sustainable sources that does not contain any genetically modified organisms; and, the prohibition of copper-impregnated nets.

According to Georgakopoulos, Ciancanelli, Coulson and Kaldis (2008), aquaculture is seen as a possible solution to three related problems in Europe; the exhaustion of fish stocks in the North Sea; the limited scope for investment and employment in remote fishing areas affected by it; and, fish as a source of "healthy" food. Nevertheless, the industry has since its emergence experienced unilateral controversies regarding food safety and unfavorable environmental impacts that derive from fish farming practices. The concept of organic salmon farming arose as an attempt to shed light on and manage the need for practices that minimize the industry's social and environmental risks.

### 3.3.2 Rules and standards for organic certification

The term "organic" is protected, and Norwegian goods can only be labeled organic if the producer is certified and approved by Debio. Debio is the Norwegian certification and inspection body for organic production, processing, distribution and import in Norway (Debio, 2008). A variety of standards has to be fulfilled to obtain certification for organic aquaculture. This section will give a brief overview at the framework, and explain thoroughly the economically demanding parts of the regulatory framework.

Canavari and Olson (2007) have studied the implementation of organic aquaculture in Italy to estimate the sales and production cost differentials between conventional and organic aquaculture. The estimates are based on the requirements put forth by AIAB. AIAB serves as the voluntary certifier for organic aquaculture in Italy, which more or less follows the same EU-certification standards as Debio. Canavari and Olson (2007) argue that conversion to organic production involves changes in the whole farm's structure and management, and that cost estimates should therefore be based on a full operating cost approach. Canavari and Olson (2007) identified four main drivers for increased costs related to organic aquaculture; 1), direct input farming costs, 2) lower farming density, 3) high monitoring and control costs, and 4) organic labeling and certification.

The direct input farming costs are primarily associated with the feed, which is required to consist of certified organic products and raw materials originating from wild aquatic stocks (Canavari and Olson, 2007; Debio, 2008). This involves that inputs must come from fishing activity which is operated in a sustainable way, and that cannot be used for human consumption (Debio, 2008). Furthermore, the use of additives such as coloring agents, vitamins, minerals, and antioxidants is restricted to an absolute minimum, and synthetic and unnatural additives are not permitted. These requirements affect the whole value-chain by incurring higher costs for feed producers, which in turn leads to higher input prices for farmers (Canavari and Olson, 2007).

The maximum fish density for organic production is set to 10 kg per cubic meter, whereas for conventional farming the stock density should not exceed 25 kg per cubic meter (Debio, 2008; Norges Lover, 2007). The halving in allowable stock densities demands equivalent increases in capital investments for organic farming to achieve the same output as in conventional farming. The stock density in organic farming is adjusted to reduce fish aggression and stress, improve environmental and water quality, and to allow for the fish to form shoals (Debio, 2008). This

restriction, in addition to the feed requirement, is considered the major drawback with organic salmon farming (Canavari and Olson, 2007).

To obtain and maintain certification, Debio (2008) requires participating firms to increase monitoring and control to optimize fish health and water quality and to minimize contamination. This includes tighter waste control and feed discharging, monthly record keeping of all accessible fish information, water temperature, stock density and the use of cleaning agents. In addition, Debio (2008) requires the company to appoint a contact person who is responsible for following up the reporting according to the standards, and who ensures that all employees who handle goods covered by the control scheme are trained in the actual standards.

Companies affiliated with the certification scheme must pay an annual certification fee according to the value of the annual certified production. For production values between one to ten million kroner, the fee corresponds to 0.25 % of the production value, and 0.10 % for production values between ten to fifty million kroner (Debio, 2008).

Canavari and Olson (2007) argue that the opportunity costs of organic production is expressed as operating results loss from conventional farming per kg of organically farmed fish. Furthermore, they found that the normal production costs of organic fish are 20 – 30 % higher than for conventional fish. Taking also into account the estimated opportunity cost of organic fish farming, Canavari and Olson (2007) estimated the price premium for organic fish, guaranteeing the firm the same total operating income as for the conventional product, to vary from 2.07 to 2.5 euro per kg.

## 3.4 Licenses in fish farming

A fish farming license gives a private company an exclusive right to economically exploit the government's resources within strictly defined geographical boundaries (Norges Lover, 2007). In order to protect the environment from excessive production of farmed salmon, the government has identified a need to regulate the total amount of salmon being produced each year. By drawing up geographical borders that the government considers suitable for aquaculture, the coastline has been divided into a total of 971 licenses (Directory of Fisheries, 2009). Each license gives the right for the owner to produce a certain quantity of fish, where production is restricted by the total biomass of fish allowed at any point in time in the particular license, which according to Bjørndal and Aaker (2006) corresponded to a biomass of 780 tons in 2006. Licenses are being issued by the government through comprehensive application processes. Some 800 licenses

were issued free of charge before 2002, while the remaining 150 licenses have, due to a remarkable increase in demand, worn a price-tag of about four to eight million Norwegian kroner (Bjørndal and Aaker, 2006). After being issued in the primary market, licenses are traded at significantly higher prices in the second-hand market through mergers and acquisitions, although their economic value has been difficult to define.

In 2009 the Norwegian government issued an additional 65 licenses for salmon farming, where five of them were earmarked for organic production (Nasjonalbudsjettet, 2010). Buyers of organic licenses are required to be certified by the administrator and designer of the Norwegian regulations for organic salmon farming, named Debio. The government has called upon this decision based on the belief that organic agriculture and aquaculture potentially represent less hazardous environmental influence (Landbruks- og matdepartementet, 2009).

# 4 Methodology

The purpose of this chapter is to describe the research strategy that is chosen to meet the objectives of this study. The research strategy is designed with intentions of attaining a deeper understanding of why and how Norwegian aquaculture companies diversify to organic salmon farming, and to what extent societal, ecological and economic goals are being integrated to fulfill, or go beyond the certification standards.

Figure 9 below illustrates the research methodology which this chapter of the study sets out to explain in more detail. Throughout the research procedure the purpose has been to combine qualitative academic research with managerial pragmatism with the aim of providing a foundation for answering the research questions.

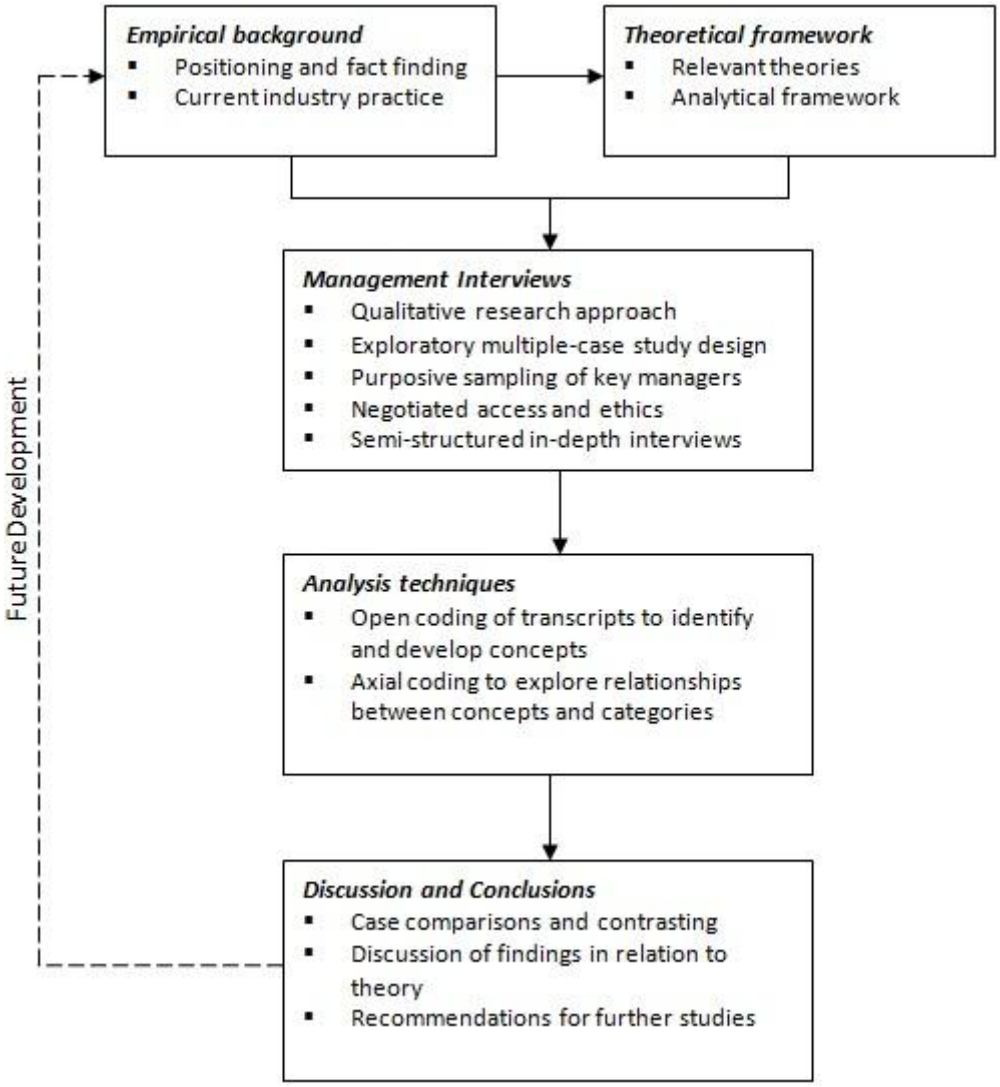


**Figure 9: Flowchart for the Project Methodology**

## 4.1 Research design

According to Yin (1994), research design connects the data to be gathered and conclusions to be drawn to the research questions of the study. Furthermore, it provides a conceptual framework for getting from a set of questions to conclusions. Ghauri and Grønhaug (2005) suggest that three different research designs can be applied in business studies. The choice of research design depends heavily on the nature of the problem being studied (Yin, 1994).

*Descriptive research* is used when the research problem is well structured. Essential in the descriptive research design is structure and precise rules and procedures that must be applied for all objects measured (Ghauri and Grønhaug, 2005). *Causal research* is concerned with testing hypotheses about cause-and-effect relationships by determining whether changes in one variable cause any effects on another variable, ceteris paribus. With this type of design the researcher can never be completely certain that there are no other variables influencing the causal relationship, which leads to greater research complexity (Yin, 1994).

However, on some occasions the researcher possesses little information on the phenomena being examined, which often result in a much wider and open research problem. *Exploratory design* provides the researcher with ideas and insight on how to solve imprecisely formulated problems, and is useful when the researcher's knowledge level is low (Grenness, 2001). The design prepares for the researcher to attain valid and reliable information in accordance with the chosen research problem throughout the exploration process (Ghauri and Grønhaug, 2005). The purpose of exploratory research is oftentimes to generate rather than testing theory (hypotheses), and the design is well suited as a preparatory study for studies testing more complex hypotheses. Exploratory design is used when the variables being examined cannot easily be quantified, and is concerned more with answering questions like "how" and "why" rather than "how often" or "how many".

The research problem of this project is relatively open in a sense that little research has been done to examine why and how Norwegian firms diversify to organic salmon farming. Furthermore, the research problem cannot easily be quantified as it seeks measures on the extent at which various phenomena are present in the firms, rather than to quantify their occurrence. An exploratory approach was therefore considered appropriate to uncover if the variables suggested in the theoretical framework are present, and if there are other variables that are relevant. In particular, and for the same reason, a multiple case design was chosen to shed light on the research questions. The case study approach is according to Ghauri and

Grønhaug (2005) often associated with exploratory research, and is particularly useful when the phenomenon under investigation is difficult to study outside its natural setting, and when the variables and concepts under study are difficult to quantify.

## 4.2 Data collection

Exploratory design offers many methods of collecting data to examine research questions. Bryman and Bell (2003) suggest that the main research methods associated with qualitative research are ethnographic and participant observation, focus groups, collection and qualitative analysis of documents and texts, and qualitative interviewing.

In ethnographic and participant observations the researcher registers the behavior of people and groups by focusing on what they do, and not necessarily what their subjective experiences and opinions are (Bryman and Bell, 2003). This type of observations was not considered as a relevant method for answering the problem of this project, as the purpose is to examine the underlying motives and means of diversifying to organic salmon farming. In focus group interviews, predominantly open questions are used to ask a group of interviewees about a specific situation or an event that is relevant to them and of the interest of the researcher (Ghauri and Grønhaug, 2005; Bryman and Bell, 2003). Focus group interview seemed irrelevant in this study as interviewing a whole group was perceived as unnecessary to collect the desired variables. Analyses of documents and texts played a role in mapping when and to what extent the interviewees decided to adopt organic production, and to determine the characteristics of firms involved in the certification scheme. Annual reports, company web-sites, certification statistics and relevant articles in industry periodicals are examples of secondary data that was used in attaining information that was necessary to perform well-prepared interviews. However, these sources of information were not solely seen as sufficient in examining the research problem.

A quantitative approach to data collection, involving statistical analysis, was discarded as the study aimed to explore a sample of managers' opinions, behavior and experiences relating to organic aquaculture production. On the contrary, a qualitative approach, investigating non statistical data, was regarded suitable despite its reputation as a challenging procedure because of the level of ambiguity mixed up in the analysis (Ghauri and Grønhaug, 2005). This was seen as a more appropriate approach as the purpose was to understand, gain insight and create explanations for the phenomena being researched, rather than to arrive at statistically valid conclusions. Consequently, qualitative interviews were used as the primary source of data collection in this study.

### 4.2.1 Qualitative interview

Qualitative research is a mixture of the rational, explorative and intuitive, where the skills and experience of the researcher plays an important role in the analysis of data (Ghauri and Grønhaug, 2005). According to Bryman and Bell (2003), the qualitative interview is among the most widely employed methods in qualitative research. The flexibility of the interview has made it particularly attractive to researchers. The purpose of the qualitative interview is to bring forth descriptions of the respondent's everyday life to interpret the meaning of the phenomena being studied (Kvale, 1997). In qualitative interviews, the researcher is interested in the knowledge, understandings, experiences and interactions of human beings (Johannesen, Tufte and Kristoffersen, 2006).

Data was gathered through a series of semi-structured in-depth interviews to allow for some flexibility between the interviews (Bryman and Bell, 2003). Structured interviews, where standardized schedules are used to guide the respondent, were seen as too restraining for the purpose of the research questions. Unstructured interviews, involving informal conversations without the use of any standardized schedule, were not considered suitable as the purpose was to explore specific areas of theory. As unstructured interviews in reality can be compared to an informal conversation, there was a risk that the respondents would give answers that were unrelated to the subjects under research.

### 4.2.2 Semi-structured interview

In semi-structured interviews the researcher has a list of questions on fairly specific topics to be covered, often referred to as the interview guide, but the respondent is given great flexibility in how he or she wishes to reply (Bryman and Bell, 2003). The questions should therefore be formulated so that the respondent is given a chance to elaborate the answers. The researcher, on the other hand, is given the freedom to change the order in which questions are asked, and may ask questions that are not included in the guide as the researcher picks up on things said by the respondent.

A semi-structured interview approach was chosen on the basis that there were several topics and factors that the respondents preferably should elaborate, especially those associated with the research problem and the theoretical framework. Because a multiple-case-study approach was taken, some structure was needed in the interviews in order to ensure cross-case comparability. An interview guide, including several questions covering the most important topics, was therefore prepared as a means for ensuring that all relevant issues were address. The

amount of questions and their order of appearance varied slightly between the interviews. This was a direct consequence of the relatively flexible questions being asked, causing the respondents to answer multiple questions relating to different topics at once. Several relevant and unforeseen factors that were not identified prior to the data collection were picked up during the actual interviews, allowing for follow-up questions to be asked. This contributed to the collection of a much wider data set that benefited the case analyses and discussion chapters.

### 4.2.3 Interview guide

An interview guide provides the researcher with an organized plan for carrying out the interviews, and helps in preparing the researcher mentally and professionally (Johannessen, Tufte and Kristoffersen, 2006). It consists of a list of topics and general questions to be undergone during the interview. The interview guide oftentimes includes bullet-points or supplementary questions that ensure coverage on all topics and questions.

One of the most important factors relating to the formulation of questions for the interview guide is to ensure that they intercept the respondent's perception of the social world, and that they include a certain degree of flexibility (Bryman and Bell, 2003). These questions should therefore be well thought-through and compared to the research problem several times, partly to test the consistency between the two and partly to see whether these questions are thorough and correct enough to attain ideal answers (Ghauri and Grønhaug, 2005). A draft of the interview questions should then be prepared and pre-tested on a few respondents to check the understanding of the interviewee regarding the research problem and interview questions. The primary interview questions (Appendix 1) were therefore tested with the help of a management contact in EWOS, i.e. the fish feed producer supplying both case companies with organic feed, and a recently resigned manager of a medium-sized Norwegian fish farming company. Feedback from the test interviews was encouraging, revealing that the interview questions were well formed and attained responses which provided valuable insight for exploring the project objectives. The test interview also verified that the length of the interview was pleasing, with a logical ordering of questions and no obvious errors.

Prior to the interviews the author broadened his knowledge pertaining to the project's topic by examining relevant literature. The purpose of this was not to test existing theory, as is the intention within quantitative researching, but rather to develop and ensure theoretical concepts for the interview guide. Industry periodicals and related research studies were also seen as necessary reading material to develop a proper understanding of the subject and the industry,

and the author visited an industry fair with representatives from most of the prominent Norwegian aquaculture companies to gain insight and establish connections with potential key informants.

The interview guide was prepared in accordance with a structured proposition of what should be included as content, provided by Johannessen et al. (2006). The structure consists of an introduction followed by some factual questions, thereafter more complicated and sensitive questions, and a finish. In the introduction the researcher should present themselves and the project's purpose, and assure anonymity and confidentiality if this is demanded. Simple factual questions relating to family, work or career may then be asked to establish a relationship of trust with the respondent. The researcher can proceed by asking more complicated questions that are related to the actual research project, although caution should be taken pertaining to particularly sensitive questions. The interview should be rounded off in an orderly way. Time should therefore be set aside to allow for questions or comments that the respondent may have (Johannessen et al., 2006). This structure was found helpful in ensuring quality in the data collected throughout the interviews.

Capturing the respondents' answers in their own terms is important to allow for detailed analysis of the interviews (Bryman and Bell, 2003). A tape recorder was therefore used to ensure that everything was properly apprehended. As suggested by Ghauri and Grønhaug (2005), the interviews were transcribed as soon as possible after the interviews had taken place, and any special circumstances were written down. The transcribed interviews were sent back to the respondents for approval or revision of potential misconceptions. Feedback was given in all cases except from one respondent, and the only revision being made was organization names that were misunderstood when transcribing.

## 4.3 Sampling

It was not the purpose of this study to draw numerical conclusions from a randomly selected data set. For that reason the research was performed using a non-probability sampling method (Bryman and Bell, 2003). More specifically, *judgment sampling* (or *purposive sampling*) was used as limitations, with respect to time and resources, complicated the sampling of a completely representative set of various multinational organic salmon producers. In deciding what cases to include, Ghauri and Grønhaug (2005) stress the importance of first choosing a target population, and then, out of the target population, selecting one or a few cases or firms to examine.

The target population for the research project was companies that operate organic salmon production. Several companies were initially considered as potential case candidates, including some Scottish companies with well-implemented organic profiles. Organic salmon farming is far more prevalent among Scottish producers than in Norway, and including companies operating in both countries would open possibilities for multinational cross-case comparisons (Georgakopoulos and Thomson, 2005). However, as the chosen research approach required the author to be present where data was collected, limitations pertaining to both time and resources led to the decision of focusing entirely on Norwegian companies.

Today, there are relatively few Norwegian fish farming companies that operate organic salmon production in Norwegian waters. To find out exactly who and how many that was involved in organic production, the Directory of Fisheries and the Norwegian certification body for organic production (Debio) was inquired by the author. Only three potential candidates were identified, and, by searching the internet for annual reports and company information, they were all disclosed to be at differing stages with respect to scale and time of implementation (Debio, 2008a). As the project's objective was to study management accounting and control systems, the overall strategy formulation and environmental embeddedness of companies involved in organic salmon farming, a company would only be contributing to the project if their scale of operations gave indications on the presence and usage of these factors. One of the three potential candidates was excluded from the population on the basis of their relative size. With only six licenses for salmon production and 13 employees the chances of finding integrated management control systems that would benefit the project seemed absent. As a result, the population consisted of two appropriate Norwegian case companies.

Initial contact with the companies was made through e-mails explaining the project's purpose and description. The potential respondents were informed that the interview would last approximately one hour, and they were invited to participate in the study. Establishing contact with the right persons within the companies was in some cases time-consuming, and the respondents then had to find time for the interview. Both companies accepted the invitation to participate in the study.

The characteristics of the two case companies vary in terms of size, year of implementing organic production and differentiation strategy. Both companies are currently in a growth phase where they are trying to build up a position in the market by adapting the production to prevailing market conditions.

As there are only three organically certified producers of salmon in Norway, assuring anonymity was considered problematic because the companies would still easily be identified. Therefore, as advised by Ghauri and Grønhaug (2005), the respondents were asked if the interview was to be treated anonymous and/or confidentially. This was not only done to ensure the sharing of truthful and richer information, but also to preserve ethical principles in business research (Bryman and Bell, 2003). One of the companies expressed that they wanted full confidentiality as they were anxious of sharing sensitive information. As a consequence each company was informed that they would receive a copy of the project containing only the general reflections and the parts of the analysis that was related to them. Although this was seen as a drawback, it allowed for the analysis to include real names of managerial positions. Nevertheless, at one respondent's request, the company names were made anonymous to preserve ethical principles.

