Coping Strategies in Highly Turbulent and Competitive Supply Environments

Geir Grundvåg Ottesen
and
Kjell Grønhaug

Abstract

This paper explores how firms cope to secure vital input factors in a volatile supply context. Based on detailed mapping of firms' thinking and doing a wide range of different coping strategies were identified. It was found that firms differ widely in their application of strategies, which is partly explained by the ambiguous nature of supply uncertainty giving rise to strategies differing in scope, e.g. to alleviate uncertainty regarding the volume of supplies or uncertainty regarding raw material type and quality. Our findings show that the widely applied strategy of backward vertical integration only helps secure a small fraction of actors' total supplies. It thus seems that the concept of vertical integration has been applied without carefully considering its limitations in the present context, where majority ownership in vessels is not allowed, and where supply is impossible to control due to state of nature.

Key words: Supply uncertainty, top managers, coping strategies

Introduction

This paper focuses on how firms confronted with uncertain supplies think and act to secure vital input factors to compete effectively in their output markets. This is a relevant concern because in some industries the supply of critical input factors can be particularly volatile and difficult to predict and control. This may cause problems in satisfying the needs and wants of downstream customers, e.g. by limiting the product range of the firm, affecting the quality of the products offered, or disturbing the ability to deliver on schedule. Therefore, uncertain supply may affect firms' ability to compete effectively in their output markets. A relevant example is the fish processing industry based on catches of wild fish. Here, factors such as fish stock variations, changes in fishing effort due to e.g. poor weather conditions, and government regulation contribute to uncertain supplies of raw material, both in terms of quality and availability (see, e.g. Dreyer, 1998; Dreyer & Grønhaug, 2001; Prochaska, 1984;

Young, 1987). In particular, actors close to harvest are more directly exposed to uncertain supply than actors further downstream in the supply chain, e.g. because supply uncertainty will, to some extent, have been absorbed by upstream actors.

Little empirical research has investigated how firms cope with uncertain supply in order to compete effectively in their output markets. The literature on purchasing and logistics has only to a very modest degree looked at the special case of supply uncertainty as described above. It should also be noted that the crucial role of input supply generally seems to have been neglected in the marketing literature. There may be several reasons for this lack of attention. For example, past research in marketing has primarily been conducted in manufacturing firms facing relatively stable supply conditions and/or firms where purchasing departments secure adequate and timely supplies by means of reliable delivery contracts and storage of necessary input factors. Managers and researchers may thus tend to perceive supply as less problematic, so that it does not attract their attention.

The main research question underlying this research is: "How do upstream actors exposed to uncertain supply think and act to secure critical input factors?" This is a highly relevant question because if the firm is unable to attract and satisfy a sufficient number of customers, it will be driven out of business. The remainder of this paper is organised as follows: In the next section, we discuss the concept of environmental uncertainty and address the strategy of backward vertical integration, which seems to be a much focused-on strategy applied by firms facing supply uncertainty. We then present our research, designed to capture how actors in the Norwegian fish processing industry think and act to secure critical inputs. Then we present our findings. Finally, the findings are discussed and implications highlighted.

Theory

Sudden and unpredictable variations in supply of critical and perishable raw materials represent a specific type of environmental uncertainty that must be dealt with in an adequate manner because firms need regular supplies to operate effectively. This follows from the input – throughput – output paradigm, which states that firms' value creation is brought about by transforming input factors into valuable products and services offered in the output market (cf. Katz & Kahn, 1978). The problem of coping with environmental uncertainty has long been recognised as a key managerial challenge. Thomson (1967), for example, postulated that "uncertainty appears as the fundamental problem for complex organisations" and that

organisations respond to uncertainty in the environment by "buffering their technical core from its effects" (p.119). A firm's performance depends heavily on adequate utilisation of its capacity, imposing fixed costs. Regular supplies are necessary for adequate capacity utilisation, which corresponds to Thomson's (1967) buffering of the technical core. This is supported by a number of studies that have demonstrated that perceived environmental uncertainty exerts a considerable influence on organisational structures and processes (Huber & Daft, 1987).

The research literature has recognised that several types of environmental uncertainty exist (see Sutcliffe & Zaheer 1998 and Miller & Shamsie 1999 for recent reviews). Sutcliffe & Zaheer (1998), for example, distinguish between primary uncertainty, competitive uncertainty, and supplier uncertainty. Primary uncertainty relates to "state of nature", for example, as faced by firms dependent on supplies of wild fish which often show a stochastic pattern (cf. Dreyer, 1998; Dreyer & Grønhaug, 2001; Prochaska, 1984). Supplier uncertainty relates to exchange patterns, i.e. supplier action, for example, opportunistic behaviour (cf. Williamson, 1975), and competitive uncertainty relates to competitors' actions (cf. Porter, 1980).

Competitive uncertainty, e.g. due to competitors' actions in markets as studied here, i.e. in highly competitive raw material markets, where sellers and buyers are multiple, the products to a large extent standardised and/or easy to judge, and where information flows rather easily, is not likely. Previous studies have shown that in such markets firms do not consider specific competitors (Ottesen & Grønhaug, 2001). The reasons are that individual competitors do not influence market opportunities, and, due to cognitive constraints and other resource requirements, firms are unable to gather, analyse and handle information about all competitors. Rather, they focus on market trends, created by the aggregated behaviours of the actors. In highly competitive markets firms are – in principle – "price takers". They react to "market signals", e.g. increasing prices influencing their expectations.

The actual market situation, with multiple suppliers and buyers, indicates that opportunistic behaviour on the part of suppliers is particularly likely, creating supplier uncertainty. However, as often observed in highly competitive "perfect" markets, all (or many) actors react in the same way to the same signal, which results in more or less expected outcomes, e.g. increased total supply causes low prices, resulting in reduced supply, followed by higher prices and increasing supply. Thus, in highly competitive markets supplier and competitor uncertainty is probably modest. However, although opportunistic behaviours on the part of suppliers or competitors are not expected *per se*, shortages in supply intensify

competitors' efforts to secure necessary supply, and thus intensify the competition for supply. This amplifies the problem of coping with primary uncertainty related to supply.

The research literature has addressed the problem of handling environmental uncertainty. In particular, the strategy of vertical integration has received much attention. The concept of vertical integration is, however, an ambiguous one. Often it is associated with ownership. By owning more than 50 per cent, the owning firm can control, and thus purposefully apply, vertical integration to avoid opportunism and/or overcome market deficiencies. However, in market situations as described here, supplier and competitor uncertainty is modest and as such does not motivate the application of vertical integration. What about primary uncertainty? Can vertical integration help actors cope with this type of environmental uncertainty? By integrating backwards and owning their own sources of supply, in this case fishing vessels, firms can apply "the economics of avoiding the market" (Porter, 1980). In this way, firms can secure a certain amount of raw material, but not necessarily all they need. In this case, firms are "guaranteed" the utilisation of at least some fraction of their processing capacity. However, acquiring and owning vessels is costly. It requires capital and imposes fixed operating costs. Also, when the catch is ample, firms can get their required supplies at prices that hardly cover the costs of owning and operating their own vessels. Also, fishing and processing are two different businesses, and there is no reason why being an expert firm in processing should yield specific advantages in fishing. Whether it is profitable for firms to own their own vessels depends not only on catch volume and price, but also on the associated costs of running the vessel(s).

It should also be noted that in the present context, governmental regulations state that upstream firms (as studied here) are not allowed to have *majority* interests in fishing vessels, also indicating that vertical integration is perceived (by the government) as a formal means of controlling firms' supply. Only a few examples of majority ownership exist.[1] Observations from the Norwegian fish processing industry show, however, that most firms with ownership in vessels hold minority investments only, and that "control over supply" is the major motive (Dreyer, Bendiksen, Iversen & Isaksen, 1998). Not all the processing firms in the seafood industry integrate backwards. It should also be noted that most firms owning vessels only get a small fraction of their necessary supplies from own vessels (Dreyer *et al.*, 1998).