The intention of qualitative interviews is to generate transferable and supplementary knowledge, and the recruiting should therefore have a clear goal (Johannessen et al., 2005). This is called purposive sampling in the methodology literature. The next step after deciding on a target population is to select the persons that will be participating in the study, also referred to as the respondents. The basis for the selection of respondents in qualitative interviews is not representation but *suitability*. The starting point for the interviews was to find persons in each company who possessed accurate knowledge relating to the research questions and theoretical framework, often referred to as *key informants* (Bryman and Bell, 2003). Each case study should therefore include respondents in possession of knowledge pertaining to the organization's economic performance, strategic planning and organic production. As it was hard to believe that one respondent from each firm would be able to sufficiently provide supplementary information on all topics, it was seen as necessary to target at least two respondents in each firm.

Interviewing multiple respondents was also seen necessary as this method relies on human memory, which records selective parts of reality (Ghauri and Grønhaug, 2005). It is quite possible that two different respondents, while going through a certain situation or experience, will record or remember different things. As adviced by Ghauri and Grønhaug (2005), the interviews should therefore be cross-checked with each other. Thus, the initial interview request asked specifically for two key management positions with complementary knowledge on the relevant topics. The interviews did not necessarily need to be held with persons representing the same position in both firms as long as they were able to provide information on all relevant issues. Table 3 provides a full reference to the data collection.

**Table 3: List of Participants for Management Dialogue**

| Company | Function | First contact | Interview length (min.) | Visit duration (min.) |
|---|---|---|---|---|
| Firm A | CEO | X | 42 | 180 |
| | Bio security team-leader | | 48 | |
| | Entrepreneur and former CEO | | 40 | 90 |
| Firm B | Manager farming | X | 40 | 150 |
| | Group quality manager | | 30 | |

All the respondents were considered key informants as they possessed complementary knowledge supplementing each other and benefiting the research.

## 4.4 Analytical approach

The two most frequently cited strategies of qualitative data analysis are according to Bryman and Bell (2003) analytical induction and grounded theory. The strategies provide a framework that is meant to guide the data analysis. Johannessen et al. (2005) describe grounded theory as a particularly challenging approach where data collecting and the analysis are prepared simultaneously, and where the primary goal is to develop new theories on the basis of the collected evidence. Grounded theory as an analytical approach was rejected on the basis that it was not intended for this project to create new theories. The lacking of time, initial knowledge and research scope were also seen as factors limiting the researcher's ability to choose this approach. Instead, analytical induction, involving that the researcher reaches a point of satisfaction in the data collection, was considered appropriate (Bryman and Bell, 2003). The point of satisfaction is reached when the interviews lead to repetition, and including more respondents after this point would contribute nothing new to the study. Although the project's purpose was to uncover as many variables as possible relating to the defined research topics, it was desirable to reach a point of satisfaction. The data collection did not lead to a point of satisfaction although several variables were mentioned more than once. However, this was not seen as problematic as it was an exploratory study where the purpose was to collect information and accumulate new knowledge on a relatively unknown research field.

In particular, analysis of multiple case studies was chosen to interpret data by looking for commonalities and differences between the two cases (Ghauri and Grønhaug, 2005). At individual case analysis level, this involves identification and categorization of elements, and exploration of their connections. The comprehension of the meaning of activities are then compared and contrasted in a cross-case analysis. To analyze data at individual case level, the

process of *coding* is used to conceptualize, categorize and establish a description of collected data (Johannessen et al., 2005). By coding transcribed texts the researcher is able to simplify the meaning and outline an overview of the material.

Coding is the starting point for most forms of qualitative data analysis (Bryman and Bell, 2003). Strauss and Corbin (1990), drawing on their grounded theory approach, distinguish between three types of coding practice. In *open coding* the transcripts of interviews are micro analyzed, broken down into conceptual units (e.g. a few words, a sentence or a paragraph) and categorized. Names of categories may be derived either from terms that emerge from the data, terms used by respondents or terms derived from existing theory and the literature (Strauss and Corbin, 1990). *Axial coding* refers to procedures in which data are put back together in new ways after open coding by linking codes to contexts, to consequences, to patterns of interaction, and to causes (Ghauri and Grønhaug, 2005). In *selective coding* related categories are integrated or clustered with a selected core category to validate their relationship and filling in categories that need further refinement and development (Strauss and Corbin, 1990).

A core category is by Ghauri and Grønhaug (2005) described as the central issue that all other categories are related to. Shortly after the interviews were transcribed, data was separated and categorized on the basis of terms deriving from the theoretical framework and the research questions. After data had been categorized, apparent relationships were drawn between the categories to link codes to causes and consequences. Selective coding was considered irrelevant in the analysis of data partly because there were no core category to which other categories could be related, and partly because the purpose of using coding was to structure data and develop insight rather than to develop new theories.

## 4.5 Reliability and validity

Reliability and validity are important criteria for the evaluation of business and management research (Bryman and Bell, 2003). However, there has been some discussion concerning their relevance for qualitative research and what the terms in reality imply, and alternative criteria for evaluation have been suggested. LeCompte and Goetz (1982), among others, suggest that the terms are adaptable to qualitative research using their interpretation of the meaning.

External reliability relates to the degree to which a study can be replicated (LeCompte and Goetz, 1982). This criterion is problematic in qualitative research as a social setting and the circumstances of an initial study must be seen as impossible to “freeze” in the sense that the

findings from a replicating study could be revealed as different from that of the original researcher. As a result, this study could be perceived to have a low external reliability as the social settings, context and point in time of the interviews would be difficult to replicate. LeCompte and Goetz (1982) suggest that a replicating researcher should therefore adopt a similar social role to that employed by the original researcher. Internal reliability describes a situation where the research team consists of more than one researcher, and to what degree there is consensus among the researchers about what they see and hear (LeCompte and Goetz, 1982). The internal reliability of this study was hard to evaluate as the interviews were performed only by the author.

Ghauri and Grønhaug (2005) emphasize the importance of evaluating the validity in qualitative research as well, and advice qualitative researchers to address four types of validity; descriptive; interpretative; theoretical; and, generalizable.

Descriptive validity explicates the factual accuracy of collected descriptions, and to what extent they reflect the actual phenomena being studied (Ghauri and Grønhaug, 2005). Both case studies included multiple respondents representing different management positions, and each informant was able to provide supplementary information on most of the questions being asked during the interviews. The researcher was therefore able to capture multiple realities within the research setting to ensure that conformity among the respondents of each case existed.

Interpretive validity refers to the credibility of the collected data in the eyes of the population being studied, i.e. how good the interpretation is (Ghauri and Grønhaug, 2005). As all interviews were tape-recorded, transcribed and sent back to the respondents for approval or revision, the interpretive validity of this study should be perceived as satisfactory.

Theoretical validity refers to the adequacy of the suggested explanation (a theory) for the research findings (Ghauri and Grønhaug, 2005). Extant theories were presented prior to the collection and interpretation of data, and have by the author been seen as helpful in identifying, understanding and constructing explanations for concepts deriving from the collected data.

The findings of a study are generalizable if they can be generalized to hold true for other settings (Ghauri and Grønhaug, 2005). The nature of this study allowed only for two companies to be included, and the evident difference between them strengthens the argument that the findings should not be seen as generalizable. The external validity of this study could therefore be perceived as low. Although it was not intended for this study to be generalized, the findings

could be used in identifying important assets that contribute to the adoption of organic production and to improve the environmental performance in other organizations.

Internal validity constitutes whether there is a causal relationship between the general phenomena being studied, and the definite data (Johannessen et al., 2006). This is a somewhat challenging issue in this study as there is a certain selection bias in relation to the selected research approach, in that the two case studies were chosen based on their accessibility and suitability to the research problem. It may also be difficult to recognize the causal relationship between the variables because the two companies were found to be quite different. The internal validity would have been greater if, by example, Scottish organic producers were included. However, the scope of the research was limited by available time and resources which in turn confined the geographical target population to include Norwegian companies exclusively.

Bryman and Bell (2006) suggest that the use of *triangulation* can improve the credibility and validity of data and conclusions. Triangulation entails using more than one source of data when studying social phenomena. Data and conclusions may then be checked by combining different methods, different interviewees, different contexts, and different observers.

All interviews were carried out using the exact same interview guide. Although the flexibility of the interview allowed for the respondents to answer multiple questions simultaneously, it enabled the researcher to cross-check answers to look for misunderstandings among the respondents representing the same company and between the two cases. Textbooks and articles in the field of strategy, investment appraisal, management accounting, environmental accounting and environmental management systems are examples of secondary data that was used by the author to become absorbed in the project's theme. Trade magazines and information databases on the aquaculture industry were also used to gain insight and knowledge to be prepared to perform the interviews. The annual reports and web pages of the two case companies were used actively to identify the relevant interview objects before the interviews, and to cross-check for correspondence with the respondents' answers after the interviews were carried out.

The initial case descriptions in the beginning of each case study are based on annual reports and company web pages, but were also compared to the respondents' own descriptions of the company. The triangulation confirmed that there was correspondence between the sources of information, and improved the credibility of the research.

## 4.6 Limitations

The project was naturally limited by time and economic resources. As a result, the findings are somewhat limited by the number and variety of respondents and firms participating in the interviews. A larger group of both respondents and firms would presumably have yielded a different set of data. Nevertheless, through the use of purposive sampling, involving identification of essential cases, the author attempted to reduce this risk as much as possible (Ghauri and Grønhaug, 2005).

There is also a risk that the meaning of collected data and quotes may have been lost when translating the transcribed interviews from Norwegian to English, as the interviews were not confirmed or revised by any of the respondents after they had been translated.

Another limitation may have occurred as a consequence of the broad research scope that was employed, embracing several interrelated special fields and management functions. As a result, one respondent from each case, i.e. the quality managers, lacked sufficient knowledge to answer some of the questions regarding management accounting practices. This reduced the descriptive validity of collected data as these results were based on a limited number of perspectives and social realities.

According to Johannessen et al. (2006), one of the advantages with interviews as a data collection method is that the researcher is able to measure the respondent's individual and personal viewpoints on a phenomenon. The disadvantage with such a procedure is that both interview effects and context effects may occur, in that the researcher's presence and the context of the interview may create special results. This can cause the sharing of artificial or incorrect results (Johannessen et al., 2006). However, the assurance of anonymity and the offering of research confidentiality prior to the interviews were used as means to lessen this risk as far as possible. The author did not perceive any of the interviews to have been affected by any of these effects, although some of the questions being asked in a few of the interviews might have been leading.

# 5 Case studies – empirical data and analysis

This chapter sets out the findings of the study in two parts: Case 1: Firm A and Case 2: Firm B. Each case will be analyzed separately in this chapter in accordance with the structure presented in the theoretical framework. The cases will then be compared and contrasted in a cross-case analysis in chapter 6 – Discussion and Conclusions.

The research findings from each case are presented in five interrelated categories. First, the findings indicating motives for diversifying into organic salmon farming are presented and analyzed. Second, the concepts demonstrating whether and how profitability was evaluated prior to the implementation of organic production will be presented and explored. The aim of this section is also to investigate if any investment appraisal technique was considered necessary. Third, the presence and usage of management accounting and control systems is explored. Most excess costs deriving from the organic certification standards are costs incurred to improve the environmental outcome of associated activities. Hence, controlling excess costs may increase profitability and enhance environmental performance by eliminating redundant input usage and unnecessary operating activities. Fourth, the findings indicating the organizations' environmental embeddedness will be presented in accordance with the analytical framework that was outlined in section 2.3. Finally, management experiences from organic production will be contrasted to the expectations that formed the basis for their investment.

## 5.1 Case 1: Firm A

Firm A is a fully-integrated producer within the Norwegian fish farming industry that controls the entire value chain, including hatchery, smolt and fish production, fish carrier, slaughterhouse and sales (Annual Report Firm A, 2009). The group consists of four companies. Production is entirely located in Norway and the company is currently in possession of 30 out of the 971 licenses available for aquaculture production in Norway, of which 26 are located in Finnmark County and four are located in Møre and Romsdal County. Two of the licenses located in Møre and Romsdal County are earmarked for organic production, whereas the last two are conditioned to research and development (R&D-licenses). Firm A established organic production of cod in 2002, and was the first Norwegian company to implement organic salmon production in 2004. Today, their entire production is organic of some sort. In 2009, the group reported total operating revenues of NOK 315 million with corresponding profits after tax of NOK - 12 million, and they had 74 full-time employees. The vision of Firm A is to be the natural and preferred choice of sustainable and organic fish products (Annual Report Firm A, 2009).

The following analysis includes answers collected through in-depth interviews with three key informants in the Firm A group. The current CEO was appointed financial director of the group in 2009 and became CEO in 2010. The bio security team-leader has been employed in Firm A on a permanent basis since 2006 and has been; responsible for research and development; the manager for organic production; and, over the last couple of years, responsible for biological security. However, he has worked as a consultant for Firm A since 1996 and until his permanent employment in 2006. The entrepreneur of Firm A worked in the company until his resignation as CEO in 2009.

### 5.1.1 Strategy formulation and motives for diversification

In uncovering why firms enter into this potentially difficult and expensive strategic decision, it seemed natural to distinguish between external and internal conditions that functioned as motivational drivers for the diversification. According to the entrepreneur and former CEO, Firm A was the first Norwegian firm to implement an organic salmon production in 2004, and the decision was made in the light of many things.

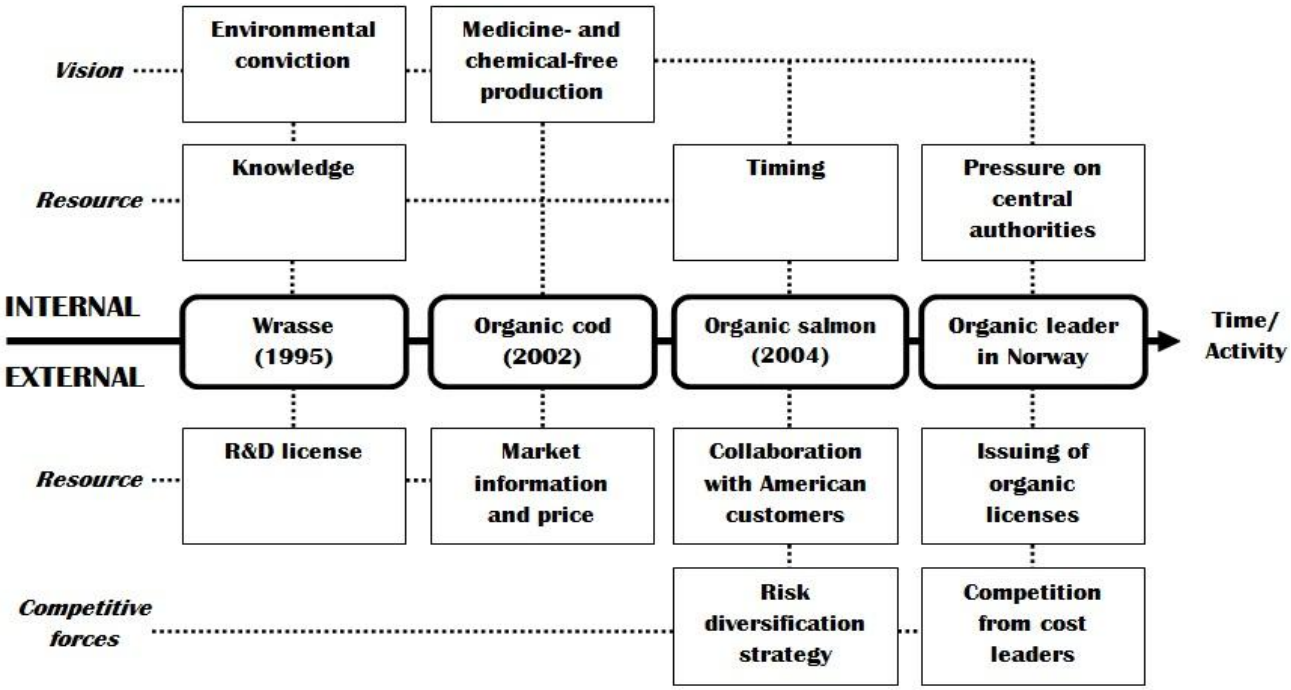


**Figure 10: Strategic Impetuses Affecting the Decision-making Process in Firm A**

The complex sequence of events, that in turn led Firm A to the decision of establishing organic production, is illustrated in figure 10 above. A timeline explains their involvement in various activities chronologically, and splits associated strategic impetuses in two categories. Internal strategic impetuses, found above the timeline, include the management's overall vision of desired production methods and existing internal resources, whereas external strategic

impetuses, found below the timeline, includes competitive forces and external resources that influenced the decision.

*Internal aspects influencing the decision to diversify*

This category includes concepts relating to internal resources possessed by Firm A that influenced the decision of diversifying. Examples of content include:

> *We realized that the way aquaculture was done back then, with reckless usage of chemicals and medicine, was not sustainable. It was a ticking bomb that would explode. Wrasse was an environmentally friendly and popular alternative for treatment of salmon lice infestation that did not require any chemicals or medicine. Then a chemical named Slice was developed specifically for the treatment of sea lice, which killed our wrasse initiative. But we refused to let go of the wrasse idea and salmon production without the use of chemicals and medicines, and decided to enter salmon farming where we could do this ourselves. (Entrepreneur and former CEO)*
>
> *When these guys started with wrasse, it was because the chemicals being used to fight salmon louse worked poorly. In the beginning of the 90s it was nuvan and neguvon. These chemicals worked poorly while wrasse worked well, so they invested in equipment and earned it all back instantly. And when they entered into fish farming, production without chemicals became the idea. (Bio Security Team-leader)*
>
> *If we look at it from an economic perspective I would think that they probably saw the opportunity to get access to the R&D-license in an easy way as they were doing research on wrasse, they already had knowledge on wrasse. They did not pay anything for the R&D-license, and then they started up as fish farmers. (CEO)*

A mixture of genuine interest of improving an industry perceived as environmentally destructive, and the demand for alternative methods for treating salmon lice, made the basis for a series of events that eventually led to the implementation of organic salmon farming in Firm A. It was explained that this was their only entry gate to fish farming as they lacked financial capital to buy licenses at full price. Despite this, the entrepreneurs possessed human capital on an area that opened possibilities of attaining external resources, and were as a consequence entitled a R&D-license to do research on the usage of wrasse as a substitute to chemicals in the removal of salmon lice (Barney, 2002).

> *In 2003 or something, they wanted to produce organic cod, but there was no body of rules for it. Therefore, in well-known [Firm A]-style, they gathered everyone they knew internationally and nationally for three days to prepare a draft of an organic standard. Now they had organic cod, and more or less randomly some Americans traveled around*

*in search of a niche production for salmon – then they heard about [Firm A] and the wrasse and so we came in contact with them. (Bio Security Team-leader)*

*I think they [competitors] may have had a slightly different approach to aquaculture than what we had through wrasse and the first R&D-license, and that this might be the difference. And I think that if we had started now, it would not have been a certainty that we had started with organic production. (CEO)*

It was noticeable that the entrepreneurs were eager to create production methods that met with their vision of chemical and medicine free production. The entrepreneurs' timing as pioneers appeared crucial in attracting foreign initiative-takers for organic production.

In view of the resource-based theory, important assets such as human capital, a clear vision of operating sustainable aquaculture, and experience from related areas of business were the most prominent firm resources that facilitated the shift to organic production (Barney, 2002). However, it was at least as important to explore what influence external conditions might have had on the decision.

*External aspects influencing the decision to diversify*

This category includes concepts relating to external factors influencing Firm A's decision of diversifying to organic aquaculture. Examples of content include:

*When prices [on conventional salmon] plummet, the price on organic salmon remains the same. When prices soar, you are not coming along to the top. You might be able to follow to the top but you will stay put when prices plummet. That is the most important thing, there is much more predictability. We are selling on long contracts. Five-year contracts at the longest, with a two-year period of notice and annual revisions. So it is a completely different way to sell. (Bio Security Team-leader)*

The shift to organic production was conspicuously seen as a risk-reduction strategy where long contracts served as an insurance against volatile commodity prices, which in turn created much more predictability in operating income and cash flows. Implementing a niche strategy was presumed to reduce the level of rivalry among existing firms (Barney and Hesterly, 2010). Firm A was entitled two of the five earmarked organic licenses in the last issuing of new licenses in 2009. In that respect it was relevant to ask whether government stimulation with regards to the issuing of R&D- and earmarked organic licenses was seen as an influencing factor for further involvement in organic fish farming:

*We have one R&D-license where we focus on wrasse, and then we have one R&D-license in co-operation with Ålesund College University that focuses on developing organic. We also have two organic licenses. So I think that if these licenses were free there is a fair chance that we would not be producing organic. So in this manner the authorities stimulate it. (Bio Security Team-leader)*

*Licenses are costly and hard to get a hold of, so if you are buying a license today it would cost you about fifty million [kroner]. A R&D-license on the other hand costs nothing. And organic licenses are issued by the authorities, so we paid something like five million [kroner] for each of them. (Bio Security Team-leader)*

The issuing of organic licenses was highlighted as an important stimulus for their current emphasis on organic aquaculture, mainly due to price differentials and difficulties of attaining unconditional licenses. However, it was explained that the organic licenses did not just appear by chance in Firm A as they were issued partly as a result of the management's dialogues with representatives of the central authorities:

*And the new organic licenses came as a result of work that we did towards the Minister of Fisheries, Helga Pedersen, where we got two licenses in the Tana fjord when the Tana fjord became a salmon fjord. Then we had several meetings to try and move them to Møre and convert them to organic production. That gave Helga the idea of issuing earmarked licenses on organic. She told us to apply, and we got two of them. (Bio Security Team-leader)*

Influential lobbying against central authorities affected their decision of issuing licenses, which in turn led to an increased growth potential for Firm A. Hence, by exploiting the collection of organizational attributes, the managers of Firm A were able to create opportunities for further growth (Barney, 2002). Market information was also mentioned as an information source supporting the decision to diversify:

*Well, all along we have been attending what is known as BioFach in Germany where we have gained knowledge. And we have been attending several meetings in the U.S.A. where we have tried to create an organic branding scheme, but it takes time. (Bio Security Team-leader)*

*And price prognoses have been relevant all along. From the very beginning we have seen - when we had one and two licenses - that we were going to be a niche producer to avoid competing against the cost leaders. (Bio Security Team-leader)*

The last-mentioned quote signals that they initially did not have any alternatives other than diversification in some sort of direction. Since the decision of producing without chemicals and medicine had already been made, organic production appeared as an obvious choice.

Conventional and organic production were seen as mutually exclusive alternatives, where organic production, judging by the nature of the competitive environment and desired production characteristics, suited Firm A's strategy the best (Hazel, 1999). Later on in the interview a question regarding the future of organic salmon farming in Firm A revealed that this strategy might remain unchanged:

> *Well, that is a discussion we are having on a continuous basis. We have a cost premium in our organic production, but we have to regain it. But I do not think we have any choice because we are too small to compete with [Firm B] and Marine Harvest and the cost leaders. Therefore, our role is to be a niche producer. (Bio Security Team-leader)*

The competitive environment, characterized by large-scale operations and cost-efficient production, was interpreted as an entry barrier to conventional salmon farming (Porter, 1980). Thus, the management team perceived a niche strategy, focusing on their competitive advantages, as a virtue of necessity. Their involvement in organic production was seen as what Clark et al. (1989) define as a discretionary investment, involving investments representing potentials for new growth in different product lines.

Firm A's entrance to organic salmon farming can be described as a many-sided sequence of events, largely dominated by internal resources such as knowledge and an environmentally enlightened vision. Furthermore, unique external opportunities and the entrepreneurs' perception of the industry's competitive environment served as facilitating impetuses for the implementation (Robertson and Yu, 2001).

### 5.1.2 Investment appraisal and advance costing

This category includes concepts relating to the analyses made prior to the implementation of organic salmon farming. By at first resolving whether excess costs are mainly perceived as operational or related to start-up investments, the necessity of performing investment appraisals is highlighted (Bierman and Smidt, 2007). Determining the most essential cost categories, causing the differential between organic and conventional production, was relevant in order to analyze the company's ability to control these costs in the next category treating management accounting practices. Initially, the respondents were asked what additional investments that had to be made to implement organic farming in comparison to those of conventional farming:

> *Well they are a lot bigger than one would think. And they are rising now that an organic EU-body of rules is developed, which put much more restrictions on the density in net*

*cages than before. In Norway, the rules used to allow 20 kg per cubic (meter), and now it is as low as 10. This means that you in practice need to double the amount of net cages to produce the same amount of fish. (Entrepreneur and former CEO)*

*…but oftentimes we just extend the net cages so that they deepen, but only to a reasonable level that is safe for the divers, circa 35 meters. (Bio Security Team-Leader)*

The restriction on the allowable fish density was highlighted as the only pure element requiring additional investments, triggering almost a doubling in production-site equipment and staff dealing with surveillance and maintenance work. However, it was explained that expanding the net cages downwards could partly offset the investment. Most other elements contributing to the excess cost in organic production were largely seen as operational:

*The feed is more expensive as well. The use of offal, natural antioxidants and coloring makes it more expensive. So approximately one krone more per kg, or about 10 % more expensive, maybe even more. (Bio Security Team-Leader)*

*There are several restrictions on organic as well, and among other things you are not allowed to use contaminants to impregnate the net cages, which mean that we have to clean them with high-pressure cleaners. And this is an enormous cost, especially during the summer months when there is more growth in the sea. During the summer months, this has to be done every 14$^{th}$ day if your net cages are not impregnated. (Entrepreneur and former CEO)*

Among the cost elements that were recognized as the most prominent in affecting operating margins were those related to feed and manual cleaning of net cages. With an average FCR in Norwegian salmon farming of about 1.2, the excess feed cost of a five kg fish corresponds to about six kroner (Directory of Fisheries, 2009). This is indisputably an important cost element for companies involved in organic aquaculture, and refers to what Spitzer and Elwood (1995) define as *conventional environmental costs*. Another environmental cost arising from the certification standards is the cost of cleaning net cages manually. In conventional farming, the nets are chemically impregnated and built with copper, whereas organic farming requires them to be cleaned without the use of contaminants (Debio, 2008). Spitzer and Elwood (1995) describe such costs as *potentially hidden voluntary costs*, incurring as a consequence of operating environmentally preferable processes.

The investment and operating costs discussed up to now derive more or less directly from the certification rules. Although these costs were considered to represent a significant portion of the cost differences in organic aquaculture, the interviews revealed that several other, less detectable cost categories arose as a result of diversification:

*What I know is that we failed to calculate the cost differences correctly, because we were too optimistic when anticipating production costs in organic. One thing is the direct costs tied to the on-site activities of one location, but it activates a whole lot of things on the sales and marketing side which requires you to have a special strategy and special veterinarians and fish biologists that give you credibility in your work. You are required to document everything in a completely new way, and it is extremely difficult to do calculations on all of this. But I know that [Firm A] has an extreme amount of extra employees as a consequence of the decision of diversifying themselves in the market. A great number of man-labor years. (Entrepreneur and former CEO)*

*Then you have another indirect cost in that we are being revised by those who certify us in accordance with the standards. This requires us to build ownership competences for being exposed to this kind of revision and to keep the formalities in order. We have one person working almost exclusively with this. (CEO)*

*Then, of course, you have a somewhat exciting operational dimension. It is costly for us that the world market for organic salmon is confined, and that it is a niche market. Some want fresh fish every day, and this of course gives us disadvantages in how we wish to slaughter the fish. (CEO)*

The respondents expressed difficulties in foreseeing the need for additional staff to deal with issues related to sales, marketing, documentation and achieving credibility in their work. Sales and customer relations were perceived as more challenging than in conventional production, in that customers were permitted to influence the production process by demanding peculiar standards. As a result, the organic operations required Firm A to redefine their role in the value chain to include interaction with the retailer as well. Instead of slaughtering fish in bulks and selling them in an efficient spot market, they were now required to provide continuous supply throughout the year. This lengthened the killing season at each location and inflicted operational disadvantages. Special knowledge for obtaining credibility and bringing about the proper documentation was needed, and obliged Firm A to introduce formal positions dealing entirely with voluntary certification activities and internal audits.

The decision to diversify into organic salmon farming clearly changed the cost structure in Firm A. Some costs were more easily detectable than others, and some were therefore less calculable as well. The entrepreneur and former CEO stated that the production cost for organic salmon farming was at least 25 – 30 % higher than in conventional production. This is in line with Canavari and Olson's (2008) assessment of excess costs in organic salmon production among Italian farmers, where the differentials were estimated to equal 20 – 30 %. In addition, the investment costs related to doubling the amount of net cages and operational equipment

seemed prominent enough to be subject for some kind of investment appraisal technique prior to the implementation. In that respect it was relevant to ask whether the shift to organic production was evaluated by any means for estimating the scale and scope of these investments and operating costs:

> *No, from a pure economic perspective they probably thought that "if we get access to that license it would be of tremendous value to us". Contracts with costumers were made that assured higher prices, but he [the entrepreneur] was probably more uncertain about the cost effects it involved. So I do not think that any Net Present Value-calculations were made. Intuition has probably been used a lot. I think he was rather uncertain about the cost of feed, the excess costs on people and these kinds of things. And these things are easily managed in the commencement, but as you grow it becomes clearer what excess costs you are actually dealing with. (CEO)*
>
> *No, little or nothing. I do not think any method was used to appraise it. They most likely looked at the selling prices and not so much on the production costs. But we are better at that nowadays. (Bio Security Team-leader)*
>
> *Well in many ways we did, we looked especially at what our Scottish friends did. They had been doing it for years with great success. But at the same time we were self-righteous enough as Norwegians to think that we in Norway would be able to produce it even cheaper. We are number one in the world at producing salmon, and we will continue to be that on organic. So if we are able to mix the fact that we have the best conditions in Norway; fjords, cold and clean water and all that. If we could combine that with copying the Scots at what they were good at; marketing, branding and those things, then it had to result in high profitability. That was our hypothesis in a way. (Entrepreneur and former CEO)*

The case study of Firm A indicated that no effort to quantify neither the investments required for implementing organic production, nor the costs of operating it, although the necessary investments and the excess environmental costs were perceived as considerable. Rather, intuitive reasoning and qualitative duplication of established Scottish counterparts was seen as sufficient prejudgment for the decision to be made. Furthermore, getting access to earmarked licenses at considerably lower prices than the estimated market value was seen as reason enough to diversify, as it was believed to offset most of the inflicting excess costs. In other words, short-term growth opportunities overruled the necessity of further evaluation, in turn leading to several surprises on the cost side. It was noticeable that the management knew where the additional environmental costs occurred and the scale of their appearance. In the next section the use of management accounting practices will be explored to determine their ability to measure and separate these environmental costs.

### 5.1.3 Management accounting and environmental costing

The costs identified in the preceding section are summarized and categorized in table 4, and were by the respondents considered the most influential parameters causing the cost differential between organic and conventional production, respectively. The costs are classified according to their *nature of appearance* (Drury, 2008), and in terms of *measurability* (Spitzer and Elwood, 1995). The *complexity factor of managing the activity* is based on the respondents' own perception and communicated control, and the *excess cost traceability* signals their ability to separate and quantify excess costs.

**Table 4: Activity Items Inflicting Excess Costs on Firm A in Organic Production**

| **Cost object / activity origin** | **Nature of appearance** | **Measurability** | **Complexity factor of managing the activity/cost** | **Excess cost traceability** |
|---|---|---|---|---|
| Special feed | *Environmental prevention cost* | *Conventional cost* | *Low* | *No* |
| Doubling of net cages | *Environmental detection cost* | *Potentially hidden: voluntary cost* | *Low* | *No* |
| Manual cleaning of nets | *Environmental internal failure cost* | *Potentially hidden: voluntary cost* | *High* | *No* |
| Sales & marketing staff | *Indirect consequential cost* | *N/A* | *High* | *No* |
| Environmental audit staff | *Environmental detection cost* | *Potentially hidden: up-front cost* | *Medium* | *No* |
| Continuous slaughtering | *Indirect consequential cost* | *N/A* | *High* | *No* |

This section aims at exploring the degree of environmental cost control. In that respect the respondents were asked how profitability of the organic operations was followed up:

> *As all other salmon farmers we are using FishTalk and FarmControl, which are biological control programs, and then we have accounting systems in the usual manner. Then we have a superstructure that links the two together and makes us capable of tagging costs on location level, region level and corporation level to get out reports on whatever you want. For example, if you want to know the costs in net cage "1" at location "A" you are able to get out a report on that. (Entrepreneur and former CEO)*

> *Then we have our accounting system where costs down at generation level and all that are recorded. Everything is then built into a system named Infront-X, where we are reporting, and then we combine economic data with biological data and look at feed factor [FCR], feed cost per kg, then divide it down at other costs per kg. This system is then used to prognosticate both growth and cost development on the generations we have ahead of us. (CEO)*

> *What we say is simply that we shall have EBIT (Earnings Before Interest and Taxes) per kg, which is an industry financial ratio among the listed, which levels that of others'. This*

*means that when we reach plateau production – where we shall be – if we have excess costs as a consequence of organic, the additional price we achieve for the product must be higher. And if we succeed in doing that we will achieve an EBIT per kg that is on level or is higher than that of others. That is what we measure on. (CEO)*

As the interviews noted, most fish farmers use management control systems, with *user aspects* designed specifically for the aquaculture industry, to follow-up business activities and evaluate the associated profitability (Bjørnenak and Olson, 1999). Profitability was calculated by comparing EBIT per kg to a company goal. From an economic point of view, it was relevant also to determine the system's scope dimension, i.e. its ability to intercept the excess costs for each cost category being influenced by the organic certification standards:

*Yes, you can do that [track the cost differentials]. If you for example have both conventional and organic at the same location, it can be tagged so that net cage 1 is conventional and net cage 2 is organic. Then you calculate organic feed price multiplied by feed quantity on one, and conventional feed price multiplied by conventional feed quantity on the other. And similarly if you have contract-working divers that perhaps need to dive three times as often where you have organic compared to conventional, you are able to tag that as well. (Entrepreneur and former CEO)*

*Everything can be registered. But that was kind of a scarcity at [Firm A] for a while. This was a system that was built over a long period, and has during the last couple of years been put into practice. (Entrepreneur and former CEO)*

Evidently, the management accounting systems were capable of registering environmental costs and to allocate them to the responsible organization level (Spitzer and Elwood, 1995). Management accounting data such as daily performance indicators and production reports were explained to facilitate day-to-day decision making and ensure that routines and processes were functioning smoothly (Seal et al., 2006). One of the respondents, however, expressed difficulties in quantifying and separating the costs:

*If what you are asking is whether we are separating costs related to normal production compared to organic production, then the answer is no - because this is almost impossible in practice. (CEO)*

*We do calculations on feed prices with and without these attributes, and we do calculations on how many times we need cleaning so that we know the approximate excess cost, but this is not registered in the accounting system at a day-to-day basis. (CEO)*

There was an interesting contrast between the entrepreneur who assumed that the systems were used to record and separate excess costs at all levels, and the current CEO who expressed

difficulties in doing so. It was noted that the systems were fully capable of recording excess costs deriving from the certification scheme, but that it was not properly put to use in Firm A at the time. It was explained that they tried to determine the excess costs, but that it was extremely difficult and they were therefore incapable of separating the costs accurately. Difficulties in measuring the relevant costs complicated the management accounting practices and were presented as the main reason for refraining from it. As costs were still measured in EBIT per kg, the excess costs caused by the organic certification standards were presumably treated as overhead costs. In accordance with Bjørnenak and Olson's (1999) generic model for unbundling management accounting innovations, it was also interesting to examine the system's reporting frequency and other user aspects:

> *The reporting is done on a monthly basis. Well now it is, but earlier on it was not. In the mid-2000's it was at best done quarterly. Now, at the 17th each month, you have accounts covering the previous month with production figures at all levels, annual prognoses, variances compared to budget and so on. (Entrepreneur and former CEO)*

It was indicated that the importance and usage of management accounting had grown in Firm A since the entrepreneur's resignation. The *time aspect* of the chosen accounting period now involved monthly intervals, and annual production prognoses were made simultaneously (Bjørnenak and Olson, 1999). In relation to their statements regarding variances between budgeted and actual cost development, the respondents were asked what was done to manage and understand why operational variances occurred:

> *Well, you make a biological plan when you put fish out in the sea. (…) For each monthly report you will then see whether you are ahead or behind schedule on each of the components you are measuring. You can make many reports on this, but the goal is to make a one- or two-page report summarizing all the important information. In that case, a well-trained eye will immediately be able to see if there is a problem. (Entrepreneur and former CEO)*

By monitoring the interplay between biological and economic data the management was capable of identifying the *causal variability factors* causing variances to occur at different operational levels (Bjørnenak and Olson, 1999). Performance reports that summarized all the most important elements were used to follow up operations. Similarly, Drury (2008) suggests that the performance report plays an essential part in the feedback process, and clarifies where operations are not functioning as planned, and where additional attention should be directed. It was also indicated that the system was an integration of several management means, and the respondents were asked specifically to verify:

*Yes, everything is connected. [Firm A] uses a program named Infront-X – a program specially designed for the aquaculture industry. (Entrepreneur and former CEO)*

Following the definitions of Bjørnenak and Olson (1999), the respondents described an *integrated system*, embracing systems relating to management accounting, biological attributes and financial reporting. In that respect it was relevant to determine how this integrated management accounting system was used to increase efficiency and reduce the environmental costs associated with organic salmon farming:

*Well it made us capable of learning things like seasonal variation and, from looking at the totality, that enormous costs arose not only in production, but also at the corporation level and on the marketing side. And these were things we learned as a consequence of the reports. However, if our system was better at an earlier stage, we would probably have made actions earlier on. So it could have been a much better control system. (Entrepreneur and former CEO)*

*We have also made some assessments to determine the costs where we have economies of scale, and some of them are sustainable. Then we implement specific actions to reduce these costs and to optimize our operations. (CEO)*

A degree of operational learning was identified in that operational improvements were made by evaluating the effectiveness of past actions. The systems were used to develop insight, knowledge and associations that were helpful in improving the effectiveness of future actions (Pérez et al., 2005). It was explained that they learned how to use and integrate the systems as operations went on, and that the systems were used actively to identify costs inhering potential scale advantages.

Most costs occurring as a consequence of organic certification relates to environmental matters such as improved fish health and environmental performance. As the salmon farming industry is still at an emerging stage, with increasing production quantities and regulations in continuous revision, companies were by the author assumed to operate pro-actively in order to adapt business activities as the circumstances changed. In that respect it was relevant to examine whether the respondents thought the importance of controlling environmental costs would increase to sustain development in the aquaculture industry in future years:

*Yes absolutely. It will simply become more and more expensive, and stricter and stricter regulations will break out related to having net cages in the sea. It has already become a considerable cost and it will only get bigger in the future. (Entrepreneur and former CEO)*

*I am certain that it will. (..) And I think the cost will simply augment to keep the industry sustainable. (Bio Security Team-leader)*

*The industry needs to admit that we do not necessarily know all the consequences of our activities, but that we are interested in exploring and finding out the real impact of our operations. (..) I am simple in that way, I believe in openness, information and knowledge. I also think that we need to adapt if we see that something is done wrong. (CEO)*

It was noticeable that the management expected environmental costs to incline significantly in the future and that the importance of collaborating with authorities and associated stakeholders would increase to allow for industry growth. There was an interesting contrast between the respondents' perceived importance of controlling environmental costs and their lacking efforts to administer them in practice. As Firm A's entire production was organic in some way, the environmental costs incurring at the operational level were significantly higher than for conventionally producing companies. At the same time the management team expressed concerns about the overall profitability of organic production. Whether there is a degree of correspondence between absent profitability and inadequate management accounting practices is a question whose answer is beyond the scope of this study.

The integrated management accounting system seemed capable of encompassing several elements of environmental management accounting (EMA). Environmental costs relating to organic production could be categorized, quantified, and allocated in terms of scale and scope, and to which organization level each element belonged (Spitzer and Elwood, 1995). However, the respondents described the measurability of descriptive objects as too complex for each object to be estimated precisely. Costs were identified according to their nature of appearance, and could from that have been separated in line with Drury's (2008) definitions as either environmental *prevention costs*, *detection costs* or *internal failure costs*. The respondents expressed no difficulties in identifying from where each excess cost element derived. Nevertheless, Firm A was unable to measure each descriptive object in conformity with Spitzer and Elwood's (1995) categorization of environmental costs. Although not verified by the respondents, indications were given that most additional environmental costs were treated as overhead at locality level, and some perhaps even overlooked. Managerial decisions that can deteriorate as a consequence of lacking control of environmental costs include those relating to product pricing, cost control, environmental compliance strategies and capital investments (Spitzer and Elwood, 1995).

### 5.1.4 Intangible assets as facilitators for environmental embeddedness

This part sets out the findings relating to the presence and usage of intangible assets, and how these enhance the environmental performance of Firm A. Issues discussed in this section draw upon the analytical framework in figure 6.

*Training and awareness building*

As required by Debio, organizations involved in the organic certification scheme must identify training needs so that all employees, whose work is comprised by the control scheme, receive appropriate training (Debio, 2008). Training should also include instruction covering the general principles of organic primary production and processing. The respondents were therefore inquired about the actions undertaken to secure the fulfillment of standards descending from the certification scheme:

> *What we did when we discovered what jungle of standards certification really required was to head-hunt a person who had been working with suchlike quality standards before, as quality manager on the group level. She sat right beneath me in the corporate structure and was given a lot of power, in some situations authority enough to overrule me. And this was done because of the great amount of work it involved. (Entrepreneur and former CEO)*

> *We held seminars and internal meetings where we had gathered all the quality managers and fish biologists and showed power-point presentations explaining "what is organic", "who are we selling to", and these types of things. We then handed out questionnaires – kind of like a test – to see if everyone had paid attention and understood everything. (Entrepreneur and former CEO)*

> *It is also important to consider how the creators of these standards think - fish welfare and all that – and try to build that mentality among the farmers. (CEO)*

It was noticeable that organizational structure and management activities were influenced by the certification standards. Fulfillment entailed awareness building among the employees to establish a mentality prepared for revision, formal positions securing correct documentation and execution at all levels. The training programs facilitated employees' ability to identify possible areas of improvement and to understand data on material use (Pérez et al., 2007). Furthermore, one of the respondents expressed difficulties in uniting the attitude of employees with the overall strategy of attaining an environmental profile:

> *We found out that working with the attitudes of employees and to change them was extremely important. This was to make sure that they understood that when you are working in an organic firm you cannot simply dump dead fish because it is easier than*

*looking after it. We actually had several incidents where people did things while they were working for us that were completely abhorrent with our strategy of being organic. And of course, if you have declared a strategy of being an environmental firm, then people are much more after you and wish to expose you if you do not follow it. [It was explained that a couple of unfortunate incidents had occurred]. So working with attitudes is extremely important, and to have people who pull strings and develops and documents our quality work. (Entrepreneur and former CEO)*

The respondent indicated that undesirable actions by employees were more easily discovered by external stakeholders, and hence also correspondingly destructive for the organization's reputation, when operating organic because it entailed stricter supervision by interested parties. Evidently, several initiatives were carried out to ensure that every employee, whose work was affected by the certification standards, was given the proper training to fulfill all requirements. As a result of training and awareness building, two main intangible assets seemed present in Firm A; the awareness of employees; and, the environmental knowledge, skills and expertise of employees (Pérez et al., 2007). According to Pérez et al. (2007), these intangible assets are driving forces for embedding environmental issues and values in the organizations, allowing for the continuous improvement of environmental performance.