[1] In the 1950s and 60s, some firms got dispensations from the general rule and were allowed to own fishing vessels, e.g. seagoing trawlers. This was due to political concerns regarding depopulation of small local communities. By allowing firms to own majority interests in vessels, the intention was that processing plants would be able to secure their supplies to "keep the weels going" and thus avoid lying off workers or shutting down.

These observations give rise to multiple questions, e.g. why do firms obtain minority shares, if the prime purpose is to "secure supply"? And as stated at the outset: How do firms cope, i.e. what are the strategies they apply to secure the necessary supply?

Although most firms in the seafood industry are rather small, they vary in "specialisation", products offered, and market focus. Some firms concentrate on rather few products, while others offer a broad range of products. Some firms mainly focus on a limited number of customers and geographical markets, while others sell their products to multiple customers in globally dispersed markets. Firms and their managers also vary in economic resources, educational background and experiences. The managers in charge may also vary in their "mental models" (cf. Johnson-Laird, 1983). Managers, like other individuals, hold and develop knowledge structures enabling them to understand their surrounding environment, and act. Such knowledge structures tend to be rather rigid, and are shaped through, and influenced by, their actual context, history, experiences, and educational background (cf. Sanford, 1987). Because managers in different firms are exposed to partly different information environments, and because managers tend to focus on the activities they are involved in (Dearborn & Simon, 1958), they may, over time, develop partly different mental models of how to act, survive and stay competitive (Day & Nedungadi, 1994), i.e., their mentally constructed "road-maps" of what works and how to act. Such mental models are also likely to include beliefs about cause-effect relationships of importance in order to behave rationally, i.e. to exert goal-directed behaviours. Present insights regarding firms' strategies for coping with uncertain supply and what they consider adequate actions are, however, limited.

Research Methodology

This section reports the research methodology underlying the empirical study to examine the stated research question, i.e., "How do upstream actors exposed to uncertain supply think and act to secure critical input factors?" We first describe the choice of research design, setting and data sources, and proceed to describe how the data were collected and analysed.

Research Design and Setting

Due to modest a priori insights, an exploratory approach was chosen here. This implies a flexible, discovery-oriented approach allowing us to gradually uncover and understand the "problem space".

The Norwegian seafood industry constitutes the context of our study. The industry consists mainly of firms involved in various types of primary processing close to harvesting, such as filleting and freezing, salting, and drying. The bulk of products are semi-processed and sold downstream the supply chain for further processing. The firms purchase their raw materials from a range of different types of fishing vessels, ranging from large ocean trawlers to small coastal vessels that provide different types of fish (e.g. cod, haddock and saithe) of variable quality (which often depends on the type of fishing gear employed). The supply is extremely uncertain in terms of volume, availability and raw material quality (Dreyer, 1998; Dreyer & Grønhaug, 2001).

Data Collection and Analysis

For the present study, 10 firms in the industry were selected. They varied in product assortments, the activities they were involved in, market scope and profitability in order to secure variability (Campbell, 1975). All the firms were small- and medium-sized, which is the case for the great majority in the industry. The average turnover is 136 million Norwegian kroner (range 32-290). The firms are relatively young, averaging 14 years (range 2-27 years). The relatively modest number of firms included were chosen for the exploratory purpose of the study, i.e. requesting detailed insights into the individual firm and its doing. Secondary printed information, including annual reports, articles in the business press, and access to accounting data from Dun & Bradstreet allowed us to trace the activities, turnover and profitability of the firms included over a number of years. To get fine-grained insights into how the firms think about and cope with uncertain supply, we focused on top managers. The reason for doing so is the crucial role of top managers, in particular in small and medium-sized firms, which dominate in the Norwegian fish processing industry. In such firms, the top manager is the prime decision-maker who has everything at his/her fingertips and knows what is going on. In these firms, top managers are also often owners with strong incentives to perform well. The managers included in the study all had extensive experience of the seafood industry, averaging 16.5 years, with a range from 7 to 25 years.

To "capture" how the managers perceived the supply situation and how to deal with it, we collected primary data. The managing directors in the selected firms were identified and

appointments made in advance. Lengthy, semi-structured interviews were conducted. General, broad questions formed the starting points for modestly structured interviews with the managers, e.g.: "How do you perceive the supply situation?" and "How do you secure the necessary input of raw materials?" Because supply is very important in the seafood industry, it was assumed that the managers would have fine-grained and reflected ideas about the nature of the supply situation and how to secure necessary input factors. We asked for and tried to elicit the subjects' own interpretations of the supply situation and how it was handled. The interviews were conducted very much as conversations, with emphasis on letting the managers play the active role and the interviewer following up with probing questions to get a deeper understanding. This procedure allowed us to explore underlying issues, such as why certain coping strategies were preferred or had emerged. Eight of the ten interviews were tape-recorded and transcribed. Two managers resisted the use of a tape-recorder. In these cases, detailed notes taken during the interviews were transcribed immediately after the interview. The transcribed interviews were content-analysed by carefully inspecting the interviews to identify different coping strategies and why they were preferred or had emerged. To allow the reader to assess our interpretations and conclusions, we report excerpts from the interviews (Kirk & Miller, 1986).

Findings

In this section, we report the findings regarding how actors close to harvest think and act in order to cope with supply uncertainty. We first report how the managers perceived the supply situation and then report how they cope with this particular type of environmental uncertainty.

Perceptions of the Supply Situation

All the ten managers expressed concerns about the supply situation. For example, one manager stated:

> If it had been so easy that we got as much raw material as we wanted every week, then it would have been easy to define our market. But here it goes in "waves", Our Lord gives us poor weather in the best fishing season [which prevents boats going out fishing]… (…) for us flexibility is the key word. (…) My job is, every day, to find out how to manage people, fish and products as best I can. One day it's best to pack the fish fresh and the next day it's better to produce salted fish. (…) so in a way market orientation is about adjusting to Our Lord.

This quote shows that the supply situation this firm faces is a highly volatile one. The same manager also explained the particular difficulties and uncertainties confronted in securing adequate supply, i.e.:

> …It is not only the difficulties involved in getting supply, it must also be of the right type [i.e. so that it allows for the most profitable production], and in the right volume, at the right time.

Inspection of this quote shows that this firm has difficulties in getting the volumes it needs, but also indicate that the supplies might not be of the "right" type. An important factor, which seems to amplify supply uncertainty, is the way the fish is caught. For example, several of the firms studied get their supply primarily from small coastal fishing vessels. Such vessels are prevented from fishing when weather conditions are poor, which is often the case during the winter season in this part of the country (Northern Norway), which happens to be the best fishing season. Another characteristic of the small fishing vessels is that they employ a range of different types of fishing equipment (e.g. fishing nets and long-lines), which influences the quality of the catch they deliver, as well as what type of fish (i.e. species) they catch. For example, fish caught by net has usually been dead for hours when it is taken on board the vessel, whereas other catch methods bring the fish on board while it is still alive. The type and quality of the fish delivered to the processing plants seems to restrict the type of output that can be made. The following quote underline this:

> If you don't know what you will get in, you sure don't know what you'll get out.

This quote reflects uncertainty regarding what the firm gets in and clearly shows that the firm's output is affected by the input. Another manager was more concrete, i.e.:

> A market-oriented firm runs its production according to what the market wants. But it also depends on the raw material. Now we produce small saithe, which has not been bled. This [poor quality] raw material puts strong limits on what we can produce. For example, it cannot be sold in the fresh fish market.

This particular type of fish (saithe) has been landed by purse seine, a very cost-effective type of fishing. This method, however, results in poor quality fish because it is impossible to bleed the fish due to a combination of large volumes and low on-board capacity to handle the fish.