*Commitment of managers*

This category includes concepts relating to the commitment of managers to improve the environmental performance of organization activities. Examples of content include:

*We decided to become a niche producer and were not supposed to compete with those that produced in the cheapest possible way. We decided to produce without the use of chemicals and medicines, and that was what we wanted to stand for. (Bio Security Team-leader)*

*Well in many ways we did [go beyond certification compliance]. The organic rules are broadly defined, and you are able to label the fish as organic although medicines are used to remove lice. So we made a self-imposed requirement permanently restricting from using medicines and to use wrasse, exclusively. (Entrepreneur and former CEO)*

The self-imposed pledge to refrain from using chemicals and medicines seemed unrelated to any economic effects it might have set off. The fact that the organization was built upon this idea and is still operating under it clearly indicates the management's commitment towards the environment. Several signals were given by the respondents that demonstrated their true enthusiasm and pride pertaining to their end-product and its production methods:

*…we have also been attending Grüner Woche in Berlin, where we were accused of having wild salmon because it looked so fine. (Bio Security Team-leader)*

*I was working with Debio in the mid-90s to develop an organic framework, but it was abandoned after one generation. It was probably too early. (Bio Security Team-leader)*

Two respondents explained that they had taken initiative and participated in the development of a few organic certification frameworks. As the bio security team-leader noted, their inspiration for developing an accepted certification scheme that was compatible with Firm A's vision had its roots long before an official framework was created. The interviews clearly indicated a commitment of managers to improve the environmental performance of organization activities. According to Pérez et al. (2007), the presence of this intangible asset is strengthened further by mechanisms such as the development of environmental audits and interdepartmental environmental committees, which is discussed more in detail in the next category.

*Cross-functional coordination and communication*

Integrating stakeholders' interests contributes to organizations by taking into account the perspectives of a greater group of stakeholders, and involves establishing trust-based collaborative relationships with them (Pérez et al., 2007). In that relation, a variety of quotes that underlined Firm A's initiatives for collaboration with stakeholders emerged during the interviews. This involved the sharing of information to obtain inputs, identify and prioritize their environmental opinions:

*Most definitely, we have dialogues with WWF [World Wide Fund for Nature], "Jeger og Fisk" and all these. We have actually had some contact with Oddekalv and "Friends of the Earth Norway" as well. I am not sure if you know him, but Don Staniford from "Pure Salmon Campaign" has also visited us. (Bio Security Team-leader)*

*We have been writing quite a lot in the news papers. (…) WWF visits us and records films with us. We try to be very open and honest when they do. Even with aquaculture-criticizing madmen like Don Staniford. He came here and got to see our wrasse and wild smolt exactly as it was. He then expressed to the Washington Post or something that "fish farming is the worst type of food production that exists. The Chileans are the worst; the Norwegians are not that bad, but the very best is [Firm A]" (Bio Security Team-Leader)*

As already noted, Firm A had been involved in the formulation of many certification frameworks were initiative-takers to the initialization of these standards in Norway. Firm A pioneered the production of organic salmon in Norway and put pressure on the authorities by lobbying for the earmarked organic licenses to be issued. Undoubtedly, various interested parties were included

in Firm A's operations to ensure that activities were in accordance with stakeholder interests and to facilitate the emerging of an organic market in Norway.

A formal management position dealing largely with environmental concerns was also recognized in Firm A, corresponding to the bio-security team-leader's position, and an environmental auditor was employed in order to accomplish the required environmental and quality audits. Environmental issues were discussed at higher instances periodically, and the discussions gradually involved more people within the organization (Pérez et al., 2007). This facilitated the integration of internal participants' interests, which, in combination with the commitment of managers and communication with external stakeholders, contributed to the emergence of the important intangible asset of cross-functional coordination and communication (Pérez et al., 2007). This can according to Hundloe et al. (1990) enable the organization to integrate social sustainability in their operations. Social sustainability is created when organizations contribute to the society's welfare by reducing conflict and by offering positive long-term perspectives for the people who are directly and indirectly concerned with the operations (Hundloe et al., 1990).

*Integration of environmental issues in strategic planning process*

Several quotes signaling the integration of environmental issues in strategic planning emerged during the interviews. Examples of content include:

> *Environmental issues have become extremely important for the company. But I do not think that we as entrepreneurs are extremists or environmental fanatics in any kind of way. But when the decision of being on that arena has been taken, you need to do it properly, from A to Z. In many ways it can be compared with gaining credibility for being healthy and selling health products, you cannot then sell tobacco at the same time. You need to be on one arena or the other. We had to work with ourselves and everyone working for us on all areas when we decided to be on the organic arena. (Entrepreneur and former CEO)*

The strategic path that was chosen entailed comprehensive examination of all business activities to ensure an overall strategy that corresponded to their company values. Gaining credibility towards external stakeholders was explained to require an overall strategy that included environmental issues in all relevant areas, including those unrelated to production processes:

> *For one thing, we had two huge American company cars that used two liters per 10 km. We then decided to sell them because it did not look so good when customers came and saw that we had the biggest cars available at the time. Thus, we bought Priuses and hybrid cars instead. This was just to explain a little of our overall mentality, which was developed over*

*time. This was not something that happened over night, but that was developed over several years. (Entrepreneur and former CEO)*

The respondents described various initiatives that were undertaken with the aim of raising the visibility of the organization's environmental commitment and to enhance its environmental reputation (Pérez et al., 2007). Firm A was in possession of two R&D-licenses, which entailed several environmental research collaborations with related organizations. These research projects were explained to affect the overall strategy formulation, although most were relatively disconnected from the core business:

*Broadly speaking, we have got [environmental] projects running all along, financed by Innovation Norway, SkatteFUNN or The Research Council of Norway, and we are working a lot with the Institute of Marine Research and others like SINTEF. (Bio Security Team-leader)*

The widespread involvement in voluntary environmental researching was explained to foster organizational learning which enhanced core operations and influenced strategic planning (Pérez et al., 2007). The respondents also shared their thoughts on how mutual reinforcement between strategic planning and further growth in organic production could improve their environmental performance:

*We need to think strategic and define the most important sustainable and organic attributes in conjunction with fish production. Today, the standards are more or less imposed upon us, but we wish to become more an initiative-taker for how these standards should be shaped. (CEO)*

*I wish, anyhow, and I believe in this, that we can place salmon production on the map and take part in the formulation of the standards that we mean are sensible to have. Because it is obvious that these standards require us to do things that we think are foolish that does not contribute to better fish health or product quality. And if they do not do these things [increase fish health and product quality], well then you should not be doing it. (CEO)*

Dissensions between the environmental outcome of current certification standards and what was perceived as sustainably optimal were uttered as incentives for influencing and improving their contents. It was indicated that incapability of influencing clearly contradictory standards could serve as motivation enough to refrain from participation. In conformity with their attitude towards the defining of environmental certification standards, profitability was articulated as a condition for integrating environmental issues in strategic planning:

*It [environmental issues] affects our strategy formulation considerably, but to be completely honest with you I would say that revenues and costs probably matter the most. We do of course use it actively in our strategic work, and we get affected by the implementation. (CEO)*

The above-mentioned quote indicates a mentality that corresponds to what Porter and Kramer (2011) define as shared value. By consistently seeking engagement in environmental issues that intersects with the company's core business, both societal and economic aspects are embraced. Moreover, Firm A is involved in a variety of activities that demonstrates their efforts for continuous improvement in environmental performance as a catalyst for change (Pérez et al., 2007). This has facilitated the emergence of one significant intangible asset; the integration of environmental issues into strategic planning process.

### 5.1.5 Experiences from organic production in contrast to expectations

This category includes concepts contrasting the managerial experiences from operating organic salmon farming to the expectations and motives that formed the basis for diversification. As can be seen from figure 11 below, management experiences could be grouped in four main categories; operational experiences; economic experiences; sales-related experiences; and reputational experiences.

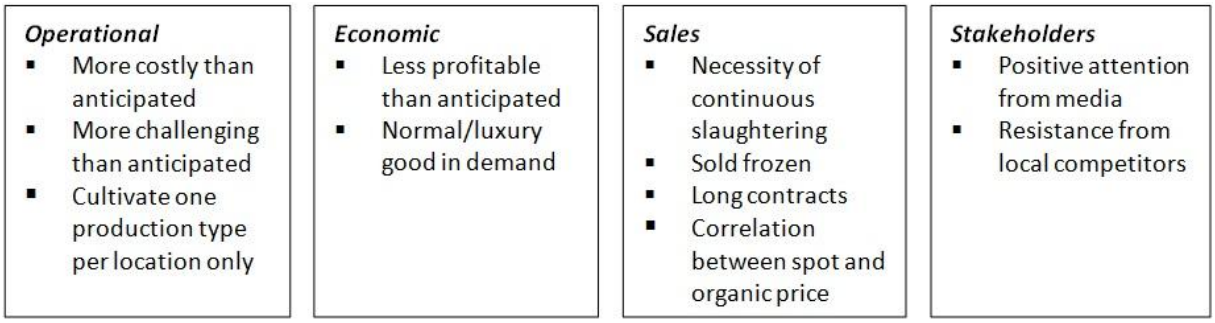


**Figure 11: Experiences from Organic Production - Firm A**

*Operational*

The operational experiences deriving from the organic aquaculture scheme were mainly related to divergences between operational implications and anticipations of its simplicity:

> *Our experience is that it involved far more work and was considerably more challenging than we expected. We miscalculated a lot of things, things that became more expensive than expected. (Entrepreneur and former CEO)*

> *We have tried to make several types of standards, and it is demanding and gets messy. You should rather choose one path. Therefore, we wish to focus on what we call Best Practice in Finnmark and organic down here. (CEO)*

*What we also discovered was that having both conventional and organic on the same location was particularly challenging because you have people working there who suddenly needs to convert from organic to ordinary. To separate equipment and feed and making sure nothing happened that could influence the organic production was extremely difficult. We found out that we needed to choose one activity at each location. (Entrepreneur and former CEO)*

The management experienced that operations were not as easily implemented as anticipated, and it was discovered that the organic procedure was best put into practice as a stand-alone operation - separated from the conventional production. Their deviating anticipations led to the miscalculation of the associated profitability. This conforms to the findings from the exploration of environmental accounting practices (EMA), where the company was found somewhat incapable of recognizing the associated cost differentials for organic production. Extending their role in the value-chain to also include the retail channel induced operational complexity as customers demanded peculiar production standards, causing confusion in using diverse standards at different locations.

*Economic*

This category includes issues relating to economic experiences from operating organic salmon farming. Examples of content include:

*Yes, the economic performance has been weaker than expected, but that is because of diseases. (Bio Security Team-leader)*

*But recently it has been a bit difficult because the profitability [in the spot market] is extremely good, and profitability certainly does not get better by operating organic, rather the opposite. (Bio Security Team-leader)*

An attitude towards organic salmon as inferior to conventional salmon with respect to profitability was identified, and the respondents clearly stated that expectations had not yet been fulfilled. This was partly due to problems related to fish disease as quoted above, but several associated issues appeared on the sales side as discussed below. Organic salmon is conceived as a superior product serving a niche market that appreciates environmental values and has a willingness to pay for it (Georgakopoulos and Thomson, 2005). As demand for exclusive goods tend to plummet when facing an overall economic downturn, it was relevant to examine how the demand for organic salmon behaved during the recent financial crisis:

*When the financial crisis broke out the prices on all types of salmon went up, not only on organic. Everything else plummeted but salmon went in the opposite direction. That was*

*a bit strange. But what I do know is that in periods when ordinary salmon is well paid – as it has been the last two years – then it is extremely difficult to achieve a price premium on organic. So the periods when producing organic is profitable, relatively speaking, is when the salmon industry is in depression with poor prices. (Entrepreneur and former CEO)*

*Well, you actually experienced an increase in the demand for ordinary salmon. My opinion is that [organic] salmon was conceived as a luxurious product, and that people went over from consuming expensive meat to cheap salmon. But expensive salmon, or extra expensive salmon, met resistance. (Bio Security Team-leader)*

*One can say that the demand for extra expensive products does not exactly prosper during recessions. (Bio Security Team-leader)*

Indications were given that the financial crisis struck the organic market as expected, although the demand for conventional salmon caused spot-prices to soar. An interesting remark was given by the bio security team-leader, comparing the peculiar behavior in consumer demand for conventional salmon to what Pindyck and Rubinfeld (2011) refer to as the inferior good, for which demand increases when consumer income decreases. Organic salmon, on the contrary, was conceived as a normal good for which demand decreased when consumer income decreased. The respondents also indicated that organic salmon could be seen as a luxury good, for which demand decreases more than proportionally to decreases in consumer demand (Pindyck and Rubinfeld, 2011). This is supported by several studies, in which environmental quality is argued to behave as a luxury good (Kip et al., 1995; Richer, 1995). Conventional and organic salmon may therefore be seen as substitute products, where demand is weakly negatively correlated and dependent on the consumer's budget constraint (Pindyck and Rubinfeld, 2011).

*Sales characteristics and price premiums*

This category includes concepts relating to the respondents' experiences from sales promotion and demand characteristics. Examples of content include:

*The biggest problem with diversified operations is that the customer is there 52 weeks of the year, while the production regime in Norway makes slaughtering fish 52 weeks a year terribly difficult if you are a medium sized fish farmer. This was a huge problem for us. (…) We then thought that something drastic had to be done: we have to convert to frozen [fish]. We have to be able to slaughter the fish when it is five kg and needs to be taken out of the sea, put it on storage in a freezing plant and parcel it out to the market. (Entrepreneur and former CEO)*

*In addition, we have had greater chances of achieving excess prices in the organic market when [spot] prices are low than when [spot] prices are high. We have had prices much higher than 30 when [spot] prices have been below 30, but it is trickier to achieve prices above 50 when [spot] prices are 40. (CEO)*

*No, but it will become a problem if our sales people do not work hard to get long contracts on organic fish. That is a vital factor for us to achieve excess prices. (CEO)*

The sales characteristics and customer demands for organic salmon was perceptibly differed from that of conventional salmon. Customers, which largely involved retail chains, demanded smooth and stable supply, and were unwilling to pay a premium of the same size when the spot-price on salmon soared. This weakens the argument of implementing organic as a risk diversification strategy (Porter, 1980). Achieving an excess price well above spot-prices required long contracts and hard work at the sales department. When expectations failed it was decided to take action and convert most of the production to be sold as frozen, although this was considered inferior to fresh fish. By evaluating the effectiveness of past actions, Firm A developed insight and associations that were helpful in improving the effectiveness of future actions. This indicates the presence of what Pérez et al. (2007) define as organizational learning.

*Stakeholders*

The interviews revealed unforeseen but interesting discoveries related to the engagement of associated stakeholders. Examples of content include:

*We have at least experienced a lot of attention in the media, and now it looks like it is about to take off (Bio Security Team-leader)*

*Yes we did, we communicated a lot with them [local stakeholders]. But what we experienced was that a lot of people, especially around here where there are several small fish farmers, tried to work against us because we pulled our hat on and went organic. Quite a few tried to oppose us because we in a way appeared better and were charging higher prices. Especially against the authorities – we experienced massive pressure to document and show that we did what we were supposed to do - to a much greater extent than if we held a much lower profile. (Entrepreneur and former CEO)*

Although the media's reaction to their pioneering approach to organic salmon farming in Norway was perceived as positive, they were met by resistance from their local competitors because their diversified product made conventional salmon appear as an inferior good. This indicates the lack of environmental values in salmon farming as their efforts of implementing operations that inflicted less harm to the environment were met by hostility.

### 5.1.6 Summary of analysis

The findings detailed in the case study of Firm A imply that the shift to organic production was influenced by its fit to the entrepreneurs' environmentally enlightened vision of using alternative ways for treating salmon lice, for which they possessed unique knowledge (Barney, 2002). The competitive environment in which Firm A operated was described to provoke the adoption of a niche strategy due to their small-scale operation. Intuitive reasoning was used to evaluate the associated profitability prior to the implementation, rather than advance costing or investment appraisal techniques. The shift to organic production was described as demanding, to some extent problematic, and more costly than expected. Although management accounting systems were present and explained as capable of tracing costs at all levels, the management expressed difficulties in detecting and measuring environmental costs, and was therefore unable to quantify the associated excess costs. Except for the lacking usage of identified management accounting systems, five important intangible assets for improving environmental performance were identified; awareness of employees; environmental knowledge, skills and expertise of employees; the commitment of managers; cross-functional coordination; and, the integration of environmental issues in strategic planning process (Pérez et al., 2007). The presence and usage of these intangible assets indicates that Firm A has a prominent influence of environmental issues over organizational structures and strategies.

## 5.2 Case 2: Firm B

Firm B is a Norwegian producer of Atlantic salmon and is fully-integrated from roe and smolt to value added products and sales (Annual Report Firm B, 2010). The group consists of ten companies, of which eight are located in Norway and comprise the entire value chain. The last two companies are located in Scotland and Japan. The group is in possession of 66 out of the 971 licenses available for aquaculture production in Norway, of which 28 are located in the Counties of Trøndelag, 25 in Møre & Romsdal County and 13 in Troms County. Three of the licenses are conditioned to organic production and were acquired during an issuing round for licenses in 2009. Firm B adopted organic production the same year and started selling the first generation in the initial months of 2011. In 2010, the group reported total operating revenues of NOK 3 429 million with corresponding profits after tax of NOK 958 million, and had 590 full-time employees. The vision of Firm B is to be the lowest cost producer and supplier of farmed salmon to the European market (Annual Report Firm B, 2010).

The following analysis includes answers collected through in-depth interviews with two key informants in the Firm B group. The manager farming has held his position since 1997 and is

responsible for Firm B's biological production in Norway. The group quality manager has been employed by Firm B since 2001 and is responsible for environmental audits and bio-quality.

### 5.2.1 Strategy formulation and motives for diversification

As can be seen from figure 12, the decision of adopting organic production was influenced by opportunities arising from the external environment in which Firm B operates, and by existing and obtainable firm resources that simplified the implementation (Barney, 2002; Porter, 1996).