After being processed (usually filleted and salted), the fish is exported as one of the lowest-priced items in the Norwegian export of whitefish products.

Our discussions with the managers showed that the supply situation was perceived as volatile and difficult to predict. For several of the managers, the supply situation strongly influenced their thinking about how to run their businesses. How then do the managers (firms) cope with uncertain supply? We observed that firms try to cope with this particular type of environmental uncertainty, either by trying to: (1) control what will happen to their inputs, (2) adjust to changes they cannot control, or (3) reduce or "buffer" the effects of supply uncertainty in the output market (cf. Katz & Kahn, 1978). We first discuss strategies that aim to control the supply of raw material.

Controlling Uncertain Supply

In the theoretical discussion, we indicated that vertical, backward integration is a way of securing the necessary supply, but also that it might not be particularly relevant here – in a highly competitive market. In spite of this, seven of the ten firms studied here have integrated into the fishing fleet. One of these has majority ownership. Here, the manager reported that the firm gets 50 per cent of its supply from own vessels. The other six firms have minority investments, which only helps securing a small part of their total supply. This observation corresponds with the findings of a recent study of vertical backward integration in the Norwegian fish processing industry. Here it was found that 50 out of 75 firms (67%) had integrated backwards by investing in fishing vessels and that only 4 out of the 50 firms (8%) with ownership got more than 50 per cent of their total supply from their own vessels (Dreyer *et al.*, 1998). Thus, in this context, vertical backward integration does not appear to be particularly effective in terms of securing supply. There may be several reasons for this. One explanation is that firms are not allowed to have majority interests in vessels (although as noted earlier, some exceptions exist). Accordingly, few firms have the necessary control over vessels to decide where they should land their catch. Regardless of this, however, control over vessels only helps secure a certain share of the yearly catch (quota), which often differ considerably from one year to another. In addition, control over vessels do not lead to control over the *source* of this particular type of uncertainty, i.e. unpredictable variations due to biological, oceanographic and climatic conditions.

Why then do firms make investments in vessels? Normally, one might expect such investments to be profit motivated. However, return on such investments is very modest, which makes it almost impossible to attract professional investors. The motive seems to be to

establish and maintain relationships, and thus through "credible commitment" (see e.g. Ghemawat, 2000, pp.121-124) to signal trust and create social ties assumed to be useful to secure supply. This was also supported by the observation that some of the firms gave loans to fishers for new vessel investments. One manager justified loans to vessels in this way: "We want to keep them [the fishing vessels] here". Thus, for some firms, local supply was considered of utmost importance. Close, social relationships were believed to be beneficial in times when they were confronted with stiff competition for supply, and credible commitments were perceived as necessary to create mutual trust and obligations. An addition observation supporting this emphasis on social relationships and support is one of the managers' saying: "Yesterday I joined A (a fisher) to inspect his new vessel".

An interesting strategy aimed at controlling the input of raw materials has emerged through recent attempts to farm whitefish species such as cod, halibut and catfish. If successful, this strategy would compare to the situation in the salmon-farming industry, where firms produce (farm) their own raw materials under relatively controllable conditions (see e.g. Ottesen & Grønhaug, 2001). However, few commercial attempts to farm whitefish species can be considered successful (and none of the firms we visited had applied this strategy). This can probably be attributed to insufficient technology, especially for managing the early stages of this kind of farming. Interestingly, cod farming seems to get considerable attention every time there is a crisis in terms of sharply reduced fishing quotas, as is the case today. Accordingly, several major actors and government bodies are now making large investments in the farming of whitefish species. It should also be noted that one of the firms we visited farm salmon in combined with its main activity, i.e. the processing of whitefish. This is, however, a rather unusual combination in the seafood industry.

Adjusting to Uncertain Supply

Several coping strategies that aim to adjust or adapt to supply uncertainty were identified. For example, we observed that the development of flexible production was a strategy applied to adjust to uncertain supply, as reflected in the following quote:

> We have four production lines in order to be flexible with regard to the raw material.