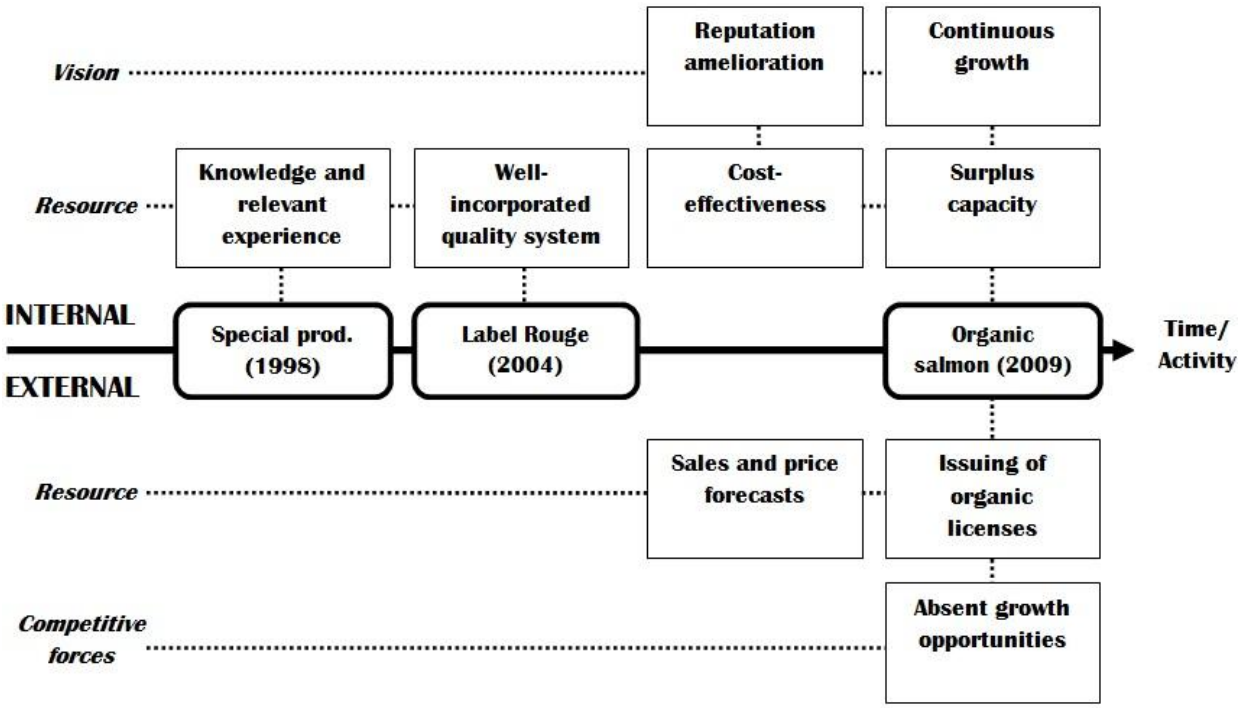


**Figure 12: Strategic Impetuses Affecting the Decision-making Process in Firm B**

*Internal aspects influencing the decision to diversify*

This category includes concepts relating to internal resources possessed by Firm B that influenced the decision of diversifying. Examples of content include:

> *We actually had most of the premises in place as we had been operating some other special production that resembles a lot to that of organic. We have something called Label Rouge, on the French market, which is a type of salmon production using special feed with strict requirements on ethics, fish welfare and further to occupational safety and health for people. So this was already implemented in our operation. As a result, obtaining organic certification was easy for us. It did not require much extra work compared to what we had on the Label Rouge standard. (Group quality manager)*

> *We already had a great deal of laws and rules aligned in our quality system, and the associated registration and documentation in place. So for us, [implementing] organic required perhaps two items in one procedure and one item in another. It was not a huge task, it went very smoothly. (Group quality manager)*

By operating similar production methods Firm B had attained elements of organizational and human capital that facilitated the implementation of organic production (Barney, 2002). This involved well-integrated controlling and coordinating systems, a formal reporting structure, as well as an experienced workforce. It was also explained that Firm B had been producing salmon in a natural reserve since 1998, where they were required to use special procedures, with resemblance to that of organic production, to reduce its environmental influence. Organic salmon farmers have, according to earlier studies, experienced difficulties in selling their production at reasonable prices (Georgakopoulus and Thomson, 2005). As the interviews pointed out, Firm B had an experienced sales department with knowledge of the market:

> *Yes, we have our own sales department in [Firm B]. Some of the people there have sold much of the salmon that [Firm A] has produced, and they are the ones who have promoted organic salmon the most in Norway. (…) So we had knowledge on where the market was and that it was possible to sell approximately 3-5000 tons of salmon at good prices. (Manager farming)*

> *We know that we earn a lot of money on commercial [salmon], and thought the organic was not too far away from the commercial salmon. We also had knowledge about the corrections that were necessary, and then we just went for it. (Manager farming)*

The management expressed that their regular production was not far from what was required by the organic standards, and that the sales department provided price and volume estimates that were assumed to offset the excess costs of adjusting the production. This was largely due to the experiences gained from similar production which had already been incorporated in the management control system. As Firm B has a declared vision of being the most effective supplier of salmon products, it was interesting to ask whether they believed their current effectiveness in conventional farming was an internal resource that could be transferred to organic farming:

> *In comparison to what [Firm A] has been doing I am certain that we are a lot cheaper than them. (Manager farming)*

> *We are a fully-integrated company that has everything from roe production to processing and out to the market. We have a vision that says "cheapest on salmon". Thus, costs are in focus. We see that the salmon is a commodity and there are large volumes of fish that go in and out. We have had this vision since 2003 and it has been part of the strategy in our system. (Manager farming)*

In conformity with the resource-based theories of Barney (2002), the possession of firm resources such as competitive cost effectiveness, human capital and well-integrated control systems, with resemblance to that of organic production, built confidence among the

management that the organic production could become profitable at forecasted prices and sales figures. Switching to organic production was described as relatively unproblematic and undemanding with respect to the additional requirements. This was explained by experiences gained from operating comparable certification schemes with transferable specifications. As several of the additional standards related to organic production had already been implemented the quality system was already in place, thereby avoiding what would otherwise have caused considerable adoption costs. These costs refer to what Drury (2008) call potentially hidden up-front costs, incurring prior to the operation of a process or a system.

*External aspects influencing the decision to diversify*

This category includes concepts relating to external factors influencing Firm B's decision of diversifying to organic production. Examples of content include:

> *We started with organic salmon when we first put out the fish at sea in 2009. The reason why we did it was because of an issuing round of licenses in 2009. About 50 commercial licenses and five organic licenses were at that time distributed. (…) You were not allowed to participate in the issuing round if you were in possession of more than 19 licenses. So the only chance for [Firm B] to obtain capacity was to apply for the organic licenses. So we did, and we got three out of five. (Manager farming)*

> *It was very volume based. We were at that time well under way with the constructing of [production facility], in which we are currently sitting. It is a large factory for handling of salmon, slaughtering and processing. We should in fact be producing about 200.000 tons annually. At the time when we applied for organic licenses we had a production capacity of 50.000 tons. Thus, we worked in all directions to obtain as much volume as possible. (Manager farming)*

The decision was made in accordance with an overall growth strategy and was seen as necessary to eliminate what would become surplus capacity. In lack of alternative ways of utilizing capacity, going into organic production was recognized as a rational decision given the organization resources identified in the preceding category. Although excess capacity facilitated the decision to diversify it cannot be regarded as a unique resource, in that it restrained competitors from applying, as unprocessed organic fish may also be sold unrefined (Barney, 2002). Indications were given that organic production would not have been considered without the stimulation from central authorities through the issuing of earmarked licenses, and the respondents were asked explicitly to verify:

*Yes, it did. It contributed to the decision-making process of whether we should go for it. At first, I think we got two licenses, then one became available, and we were fast in applying for the third as well. (Group quality manager)*

As the interviews noted, government stimulation served as an influential element in the evaluation. It was also confirmed that organic production was not operated on any of the commercial licenses. An interesting motivational impetus was mentioned in relation to how the industry and product was perceived by external stakeholders:

*It can be related to the industry reputation, and the pressure relating to whether we are environmental friendly or not. It is also about how healthy the salmon we are eating is. (…) We are of the opinion that we are very sustainable. We also think that salmon in itself is very healthy. But to produce a special product that demands stricter requirements, we think it is ok to have that. (Group quality manager)*

Organic production was explained to add beneficial elements onto the company and the industry as a whole. It could contribute in ameliorating both the industry's and the company's reputation, as well as the product's wholesomeness. Although the market for organic salmon was seen as quite different from that of conventional salmon, market information did not play any central role in the evaluation:

*We have been working with several other projects. But we did not perform any market research on the organic. But we had several other projects running from where we accumulated information. (Group quality manager)*

Rather than relying on primary or secondary market information, Firm B trusted their own ability to penetrate the market by taking advantage of an experienced sales department and existing information from related projects.

Firm B's entrance to organic salmon farming can be described as a pure growth strategy that matched their corporate structure. Firm resources such as surplus capacity, human and organizational capital attained in related operations, an experienced sales department and unique cost effectiveness were facilitators for effective implementation (Barney, 2002).

### 5.2.2 Investment appraisal and advance costing

Initially, the respondents were asked whether implementing organic production claimed any additional investments in comparison to conventional production:

*No, it does not. It is a little more because of the density restrictions on 10 kg per cubic [meter]. That is more than halved because you are able to have 25 kg per cubic on the*

*commercial salmon. So that means that you need twice as many net cages to produce the same amount of salmon. And this is a cost driver. (Manager farming)*

Increasing the amount of net cages due to the requirement put on allowable density was described as the only influential difference on the investment side. Most other excess costs were perceived as operational:

*You are not allowed to copper-impregnate the nets. But impregnation costs so much that the excess cost is not particularly prominent if you have good systems on cleaning nets. (Manager farming)*

*The largest costs relate to feed. The feed cost becomes substantially higher. That, of course, has to do with feed prices. But the energy level in this feed is also inferior to commercial feed, so you get a higher feed factor (FCR) than with commercial salmon. The feed cost can easily become three kroner higher than for commercial fish. Then you have a difference relating to the doubling of net cages. There lies almost one kroner. Then you have some trifles. Together it becomes an increase of about 4.50. (Manager farming)*

The most influential excess costs were those inflicted in relation to special feed, a doubling of net cages to arrive at equivalent production volumes, and the cleaning of nets. However, costs deriving from the requirement of cleaning nets manually were seen as insignificant because they were partly offset by fairly expensive impregnation and efficient procedures. Fulfilling the requirements was described as unproblematic and not that costly:

*I think many balk at them [organic licenses] because if you are not allowed to impregnate the nets they will get overgrown. We had knowledge about this, so that was no problem. And the density requirement of 10 kg per cubic was simple; all you need is more nets to produce "X amount" kg of salmon. (Manager farming)*

It was added that no discounted cash flow method of any kind was performed to evaluate the shift to organic production. In Firm B's case, there were no direct or mutually excluding alternatives to consider, as the licenses were conditioned to organic production (Hazel, 1999). Yet, they described the cost difference, especially that of feed, to be noticeable. It was therefore relevant also to inquire if any efforts were exerted to evaluate the cost categories they anticipated would contribute the most to the cost difference between organic and conventional:

*Yes we did. We had an adequate analysis. If we got five kroner more per kg for the organic we would obtain just as good a margin on the organic as on the commercial. Feed is the main driver for the increased cost. (Manager farming)*

It was noticeable that the decision was made in the light of comprehensive advance costing techniques showing exactly what margin was required to meet the goals for conventional salmon. Although methods such as net present value calculations were not identified, several elements of investment appraisal techniques were recognized. Economic analyses, determining the potential profits associated with organic production, were used to assess the return and risk related to the commitment of funds to the long-term project (Clark et al., 1989; Bierman and Smidt, 2007). In conformity with Canavari and Olson's (2007) assessment of organic aquaculture in Italy, returns from conventional production were used as the project's opportunity cost to evaluate its expected relative profitability, although the licenses were constrained exclusively to organic production (Bierman and Smidt, 2007). In line with the preceding discussion of motives and strategy formulation, the cost differences were described as fairly small and to correspond with their initial anticipation. In the next category, the use of management accounting will be examined to evaluate their ability to control and to actively reduce these environmental costs.

### 5.2.3 Management accounting and environmental costing

The costs identified in the preceding section are summarized and categorized in table 5 and were by the management in Firm B considered the most influential parameters causing the cost differential between organic and conventional production, respectively. The costs are classified according to their nature of *appearance* (Drury, 2008), and in terms of *measurability* (Spitzer and Elwood, 1995). The *complexity factor of managing the activity* is based on the respondents' own perception and communicated control.

**Table 5: Activity Items Inflicting Excess Costs on Firm B in Organic Production**

| Cost object / activity origin | Nature of appearance | Measurability | Complexity factor of managing the activity/cost | Excess cost traceability |
|---|---|---|---|---|
| Special feed | *Environmental prevention cost* | *Conventional cost* | *Low* | *Yes* |
| Doubling of net cages | *Environmental detection cost* | *Potentially hidden: voluntary cost* | *Low* | *Yes* |
| Manual cleaning of nets | *Environmental internal failure cost* | *Potentially hidden: voluntary cost* | *Low* | *Yes* |
| Various trifles (small) | *N/A* | *N/A* | *Low* | *Yes* |

Initially, the respondents were asked how profitability of the organic operation was followed up:

> *We run it as a separate project. The generation that was set out in 2009 is separated as a project. We monitor profitability with overview at account level on how much more it*

*costs than in commercial production. We separate on feed, labor costs and all maintenance accounts. So we have a detailed overview on that. (Manager farming)*

It was evident that the organic production was followed-up and measured with accurate means, and that all excess costs were traced down at category level. Their management accounting system was fully capable of identifying and measuring all *descriptive objects* influencing the associated profitability (Bjørnenak and Olson, 1999). This was confirmed further by the group quality manager when asked whether they were able to control the excess costs of organic production at category level:

*That we have, you know. We know exactly what it costs us. (Group quality manager)*

Ball and Milne (2004) argue that visualization of environmental consequences through accounting practices can improve managers' awareness and assist them in reducing the social costs of activities. As they were capable of accurately monitoring every cost category it was interesting to ask how the systems were linked in order to provide accurate information interrelating both economic and biological attributes, and to what extent they provided other relevant management information:

*We have several production management control systems. We have one system where we register all data relating to growth, mortality, temperatures, oxygen and environmental parameters. This is a biological production system. Then we have the economic control system related to all purchases and all that, which is connected with the biological system. We then obtain an account overview with regard to usage and costs at account level. This is then divided by kg of produced fish in the relevant period. (Manager farming)*

*Investment needs are intercepted through the making of a budget that explains what is required for the relevant year. This is then registered in proportion to costs, depreciation and interests, which is on the production side. This applies for organic fish as well. (Manager farming)*

The management control system is what Bjørnenak and Olson (1999) refer to as an *integrated system*, embracing managerial matters relating to management accounting, biological attributes and investment requirements. It was also added that the choice of accounting period was monthly reporting, with reference to what Bjørnenak and Olson (1999) denote as the scope dimension's *time* aspect. Furthermore, financial reporting was explained to derive directly from the same system by accumulating figures from all segments of operation. The systems were also used in identifying and managing variances occurring between budgeted and actual production:

*First of all there is a causal analysis to find the reason for the variance. Furthermore it is to find actions to recover the loss it incurred. This is handled in the same way for organic and commercial production. (Manager farming)*

The systems seemed capable of identifying the *causal variability factors* causing variations in descriptive objects to occur. By monitoring and comparing biological data up against economic data, the variances and their cause could easily be identified and resolved (Bjørnenak and Olson, 1999). The respondents gave the impression that the systems were exploited to their full extent, in that it assisted managers in identifying how the business was performing at all times, and how performance possibly could be improved (Seal et al. 2006). Although Firm B had not been involved in the organic certification scheme for more than a few years, the respondents were asked whether the management accounting system was used actively to improve efficiency and reduce the environmental costs related to organic production:

*Yes, we have done that. Production management is closely linked to feed utilization because the costs are primarily tied to feed. Improving the feed utilization on the organic fish would significantly lower the costs. That is where you will get results. We have used it very actively to monitor the consumption of feed. (Manager farming)*

Feed costs was emphasized as the main excess cost driver and was thereby made a prioritized element in the efforts to improve efficiency, and hence also in reducing the environmental costs and influence of operations. Drury (2008) denotes these costs as an environmental prevention cost, arising as a consequence of meeting the requirements of certification standards.

*At the same time we have had special production since 2004, and become gradually better there. And when we started with organic we took with us all the experiences we had accumulated from earlier on. Hence we did not start at zero, we are a lot better at it and we know in a way what we should avoid. But there are, of course, some new requirements in the organic that we have already started to notice when slaughtering: "the next time we do it like this and that". So we will probably get better, and this is something we always strive for also in the conventional production. (Group quality manager)*

The efficiency improvements happened to a certain degree before the implementation and they had gradually gained advantages to other producers who potentially would have started from scratch. This illustrates that organizational learning from related activities had already enhanced the effectiveness of operations (Pérez et al, 2007). The management accounting system was *continuous*, designed especially for the purpose of operating and controlling fish farming activities (Bjørnenak and Olson, 1999). As organic production was adopted fairly recently it was

also relevant to inquire if they saw any potentials in further improvements and reductions of environmental costs:

> *Yes, if we are able to take some actions with regards to feed; permit the usage of more raw materials. In addition to change the density requirement to not be 10 kg per cubic, but that you rather have to document that oxygen levels are tip top in the nets. And by having clean nets not the least. I have been visiting other farmers who operate organic, and it was among the worst things I have seen. I am not telling you who it was but it looked like the fish were in an aquarium. The net was totally overgrown. So there are completely different things you need to focus on [than the Debio requirements] to be able to tell the customer that; here the fish has been swimming in an incredibly clean net; it has been 100 % full and constantly growing; and, that there is absolutely no influence on the bottom of the sea. If focus is changed in that direction you will get cheaper production and it will become better merchandise. (Manager farming)*

As the interviews noted, dissensions relating to the certification standards were communicated in that restrictions related to density did not necessarily measure what was intended. It was made clear that completely different variables should be used in evaluating and documenting fish health and environmental performance. Further improvements in efficiency were explained to rely heavily on revision of current standards, and changes could potentially lead to ameliorations with respect to both sustainability and cost effectiveness.

The interviews indicated that elements of EMA were present, and that environmental costs were categorized, quantified, and allocated in terms of scale and scope, and to which organization level each element belonged (Spitzer and Elwood, 1995). By separating the costs of conventional and organic production, Firm B was capable of identifying environmental costs according to their nature of appearance (Drury, 2008). This involved the separation of environmental costs relating to what Drury (2008) denote as *prevention costs, detection costs* and *internal failure costs.* Identified cost elements were largely related to *private costs*, including costs that had a direct impact on the company's bottom line. In conformity with Spitzer and Elwood's (1995) classification of private environmental costs, Firm B seemed to be in control of; *conventional costs*, involving excess costs incurred in relation to raw material, capital goods and supplies; *potentially hidden costs*, involving up-front costs incurring prior to the implementation of organic production, regulatory and voluntary environmental costs; and, to a certain degree *image and relationship costs*, including the costs of community relations activities to affect subjective perceptions of management, customers, employees and communities. As the interviews noted, management decisions benefiting from EMA included those related to product pricing, cost

control, product and process design, environmental compliance strategies and capital investments (Spitzer and Elwood, 1995). When asked whether they thought the importance of controlling environmental costs would increase to sustain development in the aquaculture industry in future years, the respondents explained that the importance of controlling environmental costs, especially those incurred from controlling the spread of louse, would simply augment in the future. Their statements were based on the historical development of these costs and their perceptions of the current problems in modern aquaculture.

Drawing on the definitions of Milne (1996), Firm B's usage of the management accounting system can be considered to encompass *economic* and *ecological* goals and, to some extent, *social* goals. Economic goals derive directly from the preceding discussion and the indications that were given on the project's profitability. Social and ecological goals are, judging by the public's opinions of operational consequences, confined by the nature of fish farming (Georgakopoulos and Thomson, 2005). Fish oil and fish meal used in salmon feed are what Hundloe et al. (1990) denote as *fossil* resources, which cannot be recovered at least in the time-span that is relevant, hence challenging ecological goals (Tacon, 2008). Salmon farming inevitably affects the community in which it operates as interested parties in some way are influenced by associated externalities such as pollution, escapees and the spread of disease. However, by successfully encompassing environmental costs of operations, the management accounting systems in Firm B was capable of reducing those affecting ecological goals while at the same time improving economic efficiency.

### 5.2.4 Intangible assets as facilitators for environmental embeddedness

This part sets out the findings relating to the presence and usage of intangible assets, and how these enhance the environmental performance of Firm B. Issues discussed in this section draw upon the analytical framework in figure 6.

*Training and awareness building*

This category includes concepts relating to management efforts to ensure continuous fulfillment of certification standards. Examples of content include:

> *It is demanding, you know. It is, as you were saying, a great many rules to act in accordance with. (…) Our quality department has the main responsibility of ensuring that the company fulfills all requirements deriving from the various departments. The customer requirements have gradually become quite demanding. (Manager farming)*

A quality department, dealing largely with the fulfillment of various operational standards and environmental auditing, was identified at both group and operating level in Firm B. The quality departments were formed because the standards were perceived as demanding, and the respondents were therefore asked whether training and awareness building was considered necessary in order to achieve compliance at employee level:

> *Yes, we have to do that; training and internal revision that goes through the entire system and secures that employees have sufficient knowledge about it. This is run by our quality department, which has a close program on this. (Manager farming)*
>
> *Yes, we do. This is something we document on a sheet; what they have been trained in. Then they have to sign the paper that documents what kind of training they have had. And when we are being revised by the certification body he just pick out some people and start talking with them, without me being involved. (Group quality manager)*
>
> *There are some additional things compared to ordinary salmon production. But [Firm B] has now been working with special production since 2004, and many of these additional things have already been implemented in our ordinary production. So for our people it was not that much. But perhaps for people who have merely been producing standard salmon for years it could be a number of things that need to be implemented. But since it is well implemented in our everyday system it was no big deal. (Group quality manager)*

As required by Debio (2008), training programs were used actively to ensure that all employees involved in the certification scheme received appropriate training and were given instructions covering the general principles of organic primary production and processing. An interesting observation was made as one of the respondents mentioned that several of the additional standards relating to the organic certification scheme had, although not a requirement, already been transferred from their special production and implemented in their conventional production. This could either be seen as an indication of the commitment of managers to improve environmental performance, or as actions foreseen as necessary for the compliance of future requirements that had not yet been carried into effect by the authorities (Pérez et al., 2007; Spitzer and Elwood, 1995). Nevertheless, it was explained to simplify the shift to organic production, partly because employees were already acquainted with some of the standards, and partly because most standards had already been incorporated in the company's quality system. Their initiatives to go beyond the certification requirements demonstrated their efforts for continuous environmental improvements (Pérez et al., 2007). The development of two intangible assets was identified in Firm B as a result of training and awareness building; the

awareness of employees; and, the environmental knowledge, skills and expertise of employees (Pérez et al., 2007).

*Commitment of managers*

This category includes concepts relating to the commitment of managers to improve the environmental performance of organization activities. Examples of content include:

> *We believe that by producing in accordance with the Debio standard we are able to learn several things that can be transferred to the commercial production. So that producing organic can give a positive image to [Firm B]'s other fish as well. (Manager farming)*
>
> *We try to focus on what is best for the salmon. And it is often the case that if you do that, you are well within the rules. (Manager farming)*

Elements of organizational learning were identified to improve the environmental performance, implying changes to internal values, routines and rules (Pérez et al., 2007). According to Pérez et al. (2007), training may foster organizational learning and facilitate employees in going beyond adversarial attitudes. This was perceived as achievable in that conventional production could also benefit from the organic activities if standards and the outcome of associated training programs proved transferrable. Throughout the interviews the importance of achieving optimal fish health was taken up, although it required them to go beyond the minimum requirements for compliance. This could in turn lead to positive ripple effects by means of reducing the spread of decease and improving feed utilization and fish growth. A formal committee for dealing with environmental issues and quality control was also identified:

> *The total responsibility lies in the line management. This means that [Manager farming] with his operation coordinators, operation managers and animal technicians are in charge. Then we have the staff that sits in the quality department as the professional resource. Here, plans and suggestions for actions are prepared. But it is the operation managers and animal technicians who have to do this, and then we come in as a professional resource to ensure that everything is carried through, assist in training and controls. (Group quality manager)*
>
> *They [the quality department] manage the environmental issues in the company, make contingency plans and evaluate risk relating to emission, pollution, occupational safety and health and all that. Risk assessments and contingency plans are made for all and each and every locality and hatchery. (Manager farming)*

It was explained that they had a formal structure for dealing with environmental considerations, including integrated systems and internal procedures. In conjunction with the identified need for

training and awareness building among the employees, it was stressed that the improvements ultimately had to be made at farm level, whereas monitoring and environmental auditing took place at group level. It also was relevant to ask how they perceived the role of organic production in Firm B in the future:

> *If we would have been able to influence parts of the Debio-standard, in relation to what I talked about concerning feed and environmental parameters in a different direction, it would become a more cost-effective production that was to the best for the environment, and the customer in that we could sell the fish at a lower price. Then [Firm B] would have focused much more on organic. (Manager farming)*

As the interviews noted, the future of organic production in Firm B relied heavily on their ability to influence the formulation of associated standards in a direction that could benefit both the environment and the end-consumer in terms of lower prices. The concepts presented in this category were some, among several, examples that illustrated Firm B's consistent focus on improving environmental performance in areas facilitating the emergence of what Porter and Kramer (2011) refer to as shared value. Instead of acting like charitable donors, by engaging in philanthropic activities largely disconnected from the core business, Firm B seeks to address both economic and societal progress by using value principles, and identifying points of intersection between economic effectiveness and environmental enhancement (Porter and Kramer, 2006). Thus, elements indicating a commitment towards improved environmental performance were evident, although confined to activities that unquestionably enhance economic aspects as well. In addition to concepts identified in this category, the use of technology – which also improves environmental awareness by raising the control and visibility of costs – and the development of interdepartmental environmental committees are mechanisms that enhance the commitment of managers (Pérez et al., 2007).

*Cross-functional coordination and communication*

This category includes concepts relating to the company's integration of internal and external stakeholders' interests to secure that operations correspond to the goals of local communities. Examples of content include:

> *We communicate with the administrative agencies, but much of the communication goes through FHL [Norwegian Seafood Federation]. When new regulations are introduced, we try to make suggestions to ensure that they are changed in a sustainable direction. (Manager farming)*

*Yes. We work a lot toward the locals, and toward our interest groups. We participate in professional groups and we are interested in this. (Group quality manager)*

It was explained that the perspectives of a greater group of stakeholders was taken into account to allow for open dialogue with interested parties. This, in turn, entailed information sharing that benefited management decision-making (Pérez et al., 2007). Furthermore, the shift to organic production involved the establishing of a closer relationship to customers and key suppliers, thus extending their role in the value-chain vertically in both directions:

*We have been working a lot with [the feed supplier] on that. The feed is produced in Scotland, which involves additional freight costs of 0.90 kroner more than on feed bought commercially in Norway. So if you then think organic, what in the world are you doing? How is it with CO2 accounts when you transport the feed from Scotland and here? So we have worked a lot with [feed supplier] to move the production to Norway (Manager farming)*

*With the new sales department in [Firm B] there has been much communication with the customers on a general basis, but for organic it is like this on everything. We get very clear feedback. From regular customers we usually get feedback solely when something is not good, whereas on organic we receive sensory tests in which they point out things that were good and other that were not as good. At the same time we need to go further in the other end through our feed suppliers because stricter requirements are put on the feed. (…) Ergo, we inspect that they maintain the requirements for occupational security and health and how they are working with the environment. So we have to go out in both directions. (Group quality manager)*

It was indicated that the requirement to use special feed for organic production was not as environmentally gratifying as it could be if feed production was extended to Norway – an action that could also offset some of the excess costs related to the usage of organic feed. Furthermore, it could improve the attractiveness of organic production to other fish farming companies. Again, elements of a shared value mind-set were evident as the respondents proposed that restructuring the value-chain could create benefits for both the environment and the business (Porter and Kramer, 2011). Organic production entailed external revision by the next link in the value chain, and the suppliers had to be audited by Firm B to ensure that the production inputs fulfilled the certification requirements. Through the conduct of internal environmental audits and periodical discussions on environmental issues at higher instances, a great number of employees became involved in the environmental tasks (Pérez et al., 2007). This entailed the involvement of internal stakeholders as well, and enabled cross-functional

relationships and a better understanding of the environmental activities that were carried out at different levels in the organization.

*Integration of environmental issues in strategic planning process*

This category includes concepts relating to the integration of environmental issues in strategic planning. Examples of content include:

> *It is extremely important to us in terms of the reputation we have obtained; claims that have come and new claims that probably will come. We have spent a lot of money for example on the treatment of lice or how people see aquaculture companies with regards to incidents that have occurred. This is extremely important. (Group quality manager)*
>
> *Several suggestions to new regulations come up and some of them get enacted. This affects the way we have to think ahead. There is a proposal to a new regulation just now that says it is not allowed to have more than 200.000 salmon in one net cage. (Manager farming)*

As the interviews noted, the integration of environmental issues in strategic planning seemed confined to embrace those related to managing reputational risk and ensuring regulatory compliance exclusively (Reinhardt, 1998). Rather than to act pro-actively and include environmental issues that go beyond what is required as a minimum to ensure fulfillment, a reactive attitude towards the integration of environmental issues seemed apparent, involving only those issues that were seen as legal requirements. The respondents expressed that the authorities' continuous revision of certification and operational requirements necessitated a forward-looking approach to strategic planning. It was perceptible however that the initiatives to go beyond compliance before new requirements were put in practice were taken because they believed their future viability depended upon it. On an operational level, on the other hand, clear routines on how to identify and implement actions that could enhance environmental performance were recognized:

> *We prepare an annual plan for the environment. In this annual plan there are several measures for improvement that we carry through. Then also some projects to test things. Then we try one measure on a couple of fish farms and see what effect it gives – if it gives positive effects then we of course expand it. This is how we are working with the environment. (Group quality manager)*

The above-mentioned efforts were undertaken to assist continuous improvement of environmental performance, which could, according to Pérez et al. (2007), facilitate the emergence of an important intangible asset; the integration of environmental issues into

strategic planning. One of the respondents mentioned a development that might have influenced the way strategic planning is currently conducted, not only in Firm B, but for the entire industry:

> *I have been sitting in [Firm B] for several years and seen that the development the last 10 years has gone from being "safe food" to advance over to environment, sustainability, ethics and the welfare of employees. (…) So the focus has changed a lot more over to the environment, because the salmon industry already knows how to make safe food – we have done this for several years. The focus has changed toward the environment, and even further - to sustainability. (Group quality manager)*

The focus of strategic planning had changed for the whole industry over the past years, and sustainable development was rising up the agenda. Although the managers in Firm B clearly work actively with improving the environmental impact of business activities and to optimize fish health, these initiatives seem primarily to be associated with what is required to ensure compliance or fulfill customer demands. Hence, following the definition of Pérez et al. (2007), the integration of environmental issues in strategic planning seems somewhat absent in the case study of Firm B.

### 5.2.5 Experiences from organic production in contrast to expectations

This category includes concepts contrasting the managerial experiences from operating organic salmon farming to the expectations and motives that formed the basis for diversification. As can be seen from figure 13 below, management experiences could be grouped in four main categories; operational experiences; economic experiences; sales-related experiences; and, experiences related to disparities between the certification standards' intended meaning and their practical implications.

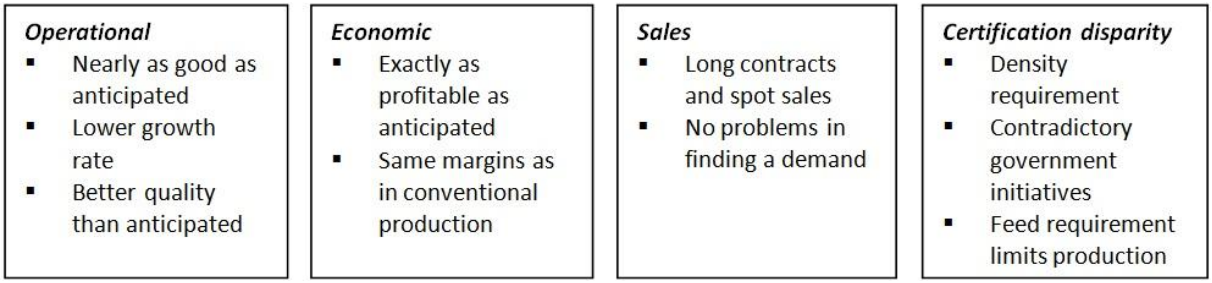


**Figure 13: Experiences from Organic Production - Firm B**

*Operational*

This category includes issues relating to operational experiences from organic production. Examples of content include:

*The expectations have largely been in place in relation to the way we envisaged that this would be. What has been the drawback is that the fish has had a lower growth rate than we expected. So this has been disappointing. Based on what the sales department says, there is no problem to sell this year's production at a good price. We are then talking about a price of perhaps five kroner above the NOS price [spot price for salmon]. (Manager farming)*

*Based on my standpoint, it is about quality, environment and reputation, and in that respect it has been very positive. We were very excited about whether the quality of the salmon and if it was inferior in terms of different color in the feed; organic can perhaps look a little whiter and be softer. But we have run pretty thorough tests on chemically on color, checked the senses and so on, and we were very pleased with that part. The interest from customers has been very positive. Therefore I must say that it has been positive and actually turned out better than expected. (Group quality leader)*

The respondents expressed that operating organic production for the most part had been unproblematic with regards to both production and quality control. The managers initially thought of the product attributes of organic salmon as inferior to that of conventional salmon, later to find out that product quality exceeded their expectations. It was interesting how the certification standards, which primarily are made to improve fish health and product attributes, were expected to cause direct opposite effects and in that sense make organic salmon appear as an inferior good (Debio, 2008). Accordingly, Rangan et al. (1996) argue that a product's likeliness to create a willingness to pay is confined if the product is preferred from an environmental perspective only, rather than by also being preferred from a health perspective. In its entirety, the operational experiences in Firm B seemed to match their anticipations.

*Economic*

This category includes issues relating to economic experiences from operating organic production. Examples of content include:

*We started slaughtering the fish in March, and we have been able to achieve five kroner better than the NOS price. And that was exactly what we hoped we would do. So we will see where the road leads us now, because this was small volumes. The large volumes will be extracted from now and onwards. (Manager farming)*

In the category exploring EMA practices, advance costing was identified as a means to evaluate the expected returns from organic farming. The required price premium corresponded to five kroner in order for organic salmon to yield equal returns to that of conventional salmon per kg sold. The sales department signaled that the demand was present and that the realized prices

corresponded to their initial estimates. The accurateness of their predictions strengthens the conclusion of the presence and usage of management accounting practices as an intangible asset in Firm B. As the managers noted, economic experiences from organic production were in line with their anticipations.

*Sales characteristics and price premiums*

This category includes concepts relating to the respondents' experiences from sales promotion and demand characteristics. Examples of content include:

> *Contracts are used a lot, mostly. Some of the organic is actually sold in spot as well. The market and interest is growing. (Manager farming)*
>
> *It is the customer who decides. If all customers want organic then we shall be able to do that. But this is not feasible at the moment because of the challenges related to feed. It is not allowed to use fish meal. Fish offal is the only allowed ingredient. (Manager farming)*

The respondents signaled that the customer was inevitably who decided what they produced, and, if a willingness to pay for it existed, that the company was willing to revise standards and implement additional rules at their request. However, the total production of organic salmon was said to be confined as a consequence of the strict requirements put on feed, which will be discussed more in detail in the next category. It was also explained that due to lacking generality and consistency among existing organic certification standards, it became a lot more complicated to sell the fish internationally with the organic label.

*Certification standard disparity*

This category includes issues relating to the managers' opinions to whether the practical implications of the certification standards coincided to their intended meaning. The respondents were initially inquired if there were any requirements in particular that they would have changed for the better with respect to improved fish health and environmental performance:

> *Yes we would do that. Not all of the requirements improve the environment, on the contrary. (Manager farming)*
>
> *There are several rules that are not sufficiently goal-oriented and are completely wrong. (Manager farming)*

*What we might have been most skeptical about, or seen as a requirement that simply must be met, is the density requirement of 10 kg per cubic. We do not see there being any problem with having 25 kg per cubic meter. (Group quality manager)*

*In the Soria Moria report I believe it was stated that 15 % of Norwegian aquaculture production should be organic within 2015. We have tried to affect this to obtain more licenses, but nothing happens. (Manager farming)*

Signals were given throughout the interviews that several changes in the standards, which would be beneficial to the environment and reduce the cost of supplying organic salmon, should be undertaken. The requirement put on density was particularly contested as a measurement for fish health, as Firm B expressed that the conventional requirements were more than applicable in organic production as well. In fact, it was claimed that the fish thrived better, grew faster and had a lower FCR by having 25 kg per cubic meter. The respondents uttered that there was a disparity between the government's statements regarding organic production goals and their lacking initiatives to allow the industry to contribute. The government's latest statement on the matter declares that *"The Government shall have a goal of 15 per cent of food production and consumption being ecological in 2020"* (The Norwegian Government, 2009). However, the respondents felt that little was done by the authorities to facilitate this growth. It was added that the requirements for feed made it almost impossible to achieve this goal if nothing were to be changed:

*But the market to obtain raw materials is very small. So the amount of organic [salmon] that can be produced today is very confined, if nothing is done to change this. (Manager farming)*

There seemed to be an obvious shortcoming in the rules with regards to the requirement of feed, and it was explained that the government's declared goal of 15 % organic production by 2020 cannot be reached unless changes are made.

### 5.2.6 Summary of analysis

The findings detailed in the case study of Firm B imply that the adoption of organic production was influenced by an overall growth strategy, where the lack of alternatives to eliminate excess capacity led Firm B to apply for licenses conditioned to organic production. Internal resources such as knowledge and relevant experience, a well-incorporated quality system and superior cost-effectiveness facilitated what was described as a relatively easy, unproblematic and inexpensive implementation. Advance costing techniques were used to recognize associated environmental costs and to evaluate profitability. Management accounting practices were

identified, and were used to quantify, categorize and allocate private environmental costs in terms of scale and scope, and to which organization level each belonged. In addition to the presence of management accounting practices, four important intangible assets for improving environmental performance were identified; awareness of employees; environmental knowledge, skills and expertise of employees; the commitment of managers; and, cross-functional coordination (Pérez et al., 2007). Although their approach to the integration of environmental issues in strategic planning was found to be reactive rather than proactive, the widespread use of cost systems, advance costing and other management accounting practices to deal with environmental issues reinforce the long-term embedding process by contributing to management decisions (Pérez et al., 2007)

# 6 Discussion and Conclusions

## 6.1 Introduction

This chapter sets out to explore the research findings in the perspective of literature such as that presented in chapter 2. The research questions will be addressed in accordance with the theoretical framework that was introduced in figure 7, by first considering strategy formulation and motives for diversifying, followed by the exploration of advance costing and management accounting practices, and then, by comparing and contrasting the environmental embeddedness of each case company.

## 6.2 The Role of Firm Resources and External Impetuses

The research findings that were presented in chapter 5 indicated that Norwegian companies involved in organic production vary significantly in terms of company size, year of implementation and scope of involvement. The two companies' entrance to organic salmon farming and other accommodating production initiatives is outlined in figure 14 below.

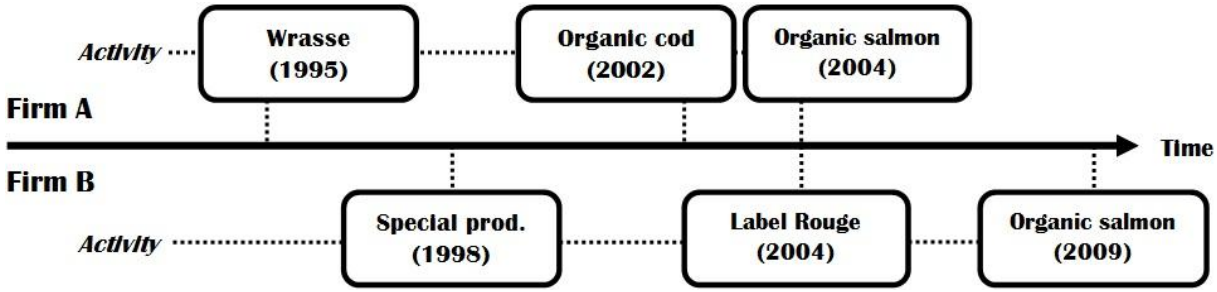


**Figure 14: Activity Timeline (Year of Implementation)**

Although the two case companies' engagement in organic production varied in terms of scope and year of implementation, they both have a history of differentiation to production methods with resemblance to that of organic salmon farming. Firm A pioneered organic production in Norway in 2004, which according to Barney (2002) can enable the creation of a *first-mover advantage*. Recreating a company's historical position in the market is difficult, if not impossible, due to the associated development of human capital, corporate culture and reputation that creates opportunities to maintain their position (Barney, 2002). However, as most of Firm A's production was sold internationally, where the rivalry among existing organic producers is higher, the potential first-mover advantage was perceived as geographically confined (Georgakopoulos and Thomson, 2005; Porter, 1980). Nevertheless, Firm B's approach to the organic market can in many ways be described as similar to that of Firm A. Both companies possessed unique competences pertaining to environmentally differentiated production methods which facilitated the implementation (Barney, 2002). It was explained that resources

such as distinctive organizational processes and human knowledge played a vital role in the decision-making process. This indicated that a unique bundle of productive firm resources allowed them to comprehend and implement the necessary adjustments in a less demanding manner than potential competitors (Penrose, 1959). This raises the question of whether distinctive knowledge on related production methods is seen as a necessity for achieving competitiveness in organic production. Respondents from both firms suggested that the lack of experience from resembling schemes, such as those found in Firm A and Firm B, was among the main reasons why most Norwegian companies refrain from organic production.

Although several important assets that facilitated the shift to organic production were identified in both companies, they expressed differing comprehensions of the operational intricacy it involved. Firm A described the shift to be more demanding and somewhat problematic, whereas Firm B described it to be relatively easy and unproblematic. The differing experiences may be explained by firm heterogeneity in both performance and organizational structure that derived from their various firm resources (Penrose, 1959). Firm B's well-incorporated quality system and superior cost-effectiveness, as well as their more thorough quantitative appraisals are examples of resources that were not identified in Firm A, and may explain their differing experiences in implementing and operating organic production. Firm B's involvement in organic production therefore constitute, judging by their distinct set of resources, a *focused cost-leader* strategy, where focus is on low costs to a chosen segment (Porter, 1980). This is in line with Barney's (2002) definition of resource heterogeneity as an explanation to why some firms persistently outperform others. This strengthens the argument that human capital and organizational processes, with resemblance to that of organic production, may be necessary for successful implementation, since Firm A still experienced problems with the implementation although they perceived their own unique knowledge as a competitive advantage. Firm B had everything except for some of the direct standard-related items in place, and thereby avoided much of the readjustments that were needed in Firm A.

Government stimulation by means of issuing licenses conditioned to organic production was described as an essential stimulus affecting the decision to convert, and respondents from both companies expressed that if it was not for the restricted use of these licenses they may not have been used for organic production. Consequently, the issuing of organic licenses can be seen as a critical impetus for reaching the government's intended target of 15 % organic food production

by 2020 (The Norwegian Government, 2009). This also indicates that the companies would never have considered organic production if the licenses were issued unconditionally.

Vertical integration was in each of the cases identified as both a consequence and an advantage of operating organic production. It entailed closer contact with customers and suppliers as they were mutually dependent on the attributes of each other's products to be in conformity with the strict environmental requirements, hence extending the value-chain vertically in both directions. Vertical integration is in the strategic management literature emphasized as a means for achieving opportunities to improve quality control (Langlois and Robertson, 1992; Porter, 1980), and was highlighted as both a necessity and an advantage when operating organic. Establishing closer relationships with costumers give the company an opportunity to create a permanent customer base and to increase profits (Rauyruen and Miller, 2007). The practical implication of these findings is that a high degree of vertical integration may therefore be seen as an advantage when considering the implementation of organic production, or any other kind of differentiation along environmental lines (Langlois and Robertson 1992). Consequences of establishing more collaborative relationships with both customers and suppliers can oftentimes be heightened exit barriers and enhanced differentiation (Harrigan, 1985). As the organic production in both companies was largely sold on long contracts with a length of as much as five years, the exit barriers were conspicuously higher than in conventional production, where most of the production was sold in an efficient spot market at prevailing prices. However, drawing on the work of Porter (1980), increased collaboration with customers, involving specially designed production and quality standards, may entail a higher bargaining power of buyers. Furthermore, the requirement pertaining to the use of special feed may, because of a limited access to necessary resources, increase the bargaining power of suppliers as well. Both threats must be perceived to confine the participating firms' ability to exercise market power (Porter, 1980). This is supported by a comparable study conducted by Georgakopoulos and Thomson (2005) which aimed at evaluating the risk perception of Scottish salmon farmers when shifting to organic production. The study described farmers to represent the weakest part of the salmon industry, while the power lies with the buyers and feed suppliers.