It should be noted that the various production lines are suited to and demand different types of raw materials. This makes it possible for this producer to handle different types of fish (species) of variable quality. Thus, the development of product-mix flexibility can be

conceived as a response to variations in raw material type and quality (cf. Anderson, 1995). Previous research has shown that this type of flexibility is an important predictor of survival and success in this industry (Dreyer, 1998; Dreyer & Grønhaug, 2001). Another manager expressed a need to build the product mix around the character of supply (and demand), i.e.:

> We base our product mix on the limitations we have at both ends [i.e. the input and output markets] because there is often a discrepancy between the kind of supplies we get and what the market wants.

We also observed that some of the firms build their own buffer zone by developing stocks of raw materials. This primarily happens through freezing fresh fish or by purchasing and stocking large volumes of frozen fish blocks/fillets from freezer trawlers. This strategy has, however, several drawbacks. For example, it imposes storage costs and can be risky because the (global) market for frozen whitefish products is a highly competitive one with fluctuating prices. Thus, trying to "buffer" production can prove costly as one of the managers had so painfully experienced. At one point in time, his firm had bought a rather large quantity at relatively high prices. The demand for processed products then dropped, forcing the firm to sell at lower prices than their costs. It should also be noted that frozen raw materials have limited usage, e.g. they can no longer be sold in the fresh fish market.

Several of the firms also try to develop a portfolio of raw materials suppliers (fishing vessels) who exhibit different patterns of instability. For example, large seagoing trawlers can supplement small coastal vessels, which are vulnerable to poor weather conditions.

Furthermore, it was observed that firms apply "marketing tactics" to their buying (cf. Kotler & Levy, 1973). For example, a frequently observed strategy in times of raw material shortage is to offer a high price (Dreyer *et al.*, 1998). In addition, most of the firms compete in the raw material market by offering inducements in addition to the price (cf. Kotler & Levy, 1973), e.g. by offering various services to fishing vessels to make it more attractive to land the fish at a particular plant (and place). Such "services" may include the sales of necessary inputs for the vessels, such as bunker fuel and food, as well as facilities for the crew to stay overnight if needed. The managers also try to build informal relationships or social contracts (cf. Macneil, 1980) with boat owners, as indicated by the following quote:

> It is important [in order to secure supplies] to have good contact with each of the boats, but we do not have written contracts [for raw material delivery] with anyone.

Reducing the Effects of Supply Uncertainty in the Output Market

Several strategies were applied to "buffer" the effects of uncertain input factors in the output market. For example, firms were found to reduce the possible effects of uncertain input factors on their output by *avoiding* long-term contracts with customers, thus remaining flexible and steering clear of promises that might be difficult to fulfil.

Another strategy we observed was to educate customers about salient characteristics of the final product and its delivery, such as the high degree of perishability and seasonal variations in deliveries of fresh seafood products. This is illustrated in the following quotes:

> We often bring our customers here to learn from them. This also puts them in a position to understand our problems better, for instance, the seasonal variations.

> We have to go to the buyers and sell the argument that fisheries are seasonal (…) however, when we go further down the market we often wonder whether those who decide know what this is all about – that it is a natural product we are talking about.

Attempts to educate the customer have also been observed in the Norwegian salmon-farming industry (Ottesen & Grønhaug, 2001). Here, a firm with a large contract with a major Japanese customer supports this relationship by means of a web-based software package developed for exclusive mutual exchange of information. According to the top manager, this program is important as an educational device for teaching the customer about the constraints and challenges of dealing with a biological raw material. The software allows the customer to follow the management (e.g. feeding regime) and subsequent development of quality attributes which are measured weekly (e.g. size composition of batch, fat content, flesh colour). In due time, this particular batch of salmon (separate cages) will be sold to this particular customer.