The research findings indicated that the risk perception of the two case companies encompassed different aspects relating to organic production. Selling on forward contracts was by Firm A seen as a strong motive as it reduces risk and increases price predictability by selling the salmon at a specific future time at a pre-agreed price. Historical prices of fresh Atlantic salmon show a clear

cyclical trend, where prices are volatile and frequently changing (Rogowsky, 2006). In addition, Rogowsky (2006) describe the prices for Norwegian fresh Atlantic salmon as generally being at their lowest point of a year in November due to larger harvests near the December holidays. Firm A saw the niche market for organic salmon as an opportunity to reduce the rivalry among firms and diversify risk by increasing predictability. Firm B, on the other hand, were afraid that the marketing of organic salmon as a superior product could inflict reputational damage onto their conventional production. Rabin (1998) argues that a company that provides both the conventional and the environmentally differentiated version of the same product may be seen as insincere by some consumers, hence putting the company's reputation at risk. Furthermore, the respondents in Firm B expressed risk relating to the possibility that the promotion of organic salmon attributes as superior to those of conventional salmon would not hold true, thus contesting the credibility of shared information (Reinhardt, 1998). Nevertheless, diversification was explained also to serve as a motivating opportunity, as the development of insight, knowledge and associations between the certification standards could allow for superior organic attributes to be transferred to conventional production and vice versa. Sharma and Vredenburg (1998) argue that organizational learning that appears from the evaluation of past actions, such as that identified in Firm B, can promote changes to internal values, routines and rules that represent collective learning.

## 6.3 Cost Control is Key

The research findings that were presented in chapter 5 indicated that most aquaculture companies use advanced management accounting systems that integrates biological attributes, cost accounting, investment needs and financial reporting. The systems allow for the identification and accurate supervision of descriptive objects and causal variability factors (Bjørnenak and Olson, 1999). They are specially designed for the aquaculture industry and must be seen as continuous. The systems allowed for permanent reporting on a frequent basis. The industry's use of particularly differentiated management control systems can be seen as a result of continuous adaptation to industry-specific conditions and local requirements – a development which by Horngren et al. (2008) is argued to be crucial in some industries for accounting systems to be up to date. The use of advanced management control and costing techniques may seem particularly important in aquaculture as the inventory is more or less invisible to the client during the average 18 months of breeding (Steine, Tveterås and Pettersen, 2010).

Both case companies expressed that they achieved higher sales prices on the organic salmon. Profitability, however, inevitably depends upon the proportionality between price premiums and the excess costs arising as a consequence of differentiation (Porter, 1980; Mintzberg, Lampel and Ahlstrand, 1998), and their ability to control and recover these costs. Both companies were found to hold fairly equal prerequisites, on the basis of their management accounting and control systems, to manage costs and profitability. The research findings, however, revealed diverse exploitation of the system properties. The managers in Firm A expressed difficulties in registering and allocating environmental costs associated with the fulfillment of organic certification standards, which indicates that they were either treated as overhead or were not entered into management accounting systems at all (Drury, 2008; Seal et al., 2006; Spitzer and Elwood, 1995). Firm B, on the contrary, described eloquently that all *private costs* were measured with accurate means and traced down at category level. Private environmental costs refer solely to the costs that directly impact the company's bottom line (Spitzer and Elwood, 1995). Furthermore, the organic production was by Firm B explained to yield equal returns to that of conventional production, which signals that they were capable of recovering the excess costs associated with organic production (Porter and van der Linde, 1995). Under the assumption that organic salmon farming improves the environmental performance of production activities, the case study of Firm B therefore demonstrates the potential of organic production to enhance the industry's environmental impact. Thus, by providing a meaningful benefit for the society that is also valuable to the business, organic salmon production may entail what Porter and Kramer (2006, 2011) refer to as the creation of shared value.

The varied emphasis on environmental cost was explained in the perceived measurability of related costs. Firm A explained that measuring and separating associated costs accurately was almost impossible, whereas findings from the case study of Firm B confirmed that the opposite was true. The difference in perceived measurability of private costs may be explained in resource heterogeneity pertaining to Firm B's superior scale of operations and well-incorporated quality system (Barney, 2002). This clearly reflects Firm B's vision of being a cost leader. A cost leader strategy involves that the company focuses on reducing costs at all levels, although it is not synonym with ignoring business areas such as service, quality and sales (Porter, 1980). Correspondingly, the findings indicated that Firm B's cost focus in conventional production entailed advantages in organic production as well.

The exploration of management accounting practices also revealed different experiences relating to the scope of costs inflicting as a consequence of organic production. While Firm B primarily mentioned excess costs that derived directly from the certification standards as influential, Firm A expressed that several other consequential costs arose as a result of diversification (see table 4 and 5, respectively, for a detailed description). These were primarily related to activities undertaken to prevent the production of waste that could be harmful to the environment, i.e. *environmental prevention costs,* and costs incurring to ensure that activities, products and processes conformed to the standards, i.e. *environmental detection costs* (Drury, 2008). The reason why Firm B perceived these costs as less noteworthy may be experiences gained from their involvement in related activities as well as more thorough techniques for evaluating operational consequences prior to the implementation. But several other costs, that were somewhat unrelated to the certification standards, incurred as a result of organic farming's nature. For example, Firm B did not mention continuous slaughtering as a cost driver, which by Firm A was expressed as an operational burden. This might be interpreted in accordance with Firm B's use of the spot market as a means for offsetting this potential disadvantage. Firm A, on the other hand, sold all their organic salmon on long contracts, which required continuous parceling out to the customer.

The exploration of investment appraisal techniques in Firm B recognized at least three out of the four factors that Bierman and Smidt (2007) argue to be characterizing a good investment appraisal decision. *Risk considerations* were taken by evaluating potentially unfavorable marketing threats, by appraising the relevant market's potential, and, in that they were certain that they possessed the required knowledge for successful implementation. Potential profits from conventional production served as the investment appraisal's *opportunity cost*, and made Firm B capable of assessing the required price premium to ensure that the organic production yielded profits which equaled that of conventional production. *Future opportunities* were addressed as their hope was to enable the transferring of rules, processes and procedures that were identified as beneficial in organic production, to their conventional production. The research findings did not give grounds for stating that the *time value of money* was considered in terms of discounted cash flows (Bierman and Smidt, 2007). However, both companies expressed that entitlement to cheap organic licenses was of tremendous value to the organizations. Hence the time value of the issuing price was considered as greater than any alternative uses of money. While Firm B, through systematic investment appraisal techniques, had identified all associated excess costs, the respondents in Firm A communicated that many excess costs arose more or

less as a surprise. Correspondingly, Clark et al. (1989) argue that extensive use of investment appraisal techniques facilitates the implementation of activities and their associated profitability.

Despite the differences in their usage of management accounting practices, both companies described the four most influential excess cost drivers to be; direct input farming cost (i.e. feed); reduced farming density; manual cleaning of nets; and, monitoring and control costs. Drawing on the work of Canavari and Olson (2007), the corresponding costs of operating organic production in Italy were found to be similar, except for one cost. Canavari and Olson (2007) revealed that organic labeling and certification was by Italian farmers perceived as the fourth most influential excess cost. These costs were not even mentioned by the respondents in any of the cases, and could obviously not have been seen as significant. Instead, the prohibition against copper-impregnated nets was emphasized as a considerable cost driver, as nets had to be cleaned manually and more frequently (Debio, 2008). Although the Italian certification scheme more or less follows the same EU-certification standards as Debio, these contrasting results may be explained by certification differences. Firm A assumed the excess costs to be approximately 20 – 30 % higher than in conventional production, which corresponds to the findings of Canavari and Olson (2007). However, Canavari and Olson (2007) estimated that Italian farmers required a price premium of organic fish, guaranteeing the firm the same total operating income as for the conventional product, to vary from NOK 17.00 to 20.50 (based on the historical EUR/NOK exchange rate of 01.01.2007). This is significantly higher than what Firm B expressed, where the required price premium equaled about five kroner. Again, this may be explained in certification and time differences, but the fact that Firm A's identified excess costs of following the Debio standard corresponded to the findings of Canavari and Olson (2007), while Firm B's did not, indicates that Firm B in fact is particularly cost efficient.

Another interesting observation was that Firm A had all along been determined and had a clear strategy stating that they were not supposed to compete with cost leaders such as Firm B. The respondents in Firm B, on the other hand, stated that they had an obvious advantage over Firm A with respect to cost effectiveness. Drawing on the work of Porter (1980), one would assume the rivalry among the firms to increase as a consequence. However, following the discussion on vertical integration in the preceding section, it may also lead to greater communication with customers and a more focused differentiation strategy (Porter, 1980).

In the analysis of management accounting practices it was recognized that the two companies put dissimilar emphasis on controlling and actively reducing environmental costs related to

organic production. This suggests the emergence of management accounting as an intangible asset. Each of the two companies are placed in one of the three categories; *no accounting for nature*; *accounting for externalities*; and *accounting for sustainability*, according to their scope of management accounting (Milne, 1996). With reference to the case analysis of Firm B, their use of management accounting practices was found to integrate both economic and ecological goals, which demonstrates that Firm B can be placed in the second category; accounting for externalities (Milne, 1996). Firm A's lacking ability of separating and allocating environmental costs relating to organic production is in accordance with Milne's (1996) first approach to environmental resources; no accounting for nature. This signifies that environmental resources are either ignored or considered only for their commercial use value in management accounting practices. The absence of accounting practices that visualize the environmental consequences of activities confines the managers' awareness and their ability to reduce the social costs of production (Ball and Milne, 2004). As the organic certification system is designed to internalize some of the externalities that arise in conventional farming, Pérez et al. (2007) argue that failing to identify, quantify and allocate the associated costs entails a lowered level of environmental embeddedness. Although it can be argued that Firm A did in fact strive to integrate ecological and social goals in all their activities, including those related to management accounting, they seemed to lack the knowledge and ability to address them properly in accounting systems, which thereby confines their ability to enhance environmental performance.

The findings from the case studies revealed that environmental management accounting (EMA) plays a part, although at varied scopes, in assessing the environmental, social and economic outcomes of organic salmon farming. On the contrary, Georgakopoulos and Thomson (2005) found the presence and usage of EMA techniques to be somewhat absent among Scottish salmon farmers, although the potential of EMA as a tool for improving environmental performance was concluded to be substantial. The varied emphasis on EMA between Scottish and Norwegian salmon producers may be explained by other findings from their research. The inability of competing with Norwegian producers on cost efficiency in conventional production was found to serve as a key motive for Scottish farmers in the decision to enter the organic niche market, where price premiums were assumed to yield higher profits than conventional production (Georgakopoulos and Thomson, 2005). This indicates that the Norwegian producers have generally had a greater degree of cost control and effectiveness than their Scottish counterparts. All the respondents in both case companies believed the importance of controlling the environmental costs of farming activities would merely augment in the future, because they

expected environmental regulations to become even stricter. Accordingly, Spitzer and Elwood (1995) assume the role of EMA to become increasingly important as regulations for further environmental improvements are carried out. Hence, EMA must be considered as an essential asset in salmon farming in general, and in organic farming in particular, in future years.

## 6.4 Environmental Embeddedness is Pivotal

The case analyses outlined in chapter 5 revealed that both companies, through the utilization of four catalysts for change that derive from the organic certification scheme, devoted much effort in increasing the overall environmental performance of business activities. These catalysts include training and awareness building, continuous environmental improvements, integrating stakeholders' interests, and, organizational learning (Pérez et al., 2007). However, the two cases indicated that the companies had chosen completely different approaches to embed environmental issues and values in the organization. Signs were given throughout the interviews that Firm B persistently try to design policies and operating practices that improve the company's competitiveness while at the same time enhancing the economic and social conditions in the communities in which they operate (Porter and Kramer, 2006). Hence, they act in accordance with a mind-set that bears a resemblance to Porter and Kramer's (2006, 2011) definition of shared value, by embracing merely those environmental issues that may also affect the company's bottom line in terms of higher profits. The findings from the case analysis of Firm B demonstrate that they, through the exploitation of sophisticated management accounting and advance costing techniques, have successfully redefined productivity in the value chain. This refers to what Porter and Kramer (2011) define as the second approach to creating shared value. Opportunities to create shared value arise because most costs related to the fulfillment of organic certification standards represent social costs that the company voluntarily is not obliged to bear, but through participation in the certification scheme is required to abide. By actively endeavor to enhance associated activities that inflict internal costs on the company, the result is expanded connections between social and economic progress (Porter and Kramer, 2011). Rather than treating social issues as peripheral matters by interacting in pure philanthropic activities, Firm B attempts to identify points of intersection between economic effectiveness and environmental performance. This may be explained in their extreme cost focused strategy and their declared vision of being the world's most cost efficient producer of farmed salmon.

Findings from the case study of Firm A indicated a more comprehensive environmental strategy, encompassing a wider set of elements relating to the definition of "environment" suggested by

Hundloe et al. (1990), including sociological, ecological and economic dimensions. A variety of organization activities and attributes, which reflected their voluntary commitment to the environment, emerged during the interviews. Examples include their self-imposed pledge to refrain from using chemicals and medicines, their self-acquired environmental research projects, their integration of a greater group of stakeholders, and, their initiatives and participation in developing environmental certification frameworks. The environmental niche strategy that was chosen entailed comprehensive examination of all business activities to ensure an overall strategy that corresponded to company values. Through the above-mentioned initiatives, by addressing the community economics as if people mattered (Milne, 1996), Firm A also encompassed the ecological consequences of their economic activity. It can therefore be argued that Firm A's approach to embed environmental issues and values in the organization to a greater extent embrace the three dimensions of sustainable development as a commonwealth of values (Milne, 1996). However, their lacking ability to separate and allocate the excess costs of organic production confines their environmental performance and could presumably deteriorate associated management decisions (Spitzer and Elwood, 1995).

The overall case analyses explored how the development of six different intangible assets deriving from organic certification could enable the embedding for environmental issues and values in the organization (Pérez et al., 2007). The research findings suggest that each of the two case companies, according to the presence and usage of these intangible assets, can be placed in different levels of embeddedness. The case study of Firm B identified the presence of four intangible assets; awareness of employees; environmental knowledge, skills and expertise of employees; the commitment of managers; and, cross-functional coordination. This indicates that Firm B relates to the primary level of fundamental embeddedness. Although the research findings clearly demonstrated that Firm B did more than what was required of them, the absence of environmental issues in strategic planning confines their level of fundamental embeddedness to the primary level. In addition, the preceding discussions on the presence and usage of management accounting practices suggest that Firm B's efforts relate to the second level of advanced embeddedness, i.e. accounting for externalities. In sum, the set of intangible assets possessed by Firm B imply that the company should be placed in square E, as shown below in figure 15.

The case study of Firm A identified the presence of five intangible assets. In addition to the use of intangible assets identified in the case study of Firm B, the integration of environmental issues

in strategic planning was recognized in Firm A, which indicates that the company relates to the visible level of fundamental environmental embeddedness. However, their use of management accounting practices to deal with environmental issues was somewhat absent, and indicates that Firm A's efforts relate to the first level of advanced embeddedness, i.e. no accounting for nature. In sum, the set of intangible assets possessed by Firm A imply that the company could be placed in square C, as shown below in figure 15.

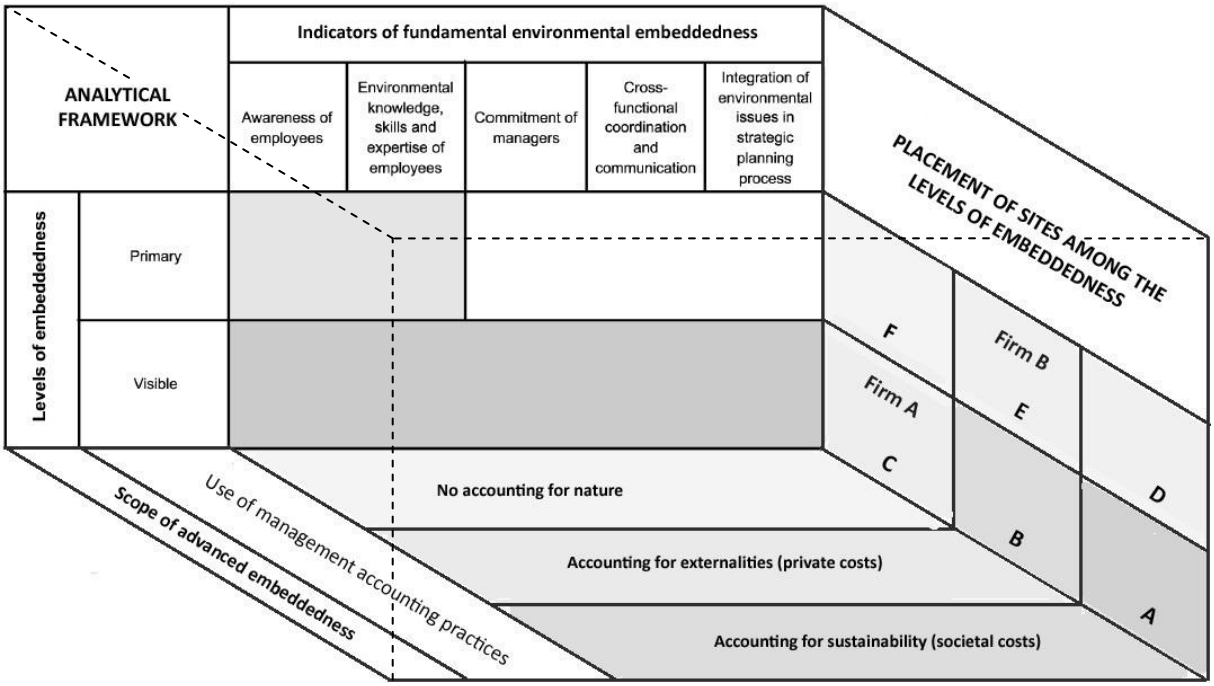


**Figure 15: Analytical Framework in Use**

Although the discussion till now has demonstrated that organic certification can improve the environmental performance of participating organizations, the research findings indicate that the certification standards has a great potential for further improvement. The respondents from both companies described a lack of correspondence between the intended meaning of several certification standards and their practical implications. The relevant standards were mainly related to costly activities where the environmental outcome of compliance was expressed as insignificant, or even negative. This indicates that if Debio is willing to revise the standards based on what the participating companies express to be clearly contradictory requirements, then organic production has a great potential of becoming an even better contribution to the industry. This can be explained more in detail in two steps. First, the participating companies will most likely only propose changes that may contribute to reduce the associated production costs. Second, the certification body will only accept proposals that clearly enhance the environmental performance of activities. In sum, by allowing for cross-functional coordination and

communication with involved producers, the certification body can facilitate the development of a meaningful benefit for the society that is also valuable to the business (Pérez et al., 2007; Porter and Kramer, 2006). Furthermore, assuming that the companies' critique is justified, the rules must be changed in order for EMA to play a part in improving the environmental performance of organic production (Drury, 2008). If not, EMA will not be contributing to the environment as cost control and successful reduction would simply lessen the cost of complying with insignificant requirements. If all Norwegian farmers have the same perception of the organic certification standards as identified in the two case companies, it could be a great threat to the concept's future as a differentiation dimension (Reinhardt, 1998). Although it was not suggested by any of the respondents, the overall research findings indicate that this might also be a reason why so few Norwegian companies are affiliated with the certification system. Interestingly, the study of Georgakopoulos and Thomson (2005) revealed that Scottish producers of organic salmon trusted the official certification body to remove any potential harm, and that the certification standards fulfilled their intended targets. Thus, the certification body in each country has, as a mediator of environmental quality, to varying extents been successful in establishing trust-based relationships to the participating companies, hence putting the credibility of organic certification in Norway at stake (Reinhardt, 1998).

In the light of the preceding discussions, the potential of organic salmon farming as a successful product differentiation along environmental lines may be evaluated. Reinhardt (1998) argues that the success of environmental product differentiation relies on the existence of three interrelated requirements. The *willingness to pay* for an environmentally differentiated good depends on ambiguous social expectations and strictly economic criteria. As the respondents in Firm B noted, at first they were afraid that the organic product would not live up to the social expectations of related marketing, while subsequent testing verified the product quality to match the levels of conventional salmon (Reinhardt, 1998). Furthermore, the absence of chemicals and medicines in organic salmon indicates that the product may be preferred both from a health standpoint and from an environmental perspective, thus increasing the consumer's willingness to pay (Rangan et al., 1996). Both companies expressed that they had identified a satisfactory willingness to pay, and the product's demand was perceived to behave as a luxury good (Kip et al., 1995; Richer, 1995). Similarly, Georgakopoulos and Thomson (2005) disclosed that most Scottish farmers perceived the price premiums in organic production to more than offset the associated cost increase. It can therefore be argued that a willingness to pay for organic salmon exists.

Both firms perceived the Debio's eco-label to provide *credible information* to the end-consumer (Reinhardt, 1998). The respondents did not believe the consumer knew exactly what the eco-labeling implied. However, they assumed that the consumers had knowledge on the certification standard, and could from that interpret that organic salmon, like any other organic product bearing the eco-label, was produced in a less hazardous manner than the conventional salmon. Accordingly, Scottish producers of organic salmon viewed organic labeling as a technology that compensated for our inability to perceive the dangers and risks associated with the existing food production regulations (Georgakopoulos and Thomson, 2005). Georgakopoulos and Thomson (2005) argue that organic labeling therefore can be seen as a social anxiety reduction technology. Although eco-labeling schemes aid the producer in establishing credible information, they may also accelerate imitation (Reinhardt, 1998).

As organic production is available for anyone to adopt at whichever license, its *barriers to imitations* must be perceived as low (Reinhardt, 1998). According to Georgakopoulos and Thomson (2005), the Scottish farmers described the relatively low entry barriers as a potential threat to their ability to earn organic price premiums, and that they had no great desire to see organic production becoming the industry norm. On the contrary, Firm A explained that they perceived a greater uptake of organic production as positive. Because this could lead to increased promotion of organic salmon as a superior product, they assumed consumer demand and price premiums to augment. Yet, even though Firm B expressed that margins were just as pleasing as for conventional salmon from day one, only a couple of Norwegian firms are involved. In conformity with the discussion in section 6.2, Reinhardt (1998) argues that strategic tools such as unique know-how and technologic advantages may prevent competitors from introducing similar products. Unique know-how was identified in both cases, and the advanced use of management accounting practices in Firm B may serve as a technological advantage. Respondents from both companies believed there were two prevailing explanations for the relatively low attractiveness of organic production in Norway; high profitability in conventional production gave no incentives for diversification; and, competitors were assumed to lack the experience and knowledge that both Firm A and Firm B had gained from operating similar production methods. This signals that resource heterogeneity might in fact serve as some sort of barriers to imitation (Barney, 2002).

## 6.5 Conclusions

The companies under investigation had fairly little in common except for resources pertaining to unique knowledge and processes which perceivably facilitated their involvement. These resources, alongside with genuine interest and government stimulation, motivated the shift to organic production. Resource heterogeneity, regarding cost effectiveness and management control systems, was revealed as a cause for varying operational experiences among the firms. Interestingly, involvement required extended communication in both directions of the value-chain to ensure that everyone complied with prevailing standards. Organic production was for various reasons assumed to reduce the risks in conventional farming, and the shift was made to pursue their overall strategies rather than in response to pressure from various stakeholders.

As organic production did not require any large investments, the use of investment appraisals was confined to advance costing and intuitive reasoning. Both firms had the ability, through advanced management accounting systems, to embed environmental issues in accounting practices. However, the findings revealed diverse utilization of the system properties. Unexpectedly, elements of environmental accounting were present in one case, where cost control served as a key component in improving profitability and environmental performance.

Comprehensive quality systems and training programs were among the elements which fostered the environmental commitment of managers. Nevertheless, the cases demonstrated two different approaches to integrating environmental issues in the organization. One company tried persistently to find points of intersection between environmental and economic aspects, whereas the other company had a more comprehensive strategy which encompassed a wider set of environmental elements. Both approaches indicated that defining an environmental strategy was pivotal when operating organic production. The companies had voluntarily initiated much of the certification standards prior to the shift because it was seen as necessary to ensure sustainable and efficient aquaculture, and avoid the risks of disease and contamination.

However, the environmental performance of organic production was, judging by the respondents' experiences, confined by a disparity between the intended meaning of standards and their practical implications. Hence, revising the standards is necessary to enhance organic production as a contribution to the industry, and for environmental accounting, as a means for getting there, to play a greater part. A willingness to pay for organic salmon existed as eco-labeling was assumed to communicate the product attributes credibly. The abovementioned sources to resource heterogeneity were found to serve as some sort of entry barrier to imitation.

## 6.6 Future Research

Future research is needed to more fully understand how differentiation along environmental lines could ameliorate the integration of economic, ecological and social goals of modern aquaculture. It would be valuable to perform a study which also includes conventional salmon producers, to investigate why they refrain from organic, and to what extent organizational attributes differ from those addressed in this study. This can involve aspects related to management accounting, quality management and initiatives undertaken to improve environmental performance.

Arguably, including a wider set of stakeholders, such as customers, feed suppliers and end-consumers, would create a superior assessment that could benefit potential newcomers and facilitate the implementation. Including international competitors would also be valuable as it enables the drawing of more valid conclusions which could broaden the perspectives addressed in this study.

As the author lacks the knowledge to explore whether the respondents' critique towards the certification standards is justified, there lies much potential in investigating the relevant issues from the perspectives of researchers within the subject area. Optimizing the standards in terms of environmental performance and cost effectiveness could improve the attractiveness of organic production and enable the transferring of beneficial standards to conventional farming.

# 7 References and Bibliography


Aarset B., Jakobsen, S. E., Iversen A., and Ottesen, G. (2004): *Lovverk, teknologi og etableringsbetingelser i norsk havbruk*. Bergen: SNF, 01/04.

Aarset, B. (1999): *Er det mulig å lære av historien? Utvikling av nye arter i oppdrett i et institusjonelt perspektiv*. 32. Ed. Bergen: Stiftelsen for samfunns- og næringslivsforskning.

Annual Report Firm A (2009): *Annual Report 2009*. Firm A.

Annual Report Firm B (2010): *Annual Report 2010*. Firm B.

Ball, A. and Milne, M. J. (2004): Sustainability and management control, chapter 18 in *Management control: theory and practices (2nd edition)*, Berry, A. J., Broadbent, J. and Otley, D. T.. London: Macmillan.

Barney, J. B. (2002). *Gaining and sustaining competitive advantage (2nd edition)*. Upper Saddle River, NJ: Prentice Hall.

Barney, J. B. and Hesterly, W. S. (2010): *Strategic management and competitive advantage – concepts and cases (3rd edition)*. Upper Saddle River, NJ: Prentice Hall.

Bierman, H. Jr. and Smidt, S. (2007): *The capital budgeting decision – Economic analysis of investment projects (9th edition)*. New York, NY: Routhledge.

Bjørndal, T. og Aaker, H. (2006): *Konsesjonar og konsesjonsverdi i norsk oppdrettsnæring.* Bergen: SNF, 39/06.

Bjørnenak T. and Olson O. (1999): Unbundling management accounting innovations. *Management Accounting Research*, *10*(4), 325-338.

Bryman, A. and Bell, E. (2003): *Business research methods*. Oxford: Oxford University Press.

Burritt, R. L. (2004): Environmental management accounting: Roadblocks on the way to the green and pleasant land. *Business Strategy and the Environment*, *13*(1), 13-32.

Cabello, F. C. (2006): Heavy use of prophylactic antibiotics in aquaculture: a growing problem for human and animal health and for the environment. *Environmental Microbiology, 8*(7), 1137-1144.

Canavari, M. and Olson, K. D. (2007): *Organic food – Consumers' choices and farmers' opportunities*. New York, NY: Springer Science and Business Media.

Clark, J. J., Hindenlang, T. J. and Pritchard, R. E. (1989): *Capital budgeting – Planning and control of capital expenditures (3rd edition)*. Englewood Cliffs, NJ: Prentice Hall

Cummins, A. (2004): The Marine Stewardship Council: A multi-stakeholder approach to sustainable fishing. *Corporate Social Responsibility and Environmental Management*, *11*(2), 85-94.

Dagens Næringsliv Jan 29th (2011): Asche, F.: Hevder oppdrett kveles. (In: *Dagens Næringsliv*. Periodical for industry and commerce, 29.01.2011).

Debio (2008): *Økologisertifisering: Regler for økologisk akvakultur*. Debio: Norsk Akkreditering.

Debio (2008a): *Økologisk akvakultur: Tilknytning til kontrollordning*. Debio: Norsk Akkreditering.

Directory of Fisheries (2009): *Lønnsomhetsundersøkelse for matfiskproduksjon; Laks og Regnbueørret*. Directory of Fisheries.

Drury, C. (2008): *Management accounting and cost accounting (7th edition)*. Pat Bond: Cengage Learning 2008.

Georgakopoulos, G. and Thomson, I. (2005): Organic salmon farming: risk perceptions, decision heuristics and the absence of environmental accounting. *Accounting Forum*, *29*(1), 49-75.

Georgakopoulos, G., Ciancanelli, P., Coulson, A. and Kaldis, E. P. (2008): Stewardship and risk: an empirically grounded theory of organic fish farming in Scotland. *Agricultural Economic Review, 9*(2), 16-30.

Ghauri, P. and Grønhaug, K. (2005): *Research methods in business studies – A practical guide (3rd edition)*. London: Prentice Hall.

Grenness, T. (2001): *Innføring i vitenskapsteori og metode (2nd edition)*. Oslo: Universitetsforlaget.

Harrigan, K. R. (1985): Exit barriers and vertical differentiation. *Academy of Management Journal*, *28*(3), 686-697.

Hillestad, M., Austreng, E. and Åsgård T. (1996): Økologisk og ressursøkonomisk perspektiv på foring av fisk. *Miljøhåndboken for fiskeoppdrett*, 123-131.

Horngren, C. T., Sundem, G. L., Stratton, W. O., Burgstahler, D. and Schatzberg, J. (2008): *Introduction to management accounting (14th edition)*. Upper Saddle River, NJ: Prentice Hall.

Hundloe, T. G. T., McDonald, J. W. and Wilks, L. (1990): Cost-benefit analysis and environmental impact assessment. *Environmental Impact Assessment Review*, *10*(1), 55-68.

Jacobsen, R. (1992): The Austrian School of strategy. *Academy of Management Review 17*(4), 782-807.

Jakobsen, S. E., Berge, D. M. and Aarset, B. (2003): *Regionale og distriktspolistiske effekter av statlig havbrukspolitikk*. Bergen: SNF, 16/03.

Johannessen, A., Tufte, P. A. and Kristoffersen, L. (2006): *Introduksjon til samfunnsvitenskapelig metode (3rd edition).* Oslo: Abstrakt Forlag.

Johanson, D. (2008): Corporate governance and board accounts: exploring a neglected interface between boards of directors and management. *The Journal of Management and Governance, 12*(4), 343-380.

Johnson, H. (1999): *Making capital budgeting decisions – Maximizing the value of the firm.* London: Financial Times Prentice Hall.

Johnson, H. T. and Kaplan, R. S. (1987): *Relevance lost - The rise and fall of management accounting*. Boston, MA: Harvard Business School Press.

Kip, V. W., Vernon J. M., Harrington J. E. Jr. (1995): *Economics of regulation and antitrust (2nd edition).* Cambridge, MA: MIT Press.

Kvale, S. (1997): *Det kvalitative forskningsintervju*. Oslo: Ad Notam Gyldendal.

Landbruks- og matdepartementet (2009): *Økonomisk, agronomisk – økologisk. Handlingsplan for å nå målet om 15 pst. økologisk produksjon og forbruk i 2020.* Oslo: Landbruks- og matdepartementet.

Langlois, R. N. (2001): Strategy and the market process – Introduction to the special issue. *Managerial and Decision Economics, 22*(4/5), 163-168.

Langlois, R. N. and Robertson, P. L. (1992): Explaining vertical integration: Lessons from the American automobile industry. *Journal of Economic History, 49*(2), 361-375.

LeCompte, M. D. and Goetz, J. P. (1982): Problems of reliability and validity in ethnographic research. *Review of Educational Research*, *52*(1), 31-60.

Milne, M. J. (1996): On sustainability; the environment and management accounting. *Management Accounting Research*, *7*(1), 135-161.

Mintzberg, H., Lampel, J. and Ahlstrand, B. (1998): *Strategy safari: The complete guide through the wilds of strategic management*. London: Financial Times Prentice Hall.

Moody, J. and White, D. R. (2000): Social cohesion and embeddedness - A hierarchical conception of social groups. *American Journal of Sociology 94*(1), 515-535.

Nanni, A. J., Miller, J. G. and Vollmann, T. E. (1988): What shall we account for? *Management Accounting, 69*(1), 42-48.

Nasjonalbudsjettet (2010): http://www.regjeringen.no/nn/dep/fin/dok/regpubl/stmeld/2009-2010/meld-st-1-2009-2010/6/2/4.html?id=579851. (17.01.2011).

Nawrocka, D. and Parker, T. (2008): Finding the connection: environmental management systems and environmental performance. *Journal of cleaner production, 17*(6), 601-607.

Naylor, R. L. (2005): Fugitive Salmon: Assessing the risk of escaped fish from net-pen aquaculture. *BioScience, 55*(5), 427-437.

*Norges Lover* (2007). Red.: Flock, H., Stuevold, L., Bull, J. H. and Tronslin, A. M.. Oslo: Det Juridiske Fakultetet ved Universitetet i Oslo.

OECD (2009): Caswell, J. A. and Anders, S. M.: *Round table on eco-labeling and certifications in the fisheries sector*. The Hague: OECD.

Pelletier, N. and Tyedmers, P. (2007): Feeding farmed salmon: is organic better? *Aquaculture, 272*(1), 399-416.

Penrose, E. T. (1959): *The theory of the growth of the firm*. New York, NY: John Wiley & Sons.

Pérez, A., Ruiz, C. C. and Fenech, F. C. (2007): Environmental management systems as an embedding mechanism: a research note. *Accounting, Auditing & Accountability Journal, 20*(1), 403-422.

Pindyck, R. and Rubinfeld, D. (2008): *Microeconomics (7th edition)*. Upper Saddle River, NJ: Prentice Hall.

Porter, M. E. (1980): *Competitive strategy: Techniques for analyzing industries and competitors.* New York, NY: Free Press.

Porter, M. E. (1996): What is strategy? *Harvard Business Review*, *Nov/Dec,* 61-78.

Porter, M. E. and Kramer, M. R. (2006): Strategy and society – The link between competitive advantage and corporate social responsibility. *Harvard Business Review, Nov/Dec,* 78-92.

Porter, M. E. and Kramer, M. R. (2011): Creating shared value – How to reinvent capitalism – and unleash a wave of innovation and growth. *Harvard Business Review, Jan/Feb,* 62-77.

Porter, M. E. and van der Linde, C. (1995): Towards a new conception of the environment - competitiveness relationship. *Journal of Economic Perspectives, 9*(4), 97-118.

Rabin, M. (1998): Psychology and economics. *Journal of Economic Literature, 36*(1), 11-46.

Rangan, K. V., Sohel, K. and Sandberg, S. K. (1996): Do better at doing good. *Harvard Business Review, May/June,* 42-54.

Rauyruen, P. and Miller, K. E. (2007): Relationship quality as a predictor of B2B customer loyalty. *Journal of Business Research, 60*(1), 21–31.

Reinhardt, F. L. (1998): Environmental product differentiation: Implications for corporate strategy. *California Management Review, 40*(1), 43-73.

Richer, J. (1995): *Green giving: An analysis of contributions to major U.S. environmental groups*. Washington D.C.: Resources for the Future.

Robertson, P. L. and Yu, T. F. (2001): Firm strategy, innovation and consumer demand: A market process approach. *Managerial and Decision Economics, 22*(4-5), 183-199.

Rogowsky, R. A. (2006): *Fresh and chilled Atlantic salmon from Norway.* Washington D.C.*:* U.S. International Trade Commission, No. 3835.

Russo, M. V. (2008): *Environmental management – readings and cases (2nd edition).* London: Sage.

Ryan, P. A. (2002): Capital budgeting practices of the Fortune 1000: How have things changed? *Journal of Business and Management, 8*(4), 355-364.

Samuelsen, S. H. and Sogn-Grundvåg, G. (2009): Kan norske laksebedrifter oppnå konkurransefortrinn gjennom differensiering? *Norsk Fiskeoppdrett, 10*(1), 14-17.

Schaltegger, S., Burritt, R. and Petersen, H. (2003): *An introduction to corporate environmental management. Striving for sustainability*. Sheffield: Greenleaf.

Schmitt, K. and Wolff, F. (2007): CSR between rhetoric and realities: analysing the contribution of CSR to the achievement of EU policy goals. *Ökologisches Wirtschaften, 4*(1), 30-34.

Seal, W., Garrison R. H. and Noreen, E. W. (2006): *Management accounting (2nd edition)*. Berkshire: McGraw-Hill.

Sharma, S. and Vredenburg, H. (1998): Proactive corporate environmental strategy and the development of competitively valuable organization capabilities. *Strategic Management Journal*, *19*(8), 729–753.

Spitzer, M. and Elwood, H. (1995): *An introduction to environmental accounting as a business management tool.* U.S. Environmental Protection Agency (EPA).

Statistics Norway (2010): *Aquaculture 2009. Final figures - strong growth in aquaculture.* http://www.ssb.no/english/subjects/10/05/fiskeoppdrett_en/. Statistics Norway. (15.02.2011).

Steine, G., Tveterås, R. and Pettersen, I. (2010): *"Føre var" i laksenæringen: Tid for kollektiv håndtering av underdekning av fiskeolje.* Oslo: Norsk institutt for landbruksøkonomisk forskning.

Strauss, A. and Corbin, J. M. (1990): *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Tacon, A. G. J. (1997): *Trends in global aquaculture and aquafeed production. 1984-1996 highlights*. Rome: Food and Agriculture Organization of the United Nations.

Tacon, A. G. J. and Metian, M. (2008): Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds: Trends and future prospects. *Aquaculture, 285*(1), 146-158.

The Economist Aug 7th (2003): The blue revolution: A new way to feed the world. http://www.economist.com/node/1974450. (15.01.2011).

The Norwegian Government (2009): *Political platform as basis for the Government's work: 2009 – 2013.* Soria Moria: The Norwegian Government.

Tveterås, S. (2000): *Assessment of the sustainability of organic salmon farming*. Bergen: SNF, 18/00.

Wernerfelt, B. (1984): A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171-180.

Yin, R. K. (1994): *Case study research – design and methods (2nd edition)*. Thousand Oaks, CA: Sage.

# Appendix 1 – Interview guide

**Introduksjon:**
Takke vedkommende for tid og deltakelse I studien.
Presentere bakgrunn og formål med studien.
Forsikre at informasjonen blir anonymisert og behandlet konfidensielt.
Tilby ettersending av oppgaven.
Be om tillatelse til å benytte båndopptaker.

**Innledende spørsmål:**

1 Navn
2 Alder
3 Posisjon og ansvarsområder i selskapet
4 Hvor lenge har du vært ansatt i selskapet?
5 Hva er din bakgrunn fra bransjen?

**Hovedspørsmål:**

*Selskapsstrategi og motiv for diversifisering*

6 Kan du fortelle litt kort om bedriften og dens kjerneaktiviteter?

7 Kan du fortelle hvordan ideen om økologisk oppdrett oppsto i bedriften?
- Hadde dere interne ressurser som gjorde dere bedre skikket enn andre?
- Var det noen forhold utenfor bedriften som spilte inn?
- Ble det hentet inn noe form for markedsinformasjon før implementering?

8 Hvilke styrker og svakheter anser du for å skille økologisk fra konvensjonell laks?
- Hvilke typer kunder er det i hovedsak den økologiske produksjonen selges til?

*Investering*

9 Kan du si noe om investeringene som kreves for å starte økologisk oppdrett vs. vanlig?
- Er differansen i størst grad tilknyttet drift eller oppstart?

10 Ble det gjort noe for å vurdere prosjektets lønnsomhet i forkant av implementeringen?
- Hva og hvordan?
- Hadde dere alternative investeringsmuligheter, og hvordan ble disse sammenlignet?
- Hvilken rolle spilte miljøhensyn i vurderingen?

*Økonomirapportering*

11 Kan du fortelle litt om hvordan lønnsomheten av investeringen følges opp?

12 Gjør dere forsøk på å spore kostnadene ved å oppfylle de spesialkrav som stilles økologisk oppdrett?
- Hvordan?
- Vet dere merkostnaden per kostnadsart sett opp mot konvensjonell drift?
- Hva benyttes denne informasjonen til?

13 Vil du si at dette produksjonsstyresystemet er blitt brukt aktivt til å redusere kostnadene tilknyttet økologisk oppdrett eller for å styre lønnsomheten?

- Vet du hvor lang tid går det mellom hver rapporterings/målingsperiode?

14 Hvis det oppstår avvik mellom budsjett og faktisk utvikling i produksjonen, gjøres det noe for å forstå hvorfor avvikene oppstod?

15 Er produksjonsstyresystemet koblet til noen andre system som skaper verdifull beslutningsrelevant informasjon til ledelsen?

16 Tror du kontroll over miljøkostnader i bransjen vil bli mer aktuelt i fremtiden?

*Implementering og integrering av miljømessig bærekraft*

17 Hva gjør dere for å forsikre at reglene for sertifisering til enhver tid oppfylles?
- Hvilke driftsmessige konsekvenser har økologisk oppdrett?
- Gis det spesifikk trening til ansatte som berøres av økologisk drift?

18 Gjør dere noe utover reglene for å forbedre fiskehelse og driftens påvirkning på miljøet?
- Kommuniserer dere med lokale interessenter eller myndigheter?
- Har dere noen formell gruppe eller ansatte som tar seg av miljøhensyn i selskapet?

19 I hvilken grad mener du miljøhensyn påvirker bedriftens aktiviteter og strategiutforming?

20 Har dere opplevd effektivitetsforbedringer i driften av økologisk oppdrett siden oppstart?

21 Har det at sentrale myndigheter stimulerer økologisk oppdrett ved for eksempel å gi ut øremerkede konsesjoner og FOU-konsesjoner påvirket satsingen deres mot økologisk?

22 Hva er deres erfaringer fra drift av økologisk lakseproduksjon i forhold til de forventningene som skapte grunnlaget for diversifiseringen?
- Tror du flertallet av sluttbrukerne vet hva som skiller økologisk fra konvensjonell fisk?
- Fikk dere inntrykk av at finanskrisen påvirket etterspørselen etter økologisk fisk?

23 Hvilken rolle tror du økologisk oppdrett vil ha i bedriften 3-5 år fremover i tid?
- Ser du tendenser i næringen mot andre diversifiseringsretninger som kan gi økologisk oppdrett økt konkurranse?
- Hvorfor tror du så få norske selskaper driver økologisk oppdrett i Norge?

**Avslutning**

24 Har du noen øvrige innspill du mener er viktige utover det som hittil er blitt nevnt?

Takke vedkommende for deltakelse i studien.
Opplyse om at intervjuet vil bli transkribert og ettersendt for godkjennelse innen kort tid.