Finally, we observed that several of the managers, in striving to exhibit purposeful behaviours in the marketplace, try to benefit from understanding and anticipating the fluctuations in supply. Close inspection of a quote from one of the managers presented earlier, indicates this, i.e.: "If you don't know what you will get in, you sure don't know what you'll get out." Another manager was more explicit when we asked him what kind of information was important for a market-oriented firm. He gave this answer:

> It's the latest news – it is the jungle telegraph and it is about being awake and creative. That's all. There is no point in selling a lot of saithe if you do not know that the quota

> is just about to be fished [which means that fishing will be stopped] – that's because in this particular fishery we often write sales contracts with our customers before the fish has been caught. I get information when I speak with the fishers, the exporting firms, FNL [a producer organisation], through the media, and friends.

Inspection of this quote shows that information about the supply situation is emphasised and that it can prove crucial in terms of market behaviours. Several other managers emphasised the need for information about the supply situation in order to initiate adequate market actions. One of the managers in a firm selling standardised products in a highly competitive market, provided an elaborate example of how a sudden and unexpected lack of raw materials had resulted in substantial market fluctuations. This involved a short-term price increase of 50 per cent followed by "consumers reducing their consumption by 20 per cent, which in turn led prices to hit the absolute bottom."

Discussion

The reported study revealed that firms exposed to highly unpredictable supply environments apply a variety of strategies to secure vital input factors. These strategies are summarised in Table 1.

Table 1. Coping Strategies and Scope

Coping Strategies	Scope
-Majority ownership in vessels -Minority ownership in vessels -Loans to fishers -Marketing tactics -Social contracts	-Secure share of catch
-Build stocks of raw materials -Build a portfolio of suppliers -Farming of salmon	-Buffer supply fluctuations
-Flexible production	-Adjust to variation in type and quality of the raw material
-Information about supply -Avoid long-term contracts with downstream customers -Educate customers	-Reduce the effect of input uncertainty in the output market

Most of the firms rely on a combination of two or more strategies but varied greatly in their choice of strategies – or rather their portfolio of strategies. For example, one firm relied mainly on majority ownership in fishing vessels to cope with uncertain supply, while another

firm relied on minority investments in vessels, combined with social contracts and information about the supply situation.

How can the large diversity in strategies between firms be explained? Several factors may shed light on this question. One explanation is that uncertainty regarding supply is ambiguous and relates to different issues such as uncertainty regarding volume availability or the quality of the acquired raw material. Accordingly, different strategies are applied to cope with different types of supply uncertainty. For example, through vertical integration firms aim to secure their share of the catch, whereas flexible production primarily is applied to handle different types and qualities of raw material. Thus, the type of supply uncertainty can to some extent explain a combination of strategies. However, inspection of Table 1 shows that many of the strategies overlap in their scope, which indicate that there are other factors at play here. One such factor can be that actors perceive "the problem of securing supply" differently, and thus that their mental models of how to cope with uncertain supply differ. As indicated in the theoretical discussion, such differences can be expected when managers vary in their immediate contexts and activities as was the case here (cf. Day & Nedungadi, 1994; Dearborn & Simon, 1958; Rosch *et al.*, 1976). It should also be noted that, in a turbulent supply environment where a "correct" strategy probably does not exist, the different actors are likely to experiment with new ways to cope. However, since a right strategy does not exist, such learning may be slow, which may explain the wide range of strategies.

In the theoretical discussion at the beginning of the article, we focused on vertical integration as a means of securing uncertain supply. In this study, we found that vertical integration is central in the managers' understanding of how to cope with uncertain supply. This corresponds well with the findings of Dreyer *et al*. (1998), who reported that "control over supply" was the main motive for backwards integration. The same research showed that 85% of the firms included in the study (N=72) considered investing in (more) vessels in the future. However, in most cases, backward vertical integration only helps secure a small fraction of the necessary supplies. Together, these observations indicate that the concept of vertical integration has been adopted and applied more or less disconnected from the realities of the present context. Here, firms are not allowed to have majority ownership in vessels, and they face a type of primary uncertainty that is impossible to control *per se*, i.e. the supply situation is in the hands of "Our Lord" as one of our informants put it.

References

Anderson, S.W. (1995). Measuring the impact of product mix heterogeneity on manufacturing overhead cost, *The Accounting Review*, 70(3), 363-387.

Campbell, D.T. (1975). "Degrees of freedom" and the case study, *Comparative Political Studies*, 8(2), 178-93.

Day, G.S., & Nedungadi, P. (1994). Managerial representations of competitive advantage, *Journal of Marketing*, 58(April), 31-44.

Dearborn, D.C., & Simon, H.A. (1958). Selective perception: A note on the departmental identification of executives, *Sociometry*, 21,140-144.

Dreyer, B. (1998). Kampen for tilværelsen - et studium av overlevelsesstrategier i fiskeindustrien. Unpublished PhD thesis, Norwegian College of Fishery Science, University of Tromsø.

Dreyer, B., Bendiksen, B.I., Iversen, A., & Isaksen, J.R. (1998). Vertical integration - is that the way to go? Tromsø, Norwegian Institute of Fisheries and Aquaculture AS, Tromsø.

Dreyer, B., & Grønhaug, K. (2001). Uncertainty, flexibility and sustained competitive advantage, fortcoming in *Journal of Business Research*,

Dreyer, B., Isaksen, J.R., & Grønhaug, K. (2001). *The art of vertical integration - profitability considerations*. Collaboration in Logistics, Proceedings of the 13th NOFOMA Conference, Reykjavik, Iceland.

Ghemawat, P. (2000). *Strategy and the Business Landscape*. New Jersey: Prentice-Hall.

Huber, G.P., & Daft, R.L., (1987). The information environments of organizations. In F. M. Jablin, L. Putnan, K. Roberts and L. Porter (eds.)*, Handbook of Organizational Communication: An Interdisciplinary Perspective*. Newbury Park: Sage.

Johnson-Laird, P.N. (1983). *Mental Models: Towards a Cognitive Science of Language, Inference, and Consciousness*. Cambridge: Cambridge University Press.

Katz, E., & Kahn, R.L. (1978). *The Social Psychology of Organizations*. New York: Wiley.

Kirk, J., & Miller, M.L. (1986). *Reliability and Validity in Qualitative Research*. Newbury Park: Sage.

Kotler, P., & Levy, S. (1973). Buying is marketing too!, *Journal of Marketing*, 37(January), 54-59.

Macneil, I.R. (1980). *The New Social Contract - An Inquiry into Modern Contractual Relations*. New Haven: Yale University Press.

Miller, D., & Shamsie, J. (1999). Strategic responses to three kinds of uncertainty: Product line simplicity at the Hollywood film studios, *Journal of Management*, 25(1), 97-116.

Ottesen, G.G., & Grønhaug, K. (2001). Market orientation and uncertain supply in upstream markets: an exploratory study, Paper under review for *European Journal of Purchasing and Supply Management*.

Porter, M.E. (1980). *Competitive Strategy*. New York: The Free Press.

Prochaska, F.J. (1984). Principal types of uncertainty in seafood processing and marketing, *Marine Resource Economics*, 1(1), 51-66.

Rosch, E., Mervis, C.B., Gray, W.D., & Johnson, D.M. (1976). Basic objects in natural categories, *Cognitive Psychology*, 8,382-439.

Sanford, A.J. (1987). *The Mind of Man: Models of Human Understanding*. Brighton: Harvester Press.

Sutcliffe, K.M., & Zaheer, A. (1998). Uncertainty in the transaction environment: An empirical test, *Strategic Management Journal*, 19(1), 1-23.

Thomson, J.D. (1967). *Organizations in Action*. New York: McGraw-Hill.

Williamson, O.E. (1975). *Markets and Hierarchies - Analysis and Antitrust Implications*. New York: The Free Press.

Young, J.A. (1987). Marketing in a dynamic environment: An overview of the UK fish processing industry, *Food Marketing*, 3(1), 144-161.